PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

Assignment ID: PATI1355089

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
ESS-Help, Inc.	09/16/2025

RECEIVING PARTY DATA

Company Name:	Emergency Safety Solutions, Inc.
Street Address:	313 Lilac Street
Internal Address:	Ste. 1B
City:	Houston
State/Country:	TEXAS
Postal Code:	77099

PROPERTY NUMBERS Total: 25

Property Type	Number
Application Number:	14933881
Application Number:	15280393
Application Number:	16359767
Application Number:	17153830
Application Number:	18132840
Application Number:	16878185
Application Number:	16878195
Application Number:	19092534
Application Number:	17334309
Application Number:	16710659
Application Number:	16710669
Application Number:	18581159
Application Number:	17156496
Application Number:	17317822
Application Number:	17499593
Application Number:	16834547
Application Number:	17493441
Application Number:	18617646
Application Number:	16991595

HAAS - **Ex. 1003**
IPR2027-00016
HAAS, Inc. *v.* Emergency Safety Solutions, Inc.

Property Type	Number
Application Number:	18890063
Application Number:	17718636
Application Number:	18238809
Application Number:	19212092
Application Number:	63729784
Application Number:	63788753

CORRESPONDENCE DATA

Fax Number:

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: +1(918)595-4800
Email: iplaw@gablelaw.com
Correspondent Name: David G. Woodral
Address Line 1: 110 North Elgin Avenue
Address Line 2: Ste. 200
Address Line 4: Tulsa, OKLAHOMA 74120

ATTORNEY DOCKET NUMBER:	012644
NAME OF SUBMITTER:	Jennalee Phillips
SIGNATURE:	/Jennalee Phillips/
DATE SIGNED:	10/21/2025
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 5
source=US Patent Assignment#page1.tiff
source=US Patent Assignment#page2.tiff
source=US Patent Assignment#page3.tiff
source=US Patent Assignment#page4.tiff
source=US Patent Assignment#page5.tiff

INTELLECTUAL PROPERTY ASSIGNMENT

WHEREAS, ESS-HELP, Inc., a Texas corporation, located at 6922 Blandford Lane, Houston, Texas 77055, (hereinafter referred to as "ASSIGNOR") is the current assignee of certain inventions, technology, patents, and pending patent applications as described in the patents and pending patent applications reflected in Schedule A hereto (and collectively referred to as the Intellectual Property); and

WHEREAS, Emergency Safety Solutions, Inc., a Texas Corporation, located at 313 Lilac Street, Ste. 1B, Houston, Texas 77099, (hereinafter referred to as "ASSIGNEE"), is desirous of acquiring the entire right, title and interest in and to the Intellectual Property;

NOW, THEREFORE, this indenture witnesseth that for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, ASSIGNORS have sold, assigned, transferred and set over and do hereby sell, assign, transfer and set over to ASSIGNEE the Intellectual Property and any and all utility, conversion, continuations, continuations-in part, or other applications subsequently filed based thereon or claiming the benefit thereof, any divisions, continuations, continuations-in-part, or requests for continued examination thereof, any and all resultant Letters Patent of the United States, its territorial possessions, and any and all foreign countries which may be granted therefor, and any and all extensions, reissues or certificates of reexamination of any and all of the foregoing, including all rights of priority and the subject matter of any and all claims which may be obtained in every such patent, the same to be held and enjoyed by ASSIGNEE for its own use and benefit, and for the use and benefit of its successors, assigns or other legal representatives, to the end of the term or terms for which such Letters Patent are or may be granted, extended, reissued or reexamined as fully and entirely as the same would have been held and enjoyed by ASSIGNORS if this assignment had not been made.

ASSIGNOR hereby authorize and request the Commissioner of Patents to issue any and all Letters Patent of the United States resulting any Intellectual Property or application subject to this Assignment to ASSIGNEE, and ASSIGNOR hereby covenant that ASSIGNOR have full right to convey the entire interest herein assigned, and that ASSIGNOR have not executed and will not execute any agreement in conflict herewith.

ASSIGNOR further hereby covenants and agrees that ASSIGNOR will, at any time, upon request and at the expense of ASSIGNEE, execute and deliver any and all papers that may be necessary or desirable to perfect the title to any Intellectual Property, patent, or application subject to this Assignment to ASSIGNEE, its successors, assigns, or other legal representatives, and that if ASSIGNEE, its successors, assigns, or other legal representatives shall desire to file any utility, conversion, division or continuation application, or to secure an extension, reissue or reexamination of Intellectual Property, patent, or application subject to this Assignment, or to file a disclaimer relating thereto, will, upon request, sign all papers, make all rightful oaths, and do all requisite acts for the filing of such utility, conversion, division, continuing, or reissue application, request for continued examination, request for reexamination or disclaimer, without further compensation.

AND, ASSIGNOR further agrees to communicate to ASSIGNEE, its successors, assigns, or other legal representatives, such facts relating to the Intellectual property, patents, and applications subject to this Assignment as may be known, and to testify as to such facts when requested to do so.

Executed by the undersigned on the date indicated.

for **ESS-Help, Inc.**

Name: DAVID M. TUCKER

Title: PRESIDENT & CHAIRMAN

09/16/2025
Date

Executed by the undersigned on the date indicated.

for **EMERGENCY SAFETY SOLUTIONS, INC.**

Name: DAVID M. TUCKER

Title: PRESIDENT & CHAIRMAN

09/16/2025
Date

JOSEPH MAGRI
Commission # HH 234012
Expires: July 2, 2026
Notary Public - State of Florida

State of Florida · County of Broward
The foregoing document was acknowledged before me on this 16th day of September 25

Notary

SCHEDULE A

Title	Country	Application Serial Number	Filing Date	Patent Number	Date Issued
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	14/933,881	11/5/2015	9,481,331 B1	11/1/2016
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	15/280,393	9/29/2016	9,616,810 B1	4/11/2017
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	16/359,767	3/20/2019	11,021,117	6/1/2021
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	17/153,830	1/20/2021	11,524,638	12/13/2022
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	18/132,840	4/10/2023		
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	16/878,185	5/19/2020	11,332,088	5/17/2022
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	16/878,195	5/19/2020	12,263,784	4/1/2025
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	19/092,534	3/27/2025		
ENHANCED COMMUNICATION SYSTEM FOR VEHICLE HAZARD LIGHTS	US	17/334,309	5/28/2021	11,511,686	11/29/2022
ENHANCEMENT OF VEHICLE HAZARD SYSTEMS	US	16/710,659	12/11/2019	10,870,390 B2	12/22/2020
ENHANCED OPERATION OF VEHICLE HAZARD AND LIGHTING COMMUNICATION SYSTEMS	US	16/710,669	12/11/2019	11,904,765	2/20/2024

Title	Country	Application Serial Number	Filing Date	Patent Number	Date Issued
ENHANCED OPERATION OF VEHICLE HAZARD AND LIGHTING COMMUNICATION SYSTEMS	US	18/581,159	2/19/2024		
CONTROL OF HIGH VISIBILITY VEHICLE LIGHT COMMUNICATION SYSTEMS	US	17/156,496	1/22/2021	11,590,887	2/28/2023
HIGH VISIBILITY LIGHTING FOR AUTONOMOUS VEHICLES	US	17/317,822	5/11/2021	11,518,298	12/6/2022
CONTROL OF HIGH VISIBILITY VEHICLE LIGHT COMMUNICATION SYSTEMS	US	17/499,593	10/12/2021	11,981,254	5/14/2024
REMOTE VEHICLE HAZARD AND COMMUNICATION BEACON	US	16/834,547	3/30/2020	11,135,968	10/5/2021
REMOTE VEHICLE HAZARD AND COMMUNICATION BEACON	US	17/493,441	10/4/2021	11,938,862	3/26/2024
REMOTE VEHICLE HAZARD AND COMMUNICATION BEACON	US	18/617,646	3/26/2024		
SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	US	16/991,595	8/12/2020	12,109,938	10/8/2024
SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	US	18/890,063	9/19/2024		
SYSTEM FOR ENHANCED CONSPICUITY OF DELIVERY VEHICLES	US	17/718,636	4/12/2022		
VEHICLE DIGITAL ALERTING SYSTEM	US	18/238,809	8/28/2023		

Title	Country	Application Serial Number	Filing Date	Patent Number	Date Issued
ENCHANCED OPTICAL EMERGENCY SIGNALING AND COMMUNICATIONS FOR TRAILERS	US	19/212,092	5/19/2025		
SYSTEM AND METHOD FOR AUTONOMOUS VEHICLE ALERTING	US	63/729,784	12/9/2024		
ALERTING SYSTEM FOR AUTOMOBILES	US	63/788,753	4/14/2025		

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

28827 7590 10/08/2024

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

EXAMINER	
SHAFI, MUHAMMAD	

ART UNIT	PAPER NUMBER
3663	

NOTIFICATION DATE	DELIVERY MODE
10/08/2024	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

iplaw@gablelaw.com

APPLICATION NO.	ISSUE DATE	PATENT NO.
16/991,595	08-Oct-2024	12109938

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit https://www.uspto.gov/electronicgrants

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	10/08/2024	12109938	012644_00013_PRV_UTL	6990

28827 7590 09/18/2024

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at https://patentcenter.uspto.gov/. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at https://certifiedcopycenter.uspto.gov/index.html. The Certified Copy Center may be reached at (800)972-6382.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 150 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Center (https://patentcenter.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional inventors):

DAVID M. TUCKER, Katy, TX;
STEPHEN T. POWERS, Houston, TX;
MIKE INCORVAIA, Hendersonville, TN;
AUSTIN REECE TUCKER, Katy, TX;

APPLICANT(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional applicants):

ESS-HELP, INC., Houston, TX;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
Change(s) applied to document, /AG/ 6/11/2024	1	1702CHE2005	IN		2007-09-14	Deepa, et al.		☐
	2	2005170311	JP	A	2005-06-30	Kazuhiko et al		☒
	3	2016222171	JP	A	2016-12-28	Oooka et al		☐
	4	2018536569	JP	A	2015-12-21	Janesick		☐
	5	H00439939	JP	U	1992-04-06	Jitsugan		☐
	6	WO2002011100		A1	2001-07-28	Kussmann		☒

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	AL-SULTAN, ET AL., "A comprehensive survey on vehicular Ad Hoc network", Journal of Network and Computer Applications, 06/20/2012, Page(s) 380-392, Volume 37, Publisher: Elsevier Ltd.	☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.A/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

	9	2009012554	JP	A	2009-01-22	Yamazaki		
/T.S./	10	2013133071	JP	A	2013-07-08	AZUMA TOSHIHIKO		
/T.S./	11	1020030015908	KR		2003-02-26	JUHEE, et al.		
/T.S./	12	1020120048948	KR		2012-05-16	LEE		
/T.S./	13	1020120106036	KR		2012-09-26	PARK		
/T.S./	14	2019970032975U	KR		1997-07-26	KIA MOTORS CORPORATION		
/T.S./	15	2019980031131	KR		1998-08-17	MIN-CHEOL SHIN		
/T.S./	16	0100446	WO	A1	2001-01-04	ALBERT		
/T.S./	17	2004018256	WO	A1	2004-03-04	McKINLEY BOOMERSHINE		
/T.S./	18	2008056186	WO	A1	2008-05-15	HEYWOOD, et al.		
/T.S./	19	WO2011154691	WO	A1	2011-12-15	PARFITT		

Change(s) applied to document.
/A.G./
6/1 /2024

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	20	US7113107	B2	2006-09-26	Taylor	
	21	US7679505	B1	2010-03-16	Vallaire	
	22	US8032273	B2	2011-10-04	Yang, et al.	
	23	US8223037	B2	2012-07-17	Grotendorst et al.	
Change(s) applied to document, /A.G./ 6/11/2024	24	US8275347	B2	09/2012	Sennett, et al.	
	25	US8483651	B1	2013-07-09	Zamora et al.	
	26	US8738025	B2	2014-05-27	Hampel, et al.	
	27	US9111447	B2	2015-08-18	Holland	
	28	US9224294		2015-12-29	St. John	
	29	US9398619	B1	2016-07-19	Sennett, et al.	
	30	US9980108	B2	2018-05-22	Hepworth, et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.A/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ESS-Help, Inc. Inventor(s): TUCKER, et al. Application No.: 16/991,595 Filed: 08/12/2020 Title: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS Attorney Docket No.: 012644_00013_PRV_UTL	Confirmation No.: 6990 Art Unit: 3663 Examiner: Muhammad Shafi

Commissioner for Patents
Box 1450
Alexandria, VA 22313-1450

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

Dear Sir:

The Applicant gratefully acknowledges allowance of the case by the Examiner, but affirmatively denies any acquiescence to the Statement(s) of Reasons for Allowance. The Applicant respectfully submits that the allowed claims meet the requirements of patentability over the art of record, and it is on this basis that the patent grant is proper. The Applicant traverses any view that the patentability of the claims was required by any particular feature, or by all of the features, set forth in the allowed claims.

Thus, the statements and characterizations by the Examiner with regard to the reasons for allowance are expressly denied and will have no preclusive effect on the construction and scope of the claims.

Respectfully submitted,

Date: September 9, 2024

/david g. woodral/

David G. Woodral, Registration No. 57277
GABLE GOTWALS
1100 ONEOK Plaza
100 West Fifth Street
Tulsa, OK 74103
Telephone: (918) 595-4800
Fax: (918) 595-4990

Customer No. 28827

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	**09/09/2024 11:14:29 AM Z ET**	**012644_00013_PRV_UTL**

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	Jennalee Phillips
PATENT CENTER #	67093218	FILING DATE	08/12/2020
CUSTOMER #	28827	FIRST NAMED INVENTOR	DAVID M. TUCKER
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	David Woodral

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
Comments on Statement of Reasons for Allowance.pdf	2	Post Allowance Communication - Incoming	90 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
Comments on Statement of Reasons for Allowance.pdf	3F0C48C4B04490E91B0B6D150AFE362E5F1823BD612B7F853 9EB66D46A79C4B684C2A77DD0796EF285504DF0A23EC1C59 B82D1A123D8B3144B6079CB99057B00

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	**09/05/2024 12:18:12 PM Z ET**	**012644_00013_PRV_UTL**

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	David Woodral
PATENT CENTER #	67054362	AUTHORIZED BY	-
CUSTOMER #	28827	FILING DATE	08/12/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	DAVID M. TUCKER

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 2001	**E202495C18336071**	**David Woodral**

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2501	UTILITY ISSUE FEE	480.00	1	480.00
			TOTAL AMOUNT:	**$480.00**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	**09/05/2024 12:18:12 PM Z ET**	**012644_00013_PRV_UTL**

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	David Woodral
PATENT CENTER #	67054362	FILING DATE	08/12/2020
CUSTOMER #	28827	FIRST NAMED INVENTOR	DAVID M. TUCKER
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
web85b.pdf	3	Issue Fee Payment (PTO-85B)	58 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
web85b.pdf	10CF85D7369304F7438B76FC56100575A0D99DE32FAA494615 8D23E04EB70826009A0C2A3126DE225C69119E92AB7A16619 F9D101F64B315698F1F2193EEE1B2

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If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ISSUE FEE TRANSMITTAL FORM

APPLICATION #	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET #
16991595	08/12/2020	DAVID TUCKER	012644_00013_PRV_UTL

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Nonprovisional Application under 35 USC 111(a)	DATE DUE	11/29/2024
CONFIRMATION #	6990	ISSUE FEE DUE	$ 480
EXAMINER	MUHAMMAD SHAFI	PUBLICATION DUE	$ 0
GROUP ART UNIT	3663	TOTAL FEES DUE	$480
CLASS - SUBCLASS	701/117000	PREV. PAID FEE	$ 0
ENTITY STATUS	Small		

1. CHANGE OF CORRESPONDENCE ADDRESS AND/OR INDICATION OF FEE ADDRESS (37 CFR 1.33 & 1.363)

Correspondence Address

CURRENT ADDRESS

Maintenance Fee Address

CURRENT ADDRESS

☐ Change of correspondence address requested,system generated AIA/122-PC form attached

☐ Fee address indication requested, system generatedSB/47-PC form attached

2. ENTITY STATUS

Change in Entity Status

NEW STATUS

3. THE FOLLOWING FEES ARE SUBMITTED

☑ Issue Fee

☑ Publication Fee

4. FEE AUTHORIZATION

☐ I authorize USPTO to apply my previously paid issue fee to the current fees due

☐ The Director is herby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number:

☑ If in addition to the payment of the issue fee amount submitted with this form, there are any discrepencies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number: 501971

5. FIRM AND/OR ATTORNEY NAMES TO BE PRINTED

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

GableGotwals
David G. Woodral

6. ASSIGNEE NAME(S) AND RESIDENCE DATA TO BE PRINTED

NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a susbstitute for filing an assignment.

Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via Patent Center on the date indicated below.

Signature	Name	Registration #	Date
/david g. woodral/	David Woodral	57277	09/05/2024

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

28827 7590 08/28/2024

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

EXAMINER	
SHAFI, MUHAMMAD	
ART UNIT	**PAPER NUMBER**
3663	

DATE MAILED: 08/28/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

TITLE OF INVENTION: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	11/29/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

28827 7590 08/28/2024

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

TITLE OF INVENTION: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	11/29/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
SHAFI, MUHAMMAD	3663	701-117000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via the USPTO patent electronic filing system ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

28827 7590 08/28/2024

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

EXAMINER	
SHAFI, MUHAMMAD	
ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 08/28/2024

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).
https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 16/991,595	Applicant(s) TUCKER et al.	
	Examiner MUHAMMAD SHAFI	Art Unit 3663	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to RCE filed on 07/22/2024.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 26-28,30-33 and 35 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 07/22/2024.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☑ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/MUHAMMAD SHAFI/
Primary Examiner, Art Unit 3663

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed on ***07/22/2024*** in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on ***07/22/2024*** has been entered.

Therefore, Claims 26-28, 30-33 and 35 are pending and have been considered below.

ALLOWANCE

Notice of Pre-AIA or AIA Status

2. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Information Disclosure Statement

3. IDS submitted on 07/22/2024 has been considered and entered.

Allowable Subject Matter

4. Remaining Claims **26-28, 30-33 and 35 are allowed**.

REASONS FOR ALLOWANCE

5. The following is an examiner's statement of reasons for allowance:

The Closest Prior Art of records, Karapantelakis (USP 2021/0287543) ***teaches,*** methods, apparatus and computer-readable mediums are provided in a wireless network for the early notification of a vehicular accident to wireless devices in the vicinity of the accident. A method comprises, in a network node of a wireless telecommunication system, responsive to reception of a distress signal by a radio access node, the distress signal generated automatically by a vehicle involved in an accident, initiating transmission, by the radio access node, of a warning signal containing an indication of the accident to one or more wireless devices.

The prior arts of record fail to teach, make obvious , or suggest, alone or in combination, a system for providing real time indication of a hazardous vehicle condition comprising: a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a first communication sent from the first vehicle to the server indicating the first vehicle is in a hazardous condition and a location of the first vehicle; wherein the server receives a second communication sent from a second vehicle to the server indicative of a location of the second vehicle; and wherein the server provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MUHAMMAD SHAFI whose telephone number is (571)270-5741. The examiner can normally be reached M-F 8:30 am -5:00 pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on 571-272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197

(toll-free). If you would like assistance from a USPTO Customer Service

Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MUHAMMAD SHAFI/
Primary Examiner, Art Unit 3663

Notice of References Cited	Application/Control No. 16/991,595	Applicant(s)/Patent Under Reexamination TUCKER et al.	
	Examiner MUHAMMAD SHAFI	Art Unit 3663	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-20150179066-A1	2015-06-25	Rider; Tomer	G08G1/165	701/31.5
*	B	US-20190202476-A1	2019-07-04	TAO; SHENG	B60W30/095	1/1
*	C	US-20190248364-A1	2019-08-15	Dastgir; Rana	B60W10/04	1/1
*	D	US-20100253499-A1	2010-10-07	Haab; Daniel B.	H05B47/18	340/471
*	E	US-20210287543-A1	2021-09-16	KARAPANTELAKIS; Athanasios	G08G1/205	1/1
*	F	US-10204517-B2	2019-02-12	Varoglu; Devrim	H04B17/318	1/1
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MUHAMMAD SHAFI	3663

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/12/2020	02/21/2023	05/31/2024	08/22/2024					
-	1	✓	✓	-	-					
-	2	✓	✓	-	-					
-	3	✓	✓	-	-					
-	4	✓	-	-	-					
-	5	✓	✓	-	-					
-	6	✓	✓	-	-					
-	7	✓	✓	-	-					
-	8	✓	✓	-	-					
-	9	✓	✓	-	-					
-	10	✓	✓	-	-					
-	11	✓	✓	-	-					
-	12	✓	✓	-	-					
-	13	✓	✓	-	-					
-	14	✓	-	-	-					
-	15	✓	-	-	-					
-	16	✓	-	-	-					
-	17	✓	-	-	-					
-	18	✓	-	-	-					
-	19	✓	-	-	-					
-	20	✓	-	-	-					
-	21	✓	-	-	-					
-	22	✓	-	-	-					
-	23	✓	-	-	-					
-	24	✓	-	-	-					
-	25	✓	-	-	-					
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2	27	✓	✓	=	=					
3	28	✓	✓	=	=					
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-	39	✓	-	-	-					
-	40	✓	-	-	-					
-	41		✓	-	-					

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MUHAMMAD SHAFI	3663

CPC - Searched*		
Symbol	**Date**	**Examiner**
(B60Q1/525 OR B60K35/00 OR B60Q1/46 OR B60Q9/008 OR B60W30/0956 OR B60W30/16 OR B60W50/14 OR G01S19/42 OR G08G1/162 OR G08G1/22 OR H04B1/3822 OR B60K35/23 OR B60K35/28 OR B60K2360/178 OR B60W2050/146 OR B60W2420/403 OR B60W2556/65 OR B60K35/85 OR B60K2360/1868 OR B60K2360/21 OR B60K2360/5915 OR B60K35/29 OR G08G1/205 OR B60W2556/45 OR B60W2556/50 OR B60K37/00 OR G08G1/0962 OR G08G1/096791).cpc.	08/22/2024	ms

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**
((G08G1/162 OR B60K35/00 OR B60Q1/30 OR B60Q1/46 OR B60Q9/008 OR B60W30/0956 OR B60W30/16 OR B60W50/14 OR G01S19/42 OR G08G1/22 OR H04B1/3822 OR B60K2370/1529 OR B60K2370/178 OR B60W2050/146 OR B60W2420/42 OR B60W2556/65 OR B60K2370/1868 OR B60K2370/193 OR B60K2370/21 OR B60K2370/5915 OR B60W2556/45 OR B60W2556/50 OR B60K37/00 OR G08G1/0962 OR G08G1/096791 OR B60Q1/525).cpc.)	08/15/2022	TS

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
701	117	02/21/2023	MA
701	117	08/22/2024	ms

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MUHAMMAD SHAFI	3663

Search Notes		
Search Notes	**Date**	**Examiner**
Performed Inventor and Assignee Search	08/15/2022	
Performed CPC search	08/15/2022	
Performed Text search	08/15/2022	
Combined CPC and text search	08/16/2022	
Refined Text search	08/16/2022	
Refined Text search	08/17/2022	
(Update search)	02/21/2023	MA
(Update search)	05/31/2024	MA
PE2E SEARCH	08/22/2024	ms
Inventor Search	08/22/2024	ms
Text Search	08/22/2024	ms
CPC Search	08/22/2024	ms

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
	Text search of: USPAT, USPGPUB.	05/31/2024	MA
	PG PUB CLAIM TEXT SEARCH--See Interference Search printout	08/22/2024	ms

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	**Art Unit**
	MUHAMMAD SHAFI	3663

CPC						
Symbol					**Type**	**Version**
B60Q	/	1	/	525	F	2013-01-01
G08G	/	1	/	162	I	2013-01-01
B60K	/	35	/	00	I	2013-01-01
G01S	/	19	/	42	I	2013-01-01
B60Q	/	9	/	008	I	2013-01-01
B60W	/	30	/	16	I	2013-01-01
B60W	/	50	/	14	I	2013-01-01
B60Q	/	1	/	46	I	2013-01-01
B60W	/	30	/	0956	I	2013-01-01
H04B	/	1	/	3822	I	2013-01-01
G08G	/	1	/	22	I	2013-01-01
B60W	/	2050	/	146	A	2013-01-01
B60W	/	2556	/	65	A	2020-02-01
B60W	/	2420	/	403	A	2013-01-01
B60K	/	35	/	23	A	2024-01-01
B60K	/	35	/	28	A	2024-01-01
B60K	/	2360	/	178	A	2024-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	8	
/MUHAMMAD SHAFI/ Primary Examiner, Art Unit 3663	22 August 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20240822

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MUHAMMAD SHAFI	3663

INTERNATIONAL CLASSIFICATION				
CLAIMED				
B60Q1/50	/	1	/	50
G08G1/16	/	1	/	16
B60K35/00	/	35	/	00
G01S19/42	/	19	/	42
B60Q9/00	/	9	/	00
B60W30/16	/	30	/	16
B60W50/14	/	50	/	14
B60Q1/46	/	1	/	46
B60W30/095	/	30	/	095
H04B1/3822	/	1	/	3822
G08G1/00	/	1	/	00
B60K35/23	/	35	/	23
B60K35/28	/	35	/	28

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
701	117

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					
B	6	0	Q	1	525	

NONE (Assistant Examiner) (Date)	Total Claims Allowed: 8	
/MUHAMMAD SHAFI/ Primary Examiner, Art Unit 3663 (Primary Examiner) 22 August 2024 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office Part of Paper No.: 20240822

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MUHAMMAD SHAFI	3663

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
-	1	-	10	-	19	3	28	-	37						
-	2	-	11	-	20	-	29	-	38						
-	3	-	12	-	21	4	30	-	39						
-	4	-	13	-	22	5	31	-	40						
-	5	-	14	-	23	6	32	-	41						
-	6	-	15	-	24	7	33								
-	7	-	16	-	25	-	34								
-	8	-	17	1	26	8	35								
-	9	-	18	2	27	-	36								

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 8	
/MUHAMMAD SHAFI/ Primary Examiner, Art Unit 3663 (Primary Examiner)	22 August 2024 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	450753	(B60Q1/525 OR B60K35/00 OR B60Q1/46 OR B60Q9/008 OR B60W30/0956 OR B60W30/16 OR B60W50/14 OR G01S19/42 OR G08G1/162 OR G08G1/22 OR H04B1/3822 OR B60K35/23 OR B60K35/28 OR B60K2360/178 OR B60W2050/146 OR B60W2420/403 OR B60W2556/65 OR B60K35/85 OR B60K2360/1868 OR B60K2360/21 OR B60K2360/5915 OR B60K35/29 OR G08G1/205 OR B60W2556/45 OR B60W2556/50 OR B60K37/00 OR G08G1/0962 OR G08G1/096791).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:40 PM
L2	5262	701/117.ccls.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:40 PM
L3	455168	L1 OR L2	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:40 PM
L4	873	((tucker) near2 (david)).in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT;	ADJ	ON	ON	2024/08/22 01:42 PM

			IBM_TDB)				
L5	325	((powers) near2 (stephen)).in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:42 PM
L6	87	((incorvaia) near2 (mike)).in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:42 PM
L7	66	((tucker) near2 (austin adj2 reece)).in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:43 PM
L8	1111	L4 OR L5 OR L6 OR L7	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:43 PM
L9	134	L3 AND L8	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:43 PM
L10	0	server near5 receiv$4 near5 (first adj2 communicat$4) near5 (first adj2 microprocessor) near5 (first adj2 vehicle) near5 (harzadous adj2 condition) near5 (second adj2 communication) near5 (second adj2 vehicle) near5 location	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:47 PM
L11	0	server near5 receiv$4 near5 (first adj2	(US-PGPUB; USPAT; USOCR; FIT (AU, AP,	ADJ	ON	ON	2024/08/22 01:49 PM

		communicat$4) near5 (first adj2 microprocessor) near5 (first adj2 vehicle) near5 (harzadous adj2 condition) near5 (second adj2 communication) near5 (second adj2 vehicle) near5 location SAME (third adj2 communication) SAME first SAME second SAME vehicle SAME (predetermined adj2 distance)	AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L12	0	L3 AND (server near5 receiv$4 near5 (first adj2 communicat$4) near5 (first adj2 microprocessor) near5 (first adj2 vehicle) near5 (harzadous adj2 condition) near5 (second adj2 communication) near5 (second adj2 vehicle) near5 location SAME (third adj2 communication) SAME first SAME second SAME vehicle SAME (predetermined adj2 distance))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:49 PM
L13	0	L8 AND (server near5 receiv$4 near5 (first adj2 communicat$4) near5 (first adj2 microprocessor) near5 (first adj2 vehicle) near5 (harzadous adj2 condition) near5 (second adj2 communication) near5 (second adj2 vehicle) near5 location SAME (third adj2 communication) SAME first SAME second SAME vehicle SAME (predetermined adj2 distance))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:49 PM
L14	7	("20030141990" OR "20100159871" OR "20100250111" OR "20100267379" OR "20120176254" OR	(US-PGPUB; USPAT)	ADJ	ON	ON	2024/08/22 01:50 PM

		"20120310517" OR "20140085107").pn.					
L15	0	L14 AND (server near5 receiv$4 near5 (first adj2 communicat$4) near5 (first adj2 microprocessor) near5 (first adj2 vehicle) near5 (harzadous adj2 condition) near5 (second adj2 communication) near5 (second adj2 vehicle) near5 location SAME (third adj2 communication) SAME first SAME second SAME vehicle SAME (predetermined adj2 distance))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	ADJ	ON	ON	2024/08/22 01:51 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	0	((server near5 receiv$4 near5 (first adj2 communicat$4) near5 (first adj2 microprocessor) near5 (first adj2 vehicle) near5 (harzadous adj2 condition) near5 (second adj2 communication) near5 (second adj2 vehicle) near5 location SAME (third adj2 communication) SAME first SAME second SAME vehicle SAME (predetermined adj2 distance))).clm.	(US-PGPUB; USPAT)	ADJ	ON	ON	2024/08/22 01:50 PM

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030141990		2003-07-31	Coon	
	2	20100159871		2010-06-24	Tester	
	3	20100250111		2010-09-30	Gutierrez, et al.	
	4	20100267379		2010-10-21	Stahlin, et al.	
	5	20120176254		2012-07-12	Imanaga, et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.S/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	6	20120310517		2012-12-06	van den Oever	
	7	20140085107		2014-03-27	Gutierrez	

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2010152648	JP	A	2010-07-08	Yukimasa et al		☒
	2	2014500550	JP	A	2014-01-09	Bennsoussan		☐
	3	2012071054	WO	A2	2012-05-31	Bennsoussan, et al.		☒

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/MUHAMMAD SHAFI/	Date Considered	08/22/2024

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.S/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.S/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2024-07-22
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.S/

(19)日本国特許庁(JP)　(12)公表特許公報(A)　(11)特許出願公表番号
特表2014-500550
(P2014-500550A)
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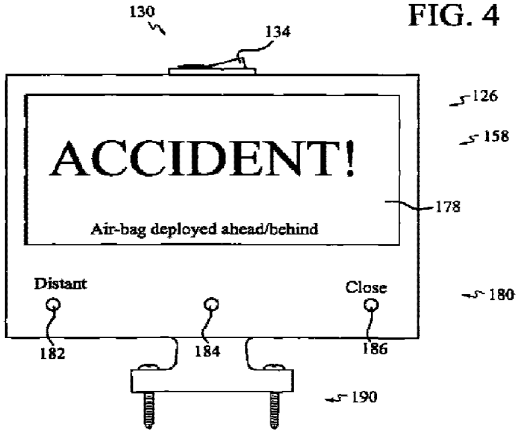
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(54)【発明の名称】車両のための危険警告システム

(57)【要約】
例えば、近くの車両が衝突状態にあるか、他の理由で運転不可能であるという、近くの危険の警告を車両運転者へ提供するようになっているシステム。実施形態は、危険を検出するように動作可能な検出器、警告信号を送信するための送信器、送信された警告信号を受信するための受信器、および接近する車両の運転者へ危険を警告するためのディスプレイを含む。いくつかの実施形態は、警告信号をブロードキャストするのに有効なトリガーを提供するために、車両のエアバッグ展開回路からのフィードバックを組み込む。接近する車両の運転者へ、視覚および／または可聴警告信号を、例えば、携帯電話によって提供できる。ある実施形態は、送信される警告信号と、接近する車両内に載せられたディスプレイおよび／またはスピーカとによって、接近する車両へかかる警告を提供する。可聴および視覚的警告は、クラッシュした車両から直接に送信できる。

FIG. 4



【特許請求の範囲】
【請求項１】
第１の車両に搭載されるように構築され、第１の危険を検出し、その結果として第１の出力をそこからもたらすようになっている第１の検出器、
前記第１の検出器と通信状態にあり、前記第１の出力を受信した後に第１の遠隔警告信号をそこからブロードキャストするように動作可能な第１の送信器、
前記第１の車両に搭載されるように構築され、別の送信器によって送信された外部遠隔警告信号を受信するように動作可能な第１の受信器、および
前記第１の受信器と動作可能な通信状態にあり、前記第１の車両の乗員へ警告を提供するように構成された第１のローカル警告デバイスであって、前記警告は、前記外部遠隔警告信号の受信に対応する、前記第１のローカル警告デバイス、
を備える、システム。
【請求項２】
第２の車両に搭載されるように構築され、第２の危険を検出し、その結果として第２の出力をもたらすようになっている第２の検出器、
前記第２の検出器と通信状態にあり、前記第２の出力を受信した後に第２の遠隔警告信号をブロードキャストするように動作可能な第２の送信器、
前記第２の車両に搭載されるように構築され、前記第１の遠隔警告信号および前記外部遠隔警告信号の少なくとも１つを受信するように動作可能な第２の受信器、ならびに
前記第２の受信器と通信状態にあり、前記第２の車両の乗員へ警告を提供するように構成された第２のローカル警告デバイスであって、前記警告は、前記第１の遠隔警告信号および前記外部遠隔警告信号の少なくとも１つに対応する、前記第２のローカル警告デバイス、
をさらに備える、請求項１に記載のシステム。
【請求項３】
前記第１の検出器および前記第２の検出器の少なくとも１つは、前記第１の車両または前記第２の車両のエアバッグ展開回路のコンポーネントからの入力を受信するために回路内に置かれた、請求項１または請求項２に記載のシステム。
【請求項４】
前記第１の車両および前記第２の車両の少なくとも１つに搭載されるように構築された警告灯であって、前記第１の出力または前記第２の出力に応答して、接近する車両の乗員に見えるように構成された警告灯出力をブロードキャストするようになっている前記警告灯
をさらに備える、請求項１または請求項２に記載のシステム。
【請求項５】
前記警告灯は、前記第１の車両または前記第２の車両の屋根の上に載せられるようになっている、請求項４に記載のシステム。
【請求項６】
前記警告灯は、ブレーキライト、方向指示ライト、テールライト、ランニングライト、フォグライト、およびヘッドライトからなる群から選択されたライトを備える、請求項４に記載のシステム。
【請求項７】
前記第１の車両および前記第２の車両の少なくとも１つに搭載されるように構築され、前記第１の出力または前記第２の出力に応答して、可聴警告をブロードキャストするようになっている警報
をさらに備える、請求項１または請求項２に記載のシステム。
【請求項８】
前記第１のローカル警告デバイスおよび前記第２のローカル警告デバイスの少なくとも１つは、出力メッセージを表示するように構成された画面を備える、請求項１または請求項２に記載のシステム。

【請求項９】
前記第１のローカル警告デバイスおよび前記第２のローカル警告デバイスの少なくとも１つは、前記第１の遠隔警告信号、前記第２の遠隔警告信号、および前記別の遠隔警告信号の少なくとも１つと関連する属性の、強度の範囲から選択された、前記瞬間強度を視覚により伝えるように構築された、請求項１または請求項２に記載のシステム。
【請求項１０】
前記第１のローカル警告デバイスおよび前記第２のローカル警告デバイスの少なくとも１つは、前記第１の遠隔警告信号、前記第２の遠隔警告信号、および前記別の遠隔警告信号の少なくとも１つと関連する属性の、強度の複数の異なった状態から選択された、強度のおよそ現在の状態を判定して、視覚により伝えるように構築され、
前記複数の音のそれぞれが強度の前記状態の１つに個別に割り当てられて、
前記システムと結合されたスピーカが、前記複数のうち、前記現在判定された状態に対応する少なくとも１つの音をブロードキャストするように構成された、
請求項９に記載のシステム。
【請求項１１】
前記第１のローカル警告デバイスおよび前記第２のローカル警告デバイスの少なくとも１つは、前記第１の遠隔警告信号、前記第２の遠隔警告信号、および前記別の遠隔警告信号の少なくとも１つに応答して、出力メッセージを表示するように構成された画面をさらに備える、請求項１０に記載のシステム。
【請求項１２】
前記メッセージは、前記第１の遠隔警告信号、前記第２の遠隔警告信号、および前記別の遠隔警告信号の少なくとも１つの特徴に基づいて予めプログラムされたメッセージの群から選択された、請求項１１に記載のシステム。
【請求項１３】
前記第１の遠隔警告信号および前記第２の遠隔警告信号の少なくとも１つのブロードキャストを停止するように動作可能なオーバーライド制御をさらに備える、請求項１または請求項２に記載のシステム。
【請求項１４】
前記オーバーライド制御は、前記第１の遠隔警告信号および前記第２の遠隔警告信号の前記少なくとも１つの第１のブロードキャスト後に予めプログラムされた期間が経過して初めて動作可能であるように構築された、請求項１３に記載のシステム。
【請求項１５】
前記第１の遠隔警告信号および前記第２の遠隔警告信号の少なくとも１つの送信範囲は、調節可能である、請求項１または請求項２に記載のシステム。
【請求項１６】
前記第１の送信器および前記第２の送信器の少なくとも１つは、前記第１の遠隔警告信号、前記第２の遠隔警告信号、および前記別の遠隔警告信号の少なくとも１つを再ブロードキャストするために動作可能に回路内に置かれた、請求項１または請求項２に記載のシステム。
【請求項１７】
前記第１の検出器および前記第２の検出器の少なくとも１つは、エアバッグ展開に応答して前記第１の出力または前記第２の出力を生成するように構成されたエアバッグ展開制御組立品のコンポーネントを備え、
前記第１のローカル警告デバイスおよび前記第２のローカル警告デバイスの少なくとも１つは、前記第１の受信器または前記第２の受信器と通信状態にあるディスプレイ・デバイスを備える、
請求項１または請求項２に記載のシステム。
【請求項１８】
前記ディスプレイ・デバイスは、前記第１の危険および前記第２の危険の少なくとも１つの場所への前記距離の見積もりを視覚により伝えるように構築され、

複数の可聴雑音のそれぞれが複数の離散的な距離見積もりの１つに個別に割り当てられて、
前記距離の前記見積もりに対応する前記雑音をブロードキャストするために、スピーカが前記システムと動作可能に結合された、
請求項１７に記載のシステム。
【請求項１９】
前記第１の検出器および前記第２の検出器の少なくとも１つは、衝突が発生したときに前記衝突を検出するようになっている、請求項１または請求項２に記載のシステム。
【請求項２０】
前記第１の送信器および前記第２の送信器の少なくとも１つは、前記第１の車両または前記第２の車両の運転者による始動の際に信号を送信し始めるように構成された、請求項１または請求項２に記載のシステム。
【請求項２１】
前記第１のローカル警告デバイスは、前記第１の車両が運転中であるときはいつでも動作するように構成された、請求項１に記載のシステム。
【請求項２２】
前記第１のローカル警告デバイスは、前記第１の車両の運転が停止した後に選択された期間にわたって動作し続けるように構成された、請求項２１に記載のシステム。
【請求項２３】
前記第１の送信器および前記第２の送信器の少なくとも１つは、選択された受信器へ信号を送信するように構成された、請求項１または請求項２に記載のシステム。
【請求項２４】
前記第１の検出器、前記第１の送信器、前記第１の受信器、および前記第１のローカル警告デバイスの少なくとも１つは、携帯電話を備える、請求項１に記載のシステム。
【請求項２５】
前記システムは、第２の遠隔警告信号をブロードキャストするように動作可能な第２の送信器をさらに備え、前記第２の送信器は、携帯電話を備える、請求項１に記載のシステム。
【請求項２６】
前記第１の危険にも前記第２の危険にも巻き込まれていない、少なくとも１つの車両の少なくとも１人の乗員へ警告を提供することを備える、請求項１または請求項２に記載の前記システムを使用する方法。
【請求項２７】
前記第１の出力および前記第２の出力の少なくとも１つの供給源に少なくとも１つのワイヤを接続することを備える、請求項１または請求項２に記載の前記警告システムを形成する方法。
【請求項２８】
前記第１の出力および前記第２の出力の少なくとも１つの供給源に少なくとも１つのワイヤを接続することは、前記第１の車両および前記第２の車両の少なくとも１つの診断プラグへの電気的接続を形成することを備える、請求項２７に記載の方法。
【請求項２９】
歩行者、道路作業者、公共施設作業者、および自転車乗用者の少なくとも１人に前記第２の送信器を装着されることを備える、請求項２５の前記システムを使用する方法。
【発明の詳細な説明】
【技術分野】
【０００１】
優先権の主張
本出願は、「モータービークルのためのクラッシュ警告システム（Ｃｒａｓｈ　Ｗａｒｎｉｎｇ　Ｓｙｓｔｅｍ　ｆｏｒ　Ｍｏｔｏｒ　Ｖｅｈｉｃｌｅ）」に関する、２０１０年１１月２４日出願の米国特許出願第１２／９２７，８４１号の出願日の利益を主張し、

その内容は、この参照により本明細書に組み込まれる。

【０００２】

本発明は、警告デバイスに関する。好ましい実施形態は、車両を巻き込んだ衝突のような、危険の発生を検出し、その後すぐに危険の近傍における車両運転者へかかる危険の警告をブロードキャストするようになっている。

【背景技術】

【０００３】

多くの特許および特許出願公開が、モバイル環境で用いることができる警告デバイスおよびシステムに関する構造および技術を開示する。本明細書で参照されるそれぞれまたは特許および公開は、参照によりその全体が本明細書に組み込まれる。２００９年４月２１日付の米国特許第７，５２３，０００号は、乗用車、静止タワーおよび人工衛星の間の通信のシステムを記載する。追突が予測されるときに、このシステムは、衝突を回避するために前の車両を加速する。

【０００４】

２００８年３月６日付の米国特許出願公開第２００８/００５５０６８（Ａ１）号は、ネットワーク過負荷を回避するために、モバイル・ノード間の警告メッセージを最適電力レベルでブロードキャストすることを記載する。通信デバイスは、危難を感知し、付近の車両へ転送すべき警告メッセージを発する。受信されたメッセージは、他の車両へ再送信できる。２０１０年６月３日付の米国特許出願公開第２０１０／０１３４２７１（Ａ１）号は、１つの乗用車から他への視覚警告システムを記載する。危険を見たドライバは、ボタンを押すことができる。その後、指示器が照らされ、指示器を見た他のドライバは、かくして危険を知ることになり、然るべく計画を立てることができる。警告は、無線で送信することもできて、同じように装備された乗用車を持つドライバは、たとえ他の乗用車の指示器を見ることができないときでも、車内警告を受信できる。

【０００５】

２０１０年５月６日付の米国特許出願公開第２０１０／０１１４４６７（Ａ１）号は、近くの車両がクラッシュした場合を、車両のスピードが正常範囲から外れたことを判定することによって、判定するためのセンサを持つ車両を記載する。この情報は、次に車両から車両への通信によって、あるいは点滅光によって他の車両へ送信できる。２０１０年５月６日付の米国特許出願公開第２０１０／０１１４４１８（Ａ１）号は、近くの車両が衝突した場合を、正常な車線外の車両の動きを判定することによって、判定するためのセンサを持つ車両を記載する。この情報は、次に車両から車両への通信によって、あるいは点滅光によって他の車両へ送信できる。

【０００６】

２０１０年１月２８日付の米国特許出願公開第２０１０／００２０１６９（Ａ１）号は、他の車両と通信するシステムを記載する。他の車両からの速度データに基礎づいて衝突が予測されたとき、このシステムは、衝突を回避するためにどこへ行く（例えば、車線を変更する）べきかドライバに指示する。２００７年３月２２日付の米国特許出願公開第２００７／００６３８２４（Ａ１）号は、道路の危険に関して、道路工事の送信器、緊急車両の送信器、または他の車両からデータを受信できるシステムを記載する。本システムは、他の車両へ信号を繰り返すこともできる。２００８年１１月６日付の米国特許出願公開第２００８／０２７５６１８（Ａ１）号は、前方の車両が正常よりゆっくりと動いているときにドライバに警告するための警告システムを記載する。車両は、それらの速度データを相互に送信し、速度の大きな食い違いがドライバへの警告を発生させる。危険信号状態（オンまたはオフ）あるいはトランクまたはドア位置（開または閉）のような、他の状況も送信できる。

【０００７】

２００１年１０月３１日公開の欧州特許第１１４９３７１（Ｂ１）号は、制限速度および減速バンプ・サイズを遠隔的に変更して、衝突情報を第１の応答者、交通取締り当局などへ報告するシステムを記載する。通信は、道路上またはその近くの固定点から警察へ、

必要に応じて次に特定の機動的な職員へのものである。

【０００８】

２００９年１１月１９日付の国際公開第２００９／１４０５１４（Ａ２）号は、相互に通信する一団の車両を記載する。後続車両は、先導車両からのデータに基づいて自律的に運転する。２０１０年５月２０日付の国際公開第２０１０/０５５５０９（Ａ１）号は、車両の状態に関わる情報を収集する車両サブシステムを記載する。情報は、遠隔中央サーバと通信され、このサーバは、危険情報を車両へ戻し、かつ他の車両へ送信する。

【０００９】

多くの論文または公表文献も、関連する構造および技術を記載する。「揺れがクラッシュを防止するかもしれない（Ａ Ｓｈａｋｅ Ｍａｙ Ｐｒｅｖｅｎｔ ａ Ｃｒａｓｈ）」と題する論文、Ｓｃｉｅｎｃｅ Ｎｏｗ，ｎｅｗｓ．ｓｃｉｅｎｃｅｍａｇ．ｏｒｇ／ｓｃｉｅｎｃｅｎｏｗ／２００９／０５／２６－０２．ｈｔｍｌ、２００９年5月２６日は、差し迫った衝突を検出するためにレーダまたはレーザを使用し、次に触覚警告によってドライバへ警告することを記載する。「Ｃａｒ－ｔｅｃｈ：死亡事故ゼロの乗用車の構築（Ｂｕｉｌｄｉｎｇ ｔｈｅ ｚｅｒｏ－ｆａｔａｌｉｔｙ ｃａｒ）」と題する論文、Ｃｏｍｐｕｔｅｒｗｏｒｌｄ，ｗｏｒｌｄｗｉｄｅｗｅｂ．ｃｏｍｐｕｔｅｒｗｏｒｌｄ．ｃｏｍ／ｓ／ａｒｔｉｃｌｅ／ｐｒｉｎｔ／９１７９６９７／Ｃａｒ＿ｔｅｃｈ＿Ｂｕｉｌｄｉｎｇ＿ｔｈｅ＿ｚｅｒｏ＿ｆａｔａｌｉｔｙ＿ｃａｒ、２０１０年8月5日は、「安全状態－例えば、乗用車の速度、ドライバが加えたブレーキ圧のレベルおよびステアリング－を近傍における他のすべての乗用車へ」送り出すことを記載する。同様に、論文「接続された乗用車のためのクラッシュ警告？（Ｃｒａｓｈ Ｗａｒｎｉｎｇ ｆｏｒ Ｃｏｎｎｅｃｔｅｄ Ｃａｒｓ？）」、ＩＣＴ Ｒｅｓｕｌｔｓ、ｗｏｒｌｄｗｉｄｅｗｅｂ．ｅｃ．ｅｕｒｏｐａ．ｅｕ／ｉｎｆｏｒｍａｔｉｏｎ＿ｓｏｃｉｅｔｙ／ａｃｔｉｖｉｔｉｅｓ／ｐｏｌｉｃｙ＿ｌｉｎｋ／ｄｏｃｕｍｅｎｔｓ／ｉｃｔ＿ｒｅｓｕｌｔｓ＿ｆａｃｔｓｈｅｅｔｓ／ｒｅｐｏｓｉｔ．ｐｄｆは、位置、速度、および軌跡を共有する接続された乗用車を記載する。かかるデータを受信した乗用車は、次に衝突を予測するために、車両の相対的な位置を計算できる。公表文献「クラッシュを防止する機能（Ｆｅａｔｕｒｅｓ ｔｈａｔ ｐｒｅｖｅｎｔ ｃｒａｓｈｅｓ）」、ＮＺ Ｔｒａｎｓｐｏｒｔ Ａｇｅｎｃｙ（ニュージーランド運輸局）、２１０．４８．１０９．８／ｖｅｈｉｃｌｅ／ｃｈｏｏｓｉｎｇ／ｆｅａｔｕｒｅｓ－ｐｒｅｖｅｎｔ．ｈｔｍｌ、２００９年１２月１日は、道路システム内の支援ネットワークに依存する衝突警告および回避システムを記載する。

【発明の概要】

【課題を解決するための手段】

【００１０】

本明細書では、用語「衝突」は、車両と、別の車両、静止物体（例えば、ガードレール、建物、木など）、人間、動物、貨物、残骸、地面などを含む別の物体との間の接触を意味し、これらを含む。衝突は、偶発的および意図的な行為（例えば、容疑者の車両を停止するために、逃亡する容疑者の車両に警察官が激突すること）によって発生する車両間の衝撃を含む。衝突は、地面と車両の車輪以外の任意の部分との間の衝撃も含む。衝突は、当分野において「事故」、「破壊」、「クラッシュ」、「衝撃」、「接触事故」、「玉突き衝突」などと呼ぶことができる。

【００１１】

本明細書では、用語「危険」は、衝突のリスクのような、危難の原因を意味し、これを含む。危険は、例えば、衝突、動物、残骸、作業員、歩行者、および他の車両さえも含む。

【００１２】

本発明は、例えば、近くの車両が衝突した状態にあるという、危険の事前警告を車両運転者へ与えるようになっている危険警告システムとして実施されうる。例となるかかる警告システムは、第１の車両に搭載されるように構築された第１の検出器を含む。概括的に

、機能する検出器は、第１の車両を巻き込んだ衝突を検出し、その結果として第１の出力をもたらすようになっている。検出器は、車両の運転者からのいかなる入力もなしに自動的に動作しうる。

【００１３】

検出器は、第１の車両のエアバッグ展開制御の衝突検出コンポーネントを含むことができる。第１の車両のエアバッグ展開回路のコンポーネントからの入力を受信するために、回路内に第１の検出器を置くことができる。かかる場合には、この車両を巻き込んだ衝突が発生したことを示す信号も、車両のエアバッグの展開が生成しうる。いくつかの実施形態において、エアバッグが展開したことを独立に（すなわち、エアバッグの回路に依存しないで）検出するように検出器を構成することができる。例えば、膨張するエアバッグに関わる熱および／または圧力を検出するようにセンサを構成できる。車両の前面、側面、または背面からを含む、任意の方位から発生した衝突を検出するために、１つ以上の検出器を配置できる。例えば、検出器は、１つ以上の加速度計を含むとよい。

【００１４】

例となるシステムは、第１の検出器と通信状態に置かれ、検出器の第１の出力を受信した後に、第１の遠隔警告信号をブロードキャストするように動作可能な第１の送信器も含む。第１の車両が十分に重大な衝突を経験した場合、近くの車両内に載せられた互換性のある危険警告システムによる受信のために、第１の遠隔警告信号がブロードキャストされる。第１の遠隔警告信号は、いかなる仲介物も通さずに直接に１つの車両から他の車両へ送信できる。いくつかの実施形態において、第１の遠隔警告信号は、中継器または増幅器、例えば、人工衛星内または地上のインフラストラクチャ内（例えば、タワー、地下道、建物など）に取り付けた中継器によって他の車両へ送信できる。自動的な、車両から車両への直接通信の１つの利点は、危険警告の従来法に比べて警告がより迅速であり、さらなる衝突を防止するのにより有効でありうることである。そのうえ、他のシステムと直接に通信するように構成されたシステムは、インフラストラクチャを変更しないで配置できる。本明細書に開示される危険警告システムの別の利点は、警告をカーブの周りに、あるいは丘を越えて送信できて、運転者へ（高速で走行しているときには比較的短期間の走行距離かもしれない）彼らの直接の視野を超える危険に関する情報を提供できることである。

【００１５】

重大さの十分なレベルの１つの判定は、エアバッグが展開する衝突として定義される。しかしながら、いくつかの危険は、エアバッグの展開をもたらさないかもしれないが、それでもなお側面衝撃衝突、追突、転覆車両、立ち往生車両、残骸などのような、遠隔警告信号のブロードキャストを保証することができる。

【００１６】

第１の例となる遠隔警告送信器は、第１の車両に搭載されるように構築され、第１の検出器の出力に応答して警告灯出力をブロードキャストするようになっている警告灯として実施できる。警告灯は、接近する車両の乗員に見えるように構成できる。１つのかかる警告灯は、第１の車両の屋根の上に載せられるようになっている。いくつかの実施形態において、警告灯は、第１の車両のブレーキライト、方向指示ライト、テールライト、ランニングライト、フォグライト、およびヘッドライトを含む群から選択された１つ以上の要素を含むことができる。

【００１７】

第２の例となる遠隔警告送信器は、第１の車両に搭載されるように構築され、接近する車両の乗員が可聴警告を知覚するために、可聴警告をブロードキャストするようになっている警報として実施できる。警報は、例えば、スピーカおよび／またはサイレンを含むことができる。

【００１８】

第３の例となる遠隔警告送信器は、無線周波またはレーダ送信器のような、ブロードキャスト用デバイスとして実施できる。一般に、遠隔警告送信器は、危険サイトから遠隔サイトへ警告情報を伝えるように構成できる。好ましくは、遠隔警告送信器は、結合された

検出器の作動出力に動作可能に応答する。様々な危険警告システムから（例えば、異なった車両から）１つ以上の遠隔警告信号を実質的に同時にブロードキャストできる。

【００１９】

例となるシステムは、第１の車両に搭載されるように構築され、近くの車両に載せられた異なった危険警告システムによって送信された第２の遠隔警告信号を受信するように動作可能な第１の受信器も含む。例となるシステムは、第１の受信器と通信状態にあり、第１の車両内に置かれた乗員へ警告を通信するのに有効な第１のローカル警告デバイスをさらに含む。例となるシステムは、異なった危険警告システムからの遠隔警告信号が、第１の車両の乗員に知覚できる、第１のローカル警告デバイスが伝えるべきローカル警告をもたらすように構築される。外挿すると、遠隔危険サイトからブロードキャストされた遠隔警告信号は、遠隔の危険に近い車両の運転者に注意を喚起するために複数のローカル警告をもたらすことができる。

【００２０】

例となる第１のローカル警告デバイスは、第１の車両の運転者による観察のために出力メッセージを表示できるディスプレイ画面を含む。ディスプレイ画面は、発光ダイオード（”ＬＥＤ：ｌｉｇｈｔ　ｅｍｉｔｔｉｎｇ　ｄｉｏｄｅ”）、液晶ディスプレイ（”ＬＣＤ：ｌｉｑｕｉｄ　ｃｒｙｓｔａｌ　ｄｉｓｐｌａｙ”）、陰極線管（”ＣＲＴ：ｃａｔｈｏｄｅ　ｒａｙ　ｔｕｂｅ”）デバイスなどを含むことができる。望ましくは、テキスト・メッセージは、車両運転者の注意を引くフォーマットで、例えば、目立つ色で、提示される。時として、第１のローカル警告デバイスは、第２の信号と関連する属性の、強度の範囲から選択された、瞬間強度を視覚により伝えるように構築される。１つの例となるローカル警告デバイスは、受信された信号と関連する属性の、強度の複数の異なった状態から選択された、強度のおよそ現在の状態を判定して、視覚により伝えるように構築される。例えば、接近する車両と危険サイトとの間の距離は、複数のライト、棒グラフ、またはアナログ・ダイアルおよびニードルの絵によって表現できる。いくつかの実施形態において、第１のローカル警告デバイスは、アナログ機器を含むことができる。ある場合には、複数の可聴音を強度の複数の状態のそれぞれ１つに個別に割り当て、第１の車両の乗員が１つの音を聴いて知覚できるように、これらの音から選択され、かつ現在判定された状態に対応する１つの音をブロードキャストするために警告デバイスをスピーカと結合することができる。

【００２１】

危険警告システムは、１つ以上の信号のブロードキャストを停止するか、または警告システムの出力を調節するように動作可能な、オーバーライド制御またはリセット・ボタンを含むことができる。例となる場合には、オーバーライド制御は、信号の第１のブロードキャスト後に第１の予めプログラムされた期間が経過して初めて動作可能なように構築される。同様に、送信される遠隔警告信号のための送信範囲は、危険場所に置かれた状況に基づいて調節可能である。近くの車両に載せられた第１の送信器は、危険サイトから送信される信号の距離を伸ばすために、クラッシュした車両から受信した遠隔警告信号を再ブロードキャストするように動作可能に回路内に置くことができる。いくつかの実施形態において、第１の送信器は、再ブロードキャストする同意を車両運転者に促して初めて、遠隔警告信号を再ブロードキャストできる。他の実施形態において、遠隔警告信号は、自動的に再ブロードキャストされうる。

【００２２】

例となるシステムは、少なくとも第２の危険警告システムと連携して使用されるようになっていてもよい。第２の警告システムは、第２の車両を巻き込んだ衝突を検出するために第２の車両に載せられ、その結果として、第１の車両のような、近くの車両の乗員に警告すべく、遠隔警告信号をブロードキャストするように構築される。複数の危険警告システムを対応する複数の異なった車両内に載せることができる。望ましくは、かかる複数の危険警告システムは、互換性のある遠隔警告信号をブロードキャストし、かつ受信するように互換性を持って配置される。ますます多くの車両が危険警告システムを含むにつれて

、個々の危険警告システムの価値または利益が増加しうる（すなわち、危険警告システムは、需要側の規模の経済を有しうる）。ベスト・ケースの状況では、道路上のすべての車両が、近くの車両へ遠隔警告信号を通信することも、かかる遠隔警告を受信することもできる危険警告システムを含むことになろう。その結果として、ブロードキャストされる遠隔警告信号が、遠隔警告信号を受信すべき範囲における近くの各車両へローカル警告を提供することになるであろう。

【００２３】

現在好ましい危険警告システムは、検出器、送信器、受信器およびローカル警告デバイスを含む。かかるシステムは、車両に載せることができる１つ以上の独立したモジュール内に含むこともできる。危険警告システムの一部、または全体が、車両に内蔵されるか、あるいは車両の１つ以上のコンポーネントに接続されうる。

【００２４】

一般に、検出器は、衝突検出器が載せられた車両を巻き込んだ衝突に起因して、あるいは運転者による起動の際に、入力信号を発生するように動作可能な任意のデバイスである。検出器は、衝突が発生したとき、あるいはその後短い期間内に、衝突を検出できる。送信器を作動する前に、衝突の重大さを評価するために、コントローラを回路内に置くことができる。望ましく、衝突警告システムが作動する前に、初めに衝突が評価されて、ある閾値を超えることが判定される。現在好ましい衝突検出器は、車両のエアバッグ展開制御組立品のコンポーネントを含む。かかる場合には、検出器は、衝突に起因するエアバッグ展開によって生じたトリガーに応答して、コントローラへの入力信号または送信器への作動信号をもたらすように構築できる。

【００２５】

送信器は、検出器と通信状態に置かれる。一般に、動作可能な送信器は、近くの交通に向けて遠隔警告信号をブロードキャストできる。ある遠隔警告信号は、音または光のような、人々が直接知覚できる信号を含む。音信号は、スピーカまたはサイレンのような、警報によってブロードキャストできる。機能する光信号は、専用の警告灯から放つことができる。警告灯は、車両の屋根に載せることができて、ブロードキャスト光はすべての方位から観察することが可能である。ある警告灯配置は、ブロードキャスト用デバイスとしてヘッドライト、方向指示ライト、テールライト、ランニングライト、フォグライト、またはブレーキライトを含むことができる。また別の遠隔警告信号は、１つ以上の近くの車両に載せられた受信器による受信のためにクラッシュした車両からブロードキャストできる信号と、その後のローカル警告デバイスへの入力とを含む。例となるブロードキャスト可能な信号は、電磁放射（例えば、赤外）、レーダ、および無線周波信号を含む。

【００２６】

受信器は、異なった警告システムからの遠隔警告信号を受信するように構築される。受信器と通信状態にあるローカル・ディスプレイ・デバイスは、遠隔警告信号に対応するローカル警告を車両の乗員へ通信するのに有効である。ディスプレイ・デバイスは、危険サイトの距離の見積もりのような、パラメータの強度を視覚により伝えるように構築できる。対応する複数の離散パラメータ値に対して、複数の可聴雑音を個別に割り当てることができる。かかる場合には、現在表示されたパラメータ値に対応する雑音をブロードキャストするために、スピーカを用いることができる。

【図面の簡単な説明】

【００２７】

【図１】本開示のある原理に従って作られた組立品の要素を表す簡略図である。

【図２】動作可能な実施形態に含むことができる要素間のある動作可能な関係を示す簡略図である。

【図３】本開示のある原理に従って作られた組立品を表す簡略立面図である。

【図４】本発明のある実施形態において動作可能な機能するディスプレイ・デバイスの簡略正面図である。

【図５】本発明の実施形態を載せたモータービークルの第１の平面図である。

【図６】本発明の実施形態を載せたモータービークルの第２の平面図である。
【発明を実施するための形態】
【００２８】
提供されるのは、危険（例えば、別の車両を巻き込んだ衝突）が近傍にあることを車両運転者（例えば、モータリスト）に警告するようになっている装置（あるいは「システム」）である。その実施形態は、便利なアフターマーケットの車両内据え付け用モジュール形態に、あるいは相手先ブランド製造された（ＯＥＭ：ｏｒｉｇｉｎａｌ　ｅｑｕｉｐｍｅｎｔ　ｍａｎｕｆａｃｔｕｒｅｄ）コンポーネントまたはシステムとして、構築できる。
【００２９】
車両に載せられるようになっている実施形態は、図１において一般に１００に示され、一般に１０６に示される検出器、および一般に１０８に示される遠隔信号送信器と通信状態にあるコントローラ１０４を含む。遠隔信号送信器１０８は、検出された危険の近傍における他の車両の運転者へ警告を提供するために、遠隔警告信号１１０をブロードキャストできるとよい。遠隔警告信号１１０は、可視、可聴、および他の送信できる信号、例えば、レーダ、電磁放射（例えば、赤外、紫外など）ならびに無線周波（ＲＦ：ｒａｄｉｏ　ｆｒｅｑｕｅｎｃｙ）信号を含むことができる。遠隔信号送信器１０８は、低電力無線周波送信器１０９であってもよい。一例として、遠隔信号送信器１０８は、１００ｍＷの最大許容電力および約１００メートルの範囲を有する、オープンソースのクラス１ブルートゥース・プロトコルの下で動作しうる。
【００３０】
検出器１０６は、危険または衝突に応答して（例えば、衝突が発生したとき、あるいはそのすぐ後に）情報信号をコントローラ１０４へ送ることができる。かなりの数の自動車両内にすでに存在する１つ以上のセンサ・コンポーネントを検出器１０６に組み込むことができる。検出器は、車両のエアバッグ展開システム内で使用されうるような、衝突検出要素１０７を含むことができる。
【００３１】
エアバッグ展開システムにおいては、いくつかのタイプの衝突検出センサが商業用途として存在する。市販の衝突検出センサは、電気的動作システム、機械的動作システム、ならびに機械および電気的動作システムの組み合わせを含む。例えば、いくつかの車両は、ばね式載荷重が衝撃により偏向してスイッチを閉じる「バネおよび質量」衝突検出センサを持つ。いくつかのより新しい車両は、圧電結晶か、またはマイクロマシン型加速度計チップかのいずれかを含み、十分に揺さぶられたときに電気信号を生成する、固体衝突検出センサを持つ。衝突に応答してスイッチを閉じる、スイッチを開く、または電気信号を生成するセンサは、衝突が発生したという情報信号をコントローラに提供するように容易になすことができる。
【００３２】
ある車両は、衝突によって押し動かされたときに、撃針をトリップする自己完結型機械エアバッグ・システムを含む。撃針は、エアバッグの膨張に使用される推進薬を発火させるためにプライマーに点火する。たとえ機械式のセンサであっても、電気スイッチとしても機能するように構成された撃針；推進薬の温度を測定するために置かれた温度センサ；エアバッグ内の圧力センサなどのような、要素の展開に応答して電気ベースの情報出力信号１１２または１１４を生成する検出器１０６として構成できる。いずれにしても、コントローラへの情報入力１１２として、あるいは遠隔信号送信器への直接指令入力１１４としてのいずれかに使用するために、様々なセンサ要素タイプから信号を得ることができる。言い換えれば、検出器１０６は、遠隔警告信号を、送信器１０８のような、送信器にブロードキャストさせるために、信号１１２または信号１１４のような、出力を生じることを特徴としうる。
【００３３】
よく見られるエアバッグ衝撃または衝突検出センサの１つは、上方に傾斜したチューブ

内に閉じ込められたボールを用い、傾斜したチューブは、高い先端に配置された電気接点を有する。傾斜の底部では小さい磁石がボールに拘束力を及ぼし、この拘束力が、衝突によって生じた減速によって克服されなければならない。十分な減速をもたらすに足る大きな衝突が発生したとき、ボールは、傾斜を転がり上って電気スイッチと接触し、これを閉じる。ボールが傾斜を転がり上ることにさらなる抵抗を提供するために、ガス減衰を組み込んでもよい。衝突後にボールは、傾斜したチューブの底部へ典型的に転がり戻り、センサをリセットする。かかるセンサにおいて、衝突検出スイッチを閉じる程度までボールがその通常の捕獲位置から離脱したことを示す、情報信号１１２または指令信号１１４を得ることができる。スイッチが閉じたとき、結果として生じる電気信号を得て、例えば、これを危険警告システム１００における情報信号１１２として使用できる。

【００３４】

また別のよく見られる衝突センサは、ＴＲＷによって設計された「Ｒｏｌａｍｉｔｅ」であり、このセンサは、突然の減速下でスイッチをトリップするために前方へ転がる小さい金属ローラを含む。かかるセンサは、トリップしたスイッチが閉じたとき、あるいは時として異なったスイッチが開いたとき、すなわちローラ要素がその通常の占有位置から離れていることを示すときにも、電気情報信号１１２を提供できる。

【００３５】

多くの場合には、（例えば、低速度の衝突に起因する）誤ったエアバッグ展開を低減するために、エアバッグ展開システムのエアバッグ制御モジュール中に安全センサ・アーミング・センサが組み込まれる。かかる安全センサは、衝突検出センサと異なって、典型的に車室内の、予想される衝撃サイトからさらに離れた位置に設置されるとよい。エアバッグ制御モジュールは、エアバッグの展開を可能にする前に、衝突検出センサおよびアーミング・センサの両方からの適切な信号を本質的に必要とする。エアバッグ展開動作の過程においてかかるエアバッグ制御モジュールのスイッチを閉じるか、または開くことによって、情報信号１１２か、または直接指令信号１１４かのいずれかとして並行に使用されうる信号を生成することもできる。同様の動作機能を持つスタンドアローンの衝突検出システムを危険警告システムに組み込むこともできる。

【００３６】

情報信号１１２または指令信号１１４に使用されうる信号へのアクセスは、衝突検出器、制御モジュール、またはかかる信号の他の供給源にワイヤ（単数）、またはワイヤ（複数）を然るべく接続することによって得ることができる。アフターマーケットの危険警告システム（すなわち、車両の製造の際に車両中に統合されなかったシステム）は、現在または将来の業界標準のオンボード診断（”ＯＢＤ：Ｏｎ－Ｂｏａｒｄ　Ｄｉａｇｎｏｓｔｉｃ”）プラグへ容易に差し込むことができる。もちろん、危険警告システム１００のＯＥＭ版は、新しい車両に内蔵できて、ＯＥＭワイヤハーネス内の然るべきセンサまたは制御モジュールへのアクセスを含むことができる。代わりに、アフターマーケットのワイヤが、直接にＯＥＭエアバッグ展開システムの衝突検出器要素またはモジュールに動作可能に接続されてもよい。検出器１０６と、コントローラ１０４または遠隔警告信号送信器１０８のいずれか、あるいは両方との間の通信も、１ｍＷの最大許容電力および約１メートルの範囲を有する、オープンソースのクラス３ブルートゥース・プロトコルのような、無線送信プロトコルを使用して提供できる。かかる場合には、１つの車両内に置かれた危険警告システムのコンポーネント間の送信が、近くの車両によって偶然に受信されるおそれはあまりないかもしれない。

【００３７】

１つ以上の指向性ベースの入力信号１１２、または指令信号１１４を提供するために、危険警告システム１００のみに専用の１つ以上の検出器１０６を使用できる。多くの衝突検出センサは、衝突を検出するそれらの機能に実質的に指向性がある。例えば、転がるボール要素は、加速における然るべき変化がチューブの軸と十分に一致する方向になければ、チューブの傾斜を登るように仕向けられないであろう。いくつかのエアバッグは、車両の乗員の頭がダッシュボードにぶつかるのを防止するように設計される。従って、ほとん

どのエアバッグ用衝突センサは、車両の長軸と一致する方向に向けられる。車両のエアバッグ展開システムと独立に載せられた複数の衝突センサは、側面衝撃衝突、あるいは背面衝撃衝突であっても、エアバッグを展開させないかもしれない衝突に応答する、遠隔警告信号の配備を可能にできる。複数の指向性ベースの入力信号１１２または指令信号１１４を提供するために、複数の独立した衝突センサをアフターマーケットの衝突警告モジュール内に載せることができる。いくつかの実施形態において、検出器１０６は、コンパスの任意の方向からの衝突を検出するように構成できる。例えば、検出器１０６は、３次元空間における速度の変化、および／または回転速度における変化のような、２つ以上の方向における速度の変化を検出できる加速度計を含むことができる。

【００３８】

車両エアバッグ展開システムの衝突センシング要素と組み合わせて、１つ以上の独立したセンサを使用できる。例えば、複数の指向性ベースの入力信号１１２または指令信号１１４を提供するために、１つ以上の独立した衝突センサをＯＥＭエアバッグ展開要素と通信状態に置くことができるアフターマーケットの衝突警告モジュール内に載せることができる。かかる独立したセンサは、例えば、側面衝撃衝突、および／または背面衝撃衝突を検出するように構成できる。

【００３９】

コントローラ１０４は、車両１００を巻き込んだ衝突の検出後に送信器１０８を作動させるために、任意の適切な介在デバイスを含むことができる。いくつかの場合には、コントローラ１０４は、検出器１０６の一部として実施できる。例えば、電気信号の有無のような、入力を衝突検出器から送信器へ直接に伝えて、それによって遠隔警告信号のブロードキャストをもたらすために、ワイヤを配置することができる。いくつかの実施形態において、コントローラ１０４は、プログラマブル論理コントローラ（”ＰＬＣ：ｐｒｏｇｒａｍｍａｂｌｅ　ｌｏｇｉｃ　ｃｏｎｔｒｏｌｌｅｒ”）、マイクロプロセッサなどのような、少なくとも基本的な意思決定が可能な構造を含むことができる。コントローラ１０４は、排出抑制、または他の車両システムの運用および／またはモニタリングに使用されるプロセッシング要素のような、従来通り車両に載せられたマイクロプロセッシング要素を含むことができる。

【００４０】

コントローラ１０４は、遠隔信号送信デバイス１０８の動作をもたらす作動出力または指令信号１１４を作る前に、検出器１０６からの入力１１２のような、１つ以上の入力を受信して評価するように構築し、配置できる。例えば、コントローラ１０４は、検出器１０６からの情報信号１１２を受信し、予めプログラムされた応答範囲と比較して信号１１２を評価し、対応する出力信号１１４を作って、ＲＦ送信器１０９からのＲＦ警告信号１１６のブロードキャストをもたらすことができる。

【００４１】

危険警告システム１００は、異なった車両内に載せられた異なった危険警告システムから送信される遠隔警告信号を受信するために、一般に１２０に示される、受信器も含むことができる。例えば、受信器１２０は、他の車両によって送信されたＲＦ信号１１６’を受信するように構築されたＲＦアンテナ１２１を含むことができる。信号１１６’を受信した後に、受信器１２０は、その出力１２２を情報入力１２２としてコントローラ１０４へ送ることができる。その結果として、コントローラ１０４は、一般に１２６に示される、ローカル警告デバイスの動作をもたらす指令出力１２４を作ることができる。ローカル警告デバイス１２６は、危険警告システム１００が据え付けられた車両の運転者へ警告を通信することができる。ローカル警告デバイス１２６は、危険警告システム１００が載せられた車両の乗員へメッセージを通信するために、テキスト文字を示しうる視覚ディスプレイ・デバイス１２８を含むことができる。代わりのローカル警告デバイスは、可聴システムおよび他の視覚により知覚できるシステムを非排他的に含むことができる。

【００４２】

危険警告システム１００が置かれた車両が運転中であるとき、システム１００のコンポ

ーネントは、自動的に動作を開始するように構成できる。送信器１０８は、車両が運転を停止した後に動作し続けることができる。例えば、衝突に起因して車両が停止したとき、送信器１０８は、他の車両運転者へ警告するために動作し続けることができる。ローカル警告デバイス１２６は、車両を運転する度にローカル警告デバイス１２６を動作可能にすることを車両の運転者が覚えておく必要がないように、システム１００が入った車両が動き始めたときに動作を開始するように構成できる。システム１００、またはその一部は、車両運転者がシステム１００を停止しえないように構成することもできる。

【００４３】

危険警告システム１００は、コントローラ１０４による評価用の入力１３２をもたらすために、一般に１３０に示される、追加の装置を含むことができる。例えば、信号１１６を切るか、さもなければ調節するために、スイッチ１３４のような、ユーザ・オーバーライド制御が車両運転者によって作動されてもよい。いくつかの場合には、警告システム１００の始動後に、選択された期間が経過して初めて、かかるオーバーライドを動作可能にするためのプログラミング命令をコントローラへ提供できる。装置１３０は、車両運転者が、他の運転者へ、特定の選択された受信者へ（例えば、選択された電話番号への携帯電話送信によって）、あるいは当局へ、テキスト・メッセージを送信することが可能なように構築できる。例えば、車両がパンクした、燃料切れである、ハイドロプレーンを起こした、雪で立ち往生している、他の理由で他の車両にとって危険であることを運転者が検知したとき、この車両運転者が他の車両内のシステムへ警告を送信することを可能にするように、装置１３０を構築することもできる。そのうえ、車両運転者は、危険、例えば、衝突、故障車、道路における残骸（例えば、落下した貨物、倒木または岩）、野生生物、轢死体、緊急車両、緊急または交通規制人員、歩行者、滑りやすい路面、作業班などを観察したとき、装置１３０を始動できる。かくして、システム１００は、車両運転者の入力のみに基づいて信号１１６を発生するように動作可能にでき、信号１１６が近くの車両運転者へ警告することができる。

【００４４】

いくつかの実施形態において、危険警告システム１００は、事象（例えば、突然の減速）を検出できるが、その事象が他の車両内のシステムへ警告信号１１６を送信することを保証するかどうかを判定できないこともある。例えば、選択された閾値を超えた減速は、警告信号１１６を自動的にもたらしうるが、一方でその閾値未満の減速は、それをもたらしえない。かかる事象の後に、ローカル警告デバイス１２６は、警告信号１１６の送信に関して車両運転者を促すことができる。かくして運転者は、警告信号１１６を送信するように、あるいは警告信号１１６を送信しないように、例えば、装置１３０によって、システム１００に指示することができる。

【００４５】

いくつかの実施形態において、システム１００は、特定の人々または組織に衝突を知らせることができる。例えば、システム１００は、セルラーまたは無線電信モジュール（例えば、携帯電話および関連機器）を含むことができて、家族構成員、友人、緊急人員などへテキストまたは音声メッセージを送ることができる。メッセージは、場所、衝突に関する情報（例えば、車両の速度、走行方向など）、および／または任意の他の情報を含むことができる。

【００４６】

図２を次に参照すると、一般に１４０に示される、第２の実施形態は、遠隔警告信号送信器１０８を動作させるために、コントローラ１０４を経由して通信状態にある検出器１０６を含む。図示されるように、遠隔警告信号送信器１０８は、聴いて知覚できる大きい音波信号１４４を接近する交通へ送信するように動作可能な警報１４２（例えば、サイレン）；見て知覚できる警告信号１４８を接近する交通へ送信するように動作可能な警告灯１４６（例えば、点滅光）；および接近する車両内に載せられた信号受信装置１２０が受信できる遠隔警告信号１５２を送信するように動作可能な送信器１５０の１つ以上として実施できる。

【００４７】
実施形態１４０は、ローカル警告デバイス１２６を動作させるために、コントローラ１０４を経由して通信状態にある受信器１２０も含む。ローカル警告デバイス１２６は、車両の乗員が見て知覚できるローカル信号１６０を送信するように構成されたローカル・ディスプレイ要素１５８；および乗員に聴こえるローカル音出力１６４を生成するように構成されたスピーカ１６２の１つ以上を含むことができる。ディスプレイ要素１５８は、例えば、ＬＥＤおよびＬＣＤディスプレイ・パネル、個別に識別可能な色を放射できる１つ以上のライト、ライト・アレイ、棒グラフ、回転ニードルを持つ計測器などを含むことができる。可聴信号１６４は、車両の運転者が警告に気付いて注意を払うであろう可能性を高めるために、視覚信号１６０と組み合わせて使用できる。可聴信号１６４および／または視覚信号１６０は、車両運転者に伝えられる他の信号（例えば、低燃料ライト、排出抑制システム・ライトなど）とは異なるように構成できる。車両運転者は、典型的な車両運転と比べて異常な音および／または光にはより気付きやすいであろう。近くの危険は、直接の壊滅的な被害の可能性があるので、車両運転者の注意をかかる危険の警告に直ちに向けることは、有利でありうる。受信器１２０と危険サイトとの間の距離に応じて強度が変化する（例えば、デシベル・レベル、色、ニードル回転量、またはバーの長さが変化する）ように、可聴信号１６４および可視信号１６０の１つまたは両方を構成できる。

【００４８】
図３に示されるように、実施形態１４０のような、危険警告システムは、一般に１７０とする自動車両内またはその上に載せられるようになすことができる。一般に、かかる自動車両１７０は、乗用車、トラック、オートバイ、重量輸送車両、配達車両などを包含しうる。同様のシステムは、ボート、自転車、建築装置、商用セミトレーラ、列車、レースカーなどのような、任意のタイプの車両内またはその上で使用されるようになすことができる。ある危険警告システムは、特定の車両に内蔵されたＯＥＭ組立品を含むことができる。

【００４９】
他の危険警告システムは、車両に載せられた１つ以上の要素に、必要に応じて接続できる、実質的にモジュール式のコンポーネントまたは組立品であってもよい。好ましくは、１つのかかる要素は、車両のエアバッグ展開システムと結合される。ある危険警告システムは、車両間で容易に移し換えができるモジュール式のスタンドアローン・システムを含むことができる。

【００５０】
いくつかの実施形態において、危険警告システムは、携帯電話（例えば、ＡｐｐｌｅＩＰＨＯＮＥ（登録商標）、ＡＮＤＲＯＩＤ（商標）電話、ＷＩＮＤＯＷＳ　ＰＨＯＮＥ（商標）など）を組み込むことができて、携帯電話に内蔵された１つ以上のセンサ（例えば、マイクロフォン、加速度計、全地球測位システム（ＧＰＳ：ｇｌｏｂａｌ　ｐｏｓｉｔｉｏｎｉｎｇ　ｓｙｓｔｅｍ）受信器など）を用いるように構成できる。かかる危険警告システムは、電話上のソフトウェア・アプリケーションまたは「Ａｐｐ」として動作しうる。携帯電話上のソフトウェア・アプリケーションとして動作する危険警告システムは、他の速度変化、例えば、落下した電話などから車両衝突を識別するための論理回路を含むことができる。携帯電話を含んだ危険警告システムは、車両内に統合されるか、または据え付けられた危険警告システムと通信するように構成できる。

【００５１】
図３を引き続き参照すると、自動車両１７０は、検出器１０６および遠隔警告信号送信器１５０と通信状態にあるコントローラ１０４を載せている。車両１７０が検出可能な衝突に巻き込まれたとき、警告信号送信器１５０は、衝突のローカルエリア内の他の車両の運転者へ遠隔警告信号１５２をブロードキャストする。加えて、警報１４２は、可聴遠隔警告信号１４４をブロードキャストできる。警報１４２は、車両のクラクションの代わりに、あるいはそれに加えて、特殊目的のノイズメーカーまたはサイレンを使用することもできるが、車両の従来型クラクションを含んでもよい。

【００５２】
さらにまた、警告灯１４６は、接近する車両の運転者によって知覚されうる遠隔警告信号１４８をブロードキャストできる。ある実施形態において、光信号１４８をブロードキャストするために使用されるデバイスは、ブロードキャストする車両へ接近するすべての角度から信号１４８の観察が可能であるように構築できる。１つのかかるデバイスは、屋根取り付け型ビーコン１７２を含む。しかしながら、可視信号１４８’のためのブロードキャスト用要素として、ヘッドライト、方向指示器、テールライト、ランニングライト、フォグライト、および／またはブレーキライトのような、車両１７０にすでに載せられた１つ以上の車両用ライト１７４を使用してもよい。ビーコン１７２または車両用ライト１７４は、車両１７０がそのスタイリングおよび／または美的訴求力を維持するように車両１７０中に統合できる。

【００５３】
警告信号１４４および警告灯１４６は、たとえ他の車両に直接の危険がないときでも、他の人々に注意を喚起できる。例えば、危険警告システムを装備した車両が、道路から外れて、例えば、溝または峡谷に嵌って、故障していることがありうる。この車両は、交通の流れの外にあるので、他の車両にとって危険ではありえない。しかしながら、運転者が傷ついて、意識不明か、あるいは危険な状態にあり、援助を必要とするかもしれない。警告信号１４４および／または警告灯１４６がなければ、他の車両の運転者は、故障車両の存在に気付かないことがありうる。警告灯１４６を見る、および／または警告信号１４４を聴いたときに、別の車両の運転者は、救助のために緊急人員を呼ぶ、および／または援助を行うことができる。いくつかの環境において、故障車両の運転者は、援助を求めるべく、さもなければ暗い領域を通って（例えば、道路に戻る）小道を見つけるために警告灯１４６からの光を利用できる。

【００５４】
実施形態１４０は、コントローラ１０４と通信状態にあり、車両１７０の近傍における別の車両内に載せられた第２の実施形態１４０’が送信した信号１５２’を受信するようになっている受信器１２０を含む。コントローラ１０４によって受信され解釈される情報信号として、信号１５２’が受信器１２０によって転送されると、コントローラ１０４は、ディスプレイ１５８に然るべき可視信号１６０を放射させることができる。コントローラ１０４は、随意的にスピーカ１６２に然るべき可聴警報１６４を放射させることができる。車両１７０のオーディオ・システム（例えば、オーディオ・エンターテインメント・システム）内に存在する１つ以上のスピーカをスピーカ１６２として使用してもよい。代わりに、危険警告システムが専用スピーカを含んでもよい。

【００５５】
車両１７０のローカル運転（例えば、都市、山、田舎など）に適した信号送信の所望の距離を達成するために、送信される遠隔警告信号１５２の送信電力をスケーラブルにすることができる。遠隔警告信号１５０のいくつかの送信器は、一定の送信範囲を有する。送信器は、ある自動車駐車用レーダ・システム内に配備されたもののような、低電力ＲＦ送信器または低電力レーダ送信器を含むことができる。実施形態１４０’は、実施形態１４０からの信号１５２を受信するようになすことができ、続いて実施形態１４０’は、かかる信号を再送信信号１５２’’として再ブロードキャストできる。かかる配置において、遠隔警告信号は、より長い距離を送信できて、接近する車両の運転者が危険サイトに到着する準備をするためのさらなる時間を提供できる。もちろん、他の人々に有用な範囲を越えて信号１５２が再ブロードキャストされるのを防止するために、かかる配置にフィードバック信号を含むことができる。例えば、８０ｋｍ離れて衝突が発生したことをモータリストに警告すること、あるいは危険サイトに向かう走行方向に対して、平行方向ではあるが、横方向にずれて（例えば、平行な街路上を）走行するモータリストに警告することは、有益ではないかもしれない。かかる過剰な範囲の警告は、多数回再ブロードキャストされる信号を受信する人には役立たないかもしれない。

【００５６】

いくつかの実施形態において、危険警告システム１４０は、信号１５２’が信号１５２として自動的に再ブロードキャストされえないように構成できる。その代わりに、システム１４０が置かれた車両の運転者に、信号１５２’を信号１５２として他の車両へ再ブロードキャストするように促すこともできる。システム１４０は、車両の運転者に信号１５２’がこれまでに送信された回数を示すことができる。いくつかの実施形態において、危険警告システム１４０は、信号１５２’を再ブロードキャストすべきかどうかを自動的に判定するように構成できる。かかる判定は、信号１５２’が送信された回数、信号１５２’の一次供給源への距離、システム１４０を載せた車両の走行の速度および方向、近くの道路の有無などに全体的または部分的に基づくことができる。ローカル・ディスプレイ・デバイス１５８が図４に示される。ディスプレイ・デバイス１５８は、テキスト・メッセージおよび／または１つ以上の指示器要素が示されうるディスプレイ・パネル１７８を含むことができる。パネル１７８は、ローカル・ディスプレイ・デバイス１５８が載せられた車両の運転者へ然るべきテキスト・メッセージを伝えるように構成できる。メッセージは、「事故！」、「前方に衝突！」、「注意！」、「故障車両！」、「危険！」、または「警告！」のような、簡単な警告を含むことができる。テキストは、車両のドライバの注意を引く方法または色で表示されるとよい。ディスプレイ・パネル１７８のある実施形態は、より複雑なメッセージを示すことができる。一例として、受信器１２０は、交通標識からブロードキャストされた信号を受信できて、その後、ドライバがかかる交通標識が見えて判読できる短い期間に知覚しえたものよりいっそう完全なメッセージを表示できる。ドライバは、標識を通過した後により詳細にメッセージを再吟味できる。

【００５７】

いくつかの実施形態は、例えば、危険が現車両の前または後にあるというような、危険の場所に関する詳細を含むことができる。一般に１８０に示されるディスプレイは、危険サイトへの距離のような、信号と関連する属性の強度を示すことができる。図４に示される強度ディスプレイ１８０は、黄色発光要素１８２、橙色発光要素１８４、および赤色発光要素１８６を含む。かかる配置において、黄色要素１８２は、遠い危険を示すように動作可能になすことができる。同様に、ディスプレイ１８０が危険場所に接近するにつれて、橙色要素１８４および赤色要素１８６を然るべき順に個別に照らすことができる。代わりの強度ディスプレイは、ＣＲＴ、ＬＣＤ、またはＬＥＤ画面のような、多画素画面上に提示できて、かかるパラメータを円グラフ、棒グラフ、および回転ニードルを持つアナログ・ダイアルの絵などのような、グラフに様々な形態で示すことができる。

【００５８】

スピーカ１６２は、危険サイトへの距離のような、パラメータの強度レベルを示すために、高低、音量などが変化しうる可聴警告音を放射できる。例えば、予め録音された音声が危険サイトへの距離を告げることができる。ローカル警告デバイス１２６を含んだシステム１４０のモジュール式の実施形態は、ディスプレイ要素１５８およびスピーカ１６２を含むことができる。

【００５９】

図４は、トグルスイッチ１３４として実施された追加の入力装置１３０も示す。かかるスイッチ１３４は、オン−オフ・スイッチ、および／またはより多くの警告信号の１つの出力を停止するのに有効なオーバーライド制御として用いることができる。別の代わりの入力装置１３０は、送信要素１０８による送信のために、車両の乗員がテキスト・メッセージを入力できるようになっているデバイス（例えば、キーボードまたはキーパッド、図示されない）を含むことができる。

【００６０】

かかるローカル・ディスプレイが載せられる車両に対してローカル・ディスプレイ１２６または１５８を固定するために、対策を講じることができる。従って、一般に１９０に示される、固定手段が一般に含まれる。固定手段１９０は、図示されるような、ねじ、あるいは、異なった車両間のシステム１２６の移送を可能にする、面ファスナのような、切り離し用配置、摩擦取り付け配置、吸盤取り付け配置、および当分野で一般に知られる他

の固定配置を含む、様々な接着配置を含むことができる。

【００６１】

ある実施形態は、ＯＥＭ据え付けシステム内に組み込むことができて、さらに市販のメディア再生システム、ＧＰＳ受信器、携帯電話などのような、車両内に載せるか、または据え付けることができるデバイス中に統合するか、あるいはそれらの付加装置として利用することもできる。

【００６２】

ＧＰＳ受信器または別の場所検知デバイス（例えば、場所を判定するために携帯電話基地局三角測量を使用する携帯電話のようなデバイス）を組み込んだ危険警告システムは、例えば、危険の場所に関する情報を送信できる。例えば、車両運転者が危険を観察した場合、運転者は、他の車両内のシステムへの警告を始動させることができる。警告は、危険のおよその場所および／または危険が観察された時間を含むことができる。いくつかの実施形態において、警告は、人間の介在なしに危険警告システムによって受動的に開始されて、なおかつ危険の場所および／または時間に関する情報を含むことができる。いくつかの実施形態において、危険警告システムは、車両の進路外の危険に関する情報が不必要に車両運転者の気を散らすのを避けるために、場所および時間によって警告をフィルタすることができる。

【００６３】

危険警告システムは、音声認識システムを含むことができる。例えば、危険を観察したときに、車両運転者は、危険警告システムを始動できて、次に口頭で危険の特質（例えば、「中央車線における残骸」）を報告できる。音声認識システムは、車両運転者の話し言葉をテキストに変換できて、そのテキストを（例えば、ショート・メッセージ・サービス（ＳＭＳ：Ｓｈｏｒｔ　Ｍｅｓｓａｇｅ　Ｓｅｒｖｉｃｅ）またはマルチメディア・メッセージング・サービス（ＭＭＳ：Ｍｕｌｔｉｍｅｄｉａ　Ｍｅｓｓａｇｉｎｇ　Ｓｅｒｖｉｃｅ）などを経由して）他の危険警告システムへ送信できる。ＧＰＳベースのナビゲーション分野で知られるように、近くの車両内の危険警告システムは、車両運転者の聴覚による受信のために、テキストをコンピュータ合成音声に変換できる。かかるシステムは、予め考慮されなかった危険に対する幅広い警告を与えることができて、かかる危険に関するより詳細を提供できる。他の実施形態において、危険を観察した運転者の録音を近くの車両内の危険警告システムへ送信し、再生することもできる。

【００６４】

いくつかの実施形態において、危険警告システムは、危険の現場に後で到着する車両の運転者が、危険に関する情報を更新することを可能にする。例えば、危険警告システムは、他の車両運転者が、第１の車両の現在の場所の近傍における危険に気付いたことについて、第１の車両の運転者に注意を喚起できる。かくして第１の車両の運転者は、例えば、音声確認、スイッチ、キーパッド、キーボード、またはタッチスクリーンを通じて、危険を確認できる。危険がもはや存在しないことを特定の数の車両運転者が示した後に（例えば、１人の運転者、２人の運転者、３人の運転者などからの指示後に）、危険警告システムは、かかる危険警告の送信を停止できる。

【００６５】

本明細書の危険警告システムは、いくつかの自動車で利用できる衝突防止システムまたは衝突回避システム（例えば、いつ車両に衝突の危険があるかを検出するためにレーダを使用するシステム、予測される衝突の前にブレーキをプレチャージするシステム、予測される衝突の前に車両を減速するためにブレーキをかけるシステム、あるいは予測される衝突の前に安全ベルトを締め付けるシステム）を補完できる、および／またはそれらと相互作用できる。例えば、本明細書の危険警告システムは、衝突が迫り来ることを示す衝突回避システムから信号を受信するように構成できる。本危険警告システムは、衝突が発生する前に、差し迫った衝突の警告を他の車両へ送信できる。これによって他の車両の運転者が反応するための追加の期間を提供でき、従って、そうでなく仮に衝突が始まった後に初めて警告信号が送られたのであれば衝突に遭ったと思われるいくつかの車両が、衝突に遭

うのを防ぐことができる。例えば、かかる早期の警告は、２車両の衝突が、３、４、またはそれ以上の車両を巻き込んだ衝突になるのを避けることができる。

【００６６】

本明細書に開示されるような危険警告システムは、他の互換性があるシステムから信号を受信するように構成することもできる。例えば、歩行者、道路または公共施設作業者、あるいは自転車乗用者が、危険警告システムによって検出可能な信号を送信するために送信器を携えることができる。かかる送信器は、携帯電話上のソフトウェア・アプリケーションとして動作してもよい。かくして近くの車両の運転者は、かかる個人の存在の事前警告を受信できる。

【００６７】

図５および６は、危険警告システムの実施形態が、衝突の事前警告の増分と、車両の運転者が回避行動を取りうるさらなる時間とを提供するのに有効でありうる２つの交通状況を示す。図５において、車両１９２の元の走行方向は、矢印１９４によって示され、車両１９６の進行方向は、矢印１９８によって示される。車両１９２が障害物にぶつかって、エアバッグ展開をもたらしたことが示される。エアバッグ展開の結果として、車両１９２内に載せられた危険警告システムは、ブロードキャスト範囲のすべての協力車両へ遠隔警告信号１５２もブロードキャストする。従って、車両１９６の運転者は、予め警告されて、衝突の近傍で相応の注意を払うことができる。シート上の紙面の有効利用のために、対称なブロードキャスト信号１５２の半分のみが示される。車両の静止した方向が不確定なので、信号１５２のような、ブロードキャスト信号は、すべての方角にブロードキャストされるとよい。

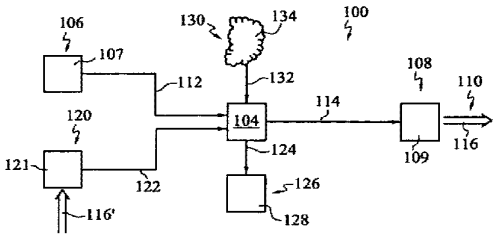
【００６８】

図６は、交通の移動方向が矢印２００によって指示される交通状況を示す。車両２０２、２０４、２０６は、示された交通の速度で運転するためのおよそ最小安全距離に間隔をあけている。車両２０８、２１０、２１２は、一般に２１３とする衝突にまさに巻き込まれたところであり、少なくとも車両２１０においてエアバッグが展開されて、遠隔警告信号１５２のブロードキャストをもたらした。車両２１４は、衝突２１３に遭うのを回避するのに間に合うよう停止できないかもしれないが、車両２１６の運転者は、警告信号１５２を受信して、衝突２１３を回避するのに十分なさらなる時間の増分を得ることができる。

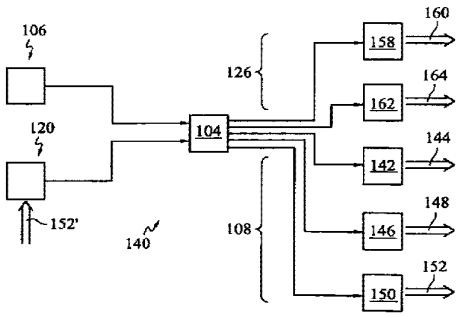
【００６９】

一旦衝突が起ると、危険警告システム１００のような危険警告システムは、接近する車両が十分に警告されるのを確実にするのに必須の期間にわたって遠隔警告信号１５２を送信するように構築されているとよい。例えば、かかる必須の期間は、約２分とすることができる。送信する車両の運転者がさらなる危険はないと判定した場合、次に運転者は、信号を停止することが可能でありうる。例えば、危険警告システムは、「リセット」ボタン、またはクラッシュした車両の内部のローカル・ディスプレイ画面と結合されたオン／オフ・ボタンを押すことによって中断できる。運転者が意識不明であるか、あるいはリセット・ボタンを押すことができなければ、信号１５２は、別の人が妨害するまでブロードキャストし続けることができる。

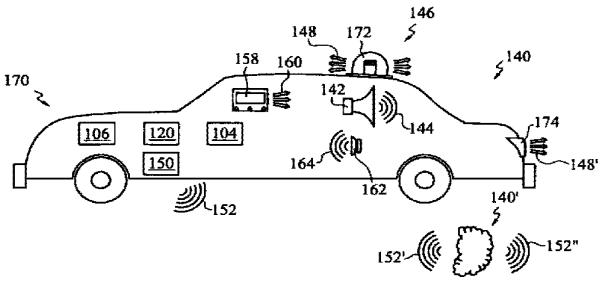
【図１】



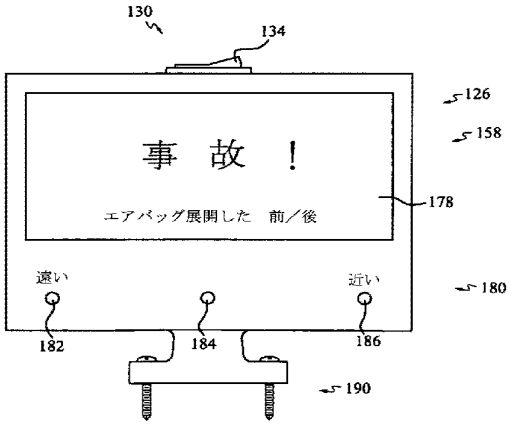
【図２】



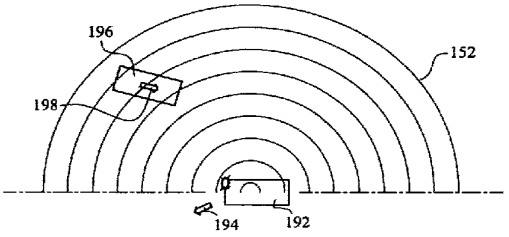
【図３】



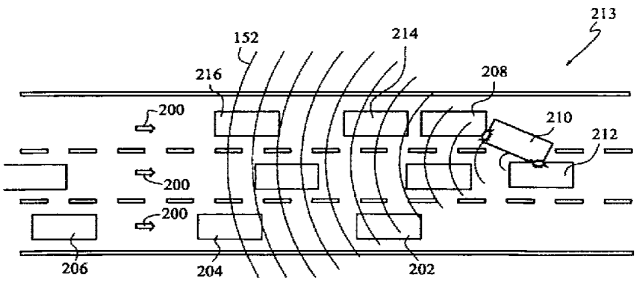
【図４】



【図５】



【図６】



【国際調査報告】

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/001837

A. CLASSIFICATION OF SUBJECT MATTER

B60Q 1/52(2006.01)i, B60Q 5/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60Q 1/52; G08G 1/16; B60R 25/10; B60Q 1/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: "hazard", "warning", "alarm", "detector", "transmitter", "receiver"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6615137 B2 (LUTTER; ROBERT PIERCE et al.) 02 September 2003 See figures 1,8,9,16; col.2 lines 13-34; and col.5 line 27 - col.6 line 29.	1-3,15,16,19,20-23,24-26,27-28,29
Y		4-14,17
A		18
Y	US 06081188A A (KUTLUCINAR; ISKENDER V. et al.) 27 June 2000 See figures 1,4 and claims 1-7.	4-7
Y	US 2007-0063824 A1 (KENT GADDY et al.) 22 March 2007 See figures 2-3 and claims 1,12,15.	8-12,17
Y	US 2010-0134271 A1 (EDWARDS GARY THOMAS et al.) 03 June 2010 See figure 12; claim 1; and paragraphs 0030-0033.	13-14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 MAY 2012 (29.05.2012)	**01 JUNE 2012 (01.06.2012)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer CHO, Choon Geun Telephone No. 82-42-481-8482

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2011/001837

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6615137 B2	02.09.2003	AU 2002-349794 A8	08.01.2003
		US 2002-0140548 A1	03.10.2002
		US 2002-0198653 A1	26.12.2002
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		US 6792351 B2	14.09.2004
		WO 03-001474 A2	03.01.2003
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US 06081188A A	27.06.2000	AU 1999-43228 A1	30.12.1999
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		US 6229438 B1	08.05.2001
		WO 99-65001 A2	16.12.1999
		WO 99-65001 A3	16.12.1999
US 2007-0063824 A1	22.03.2007	None	
US 2010-0134271 A1	03.06.2010	None	

Form PCT/ISA/210 (patent family annex) (July 2009)

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(51)Int.Cl.	F I	テーマコード（参考）
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Ｂ６０Ｒ 21/0136 (2006.01)	Ｂ６０Ｒ 21/0136	
Ｂ６０Ｑ 1/52 (2006.01)	Ｂ６０Ｒ 21/00 ６２８Ｂ	
	Ｂ６０Ｑ 1/52	

(81)指定国 AP(BW,GH,GM,KE,LR,LS,MW,MZ,NA,RW,SD,SL,SZ,TZ,UG,ZM,ZW),EA(AM,AZ,BY,KG,KZ,MD,RU,TJ,TM),EP(AL,AT,BE,BG,CH,CY,CZ,DE,DK,EE,ES,FI,FR,GB,GR,HR,HU,IE,IS,IT,LT,LU,LV,MC,MK,MT,NL,NO,PL,PT,RO,RS,SE,SI,SK,SM,TR),OA(BF,BJ,CF,CG,CI,CM,GA,GN,GQ,GW,ML,MR,NE,SN,TD,TG),AE,AG,AL,AM,AO,AT,AU,AZ,BA,BB,BG,BH,BR,BW,BY,BZ,CA,CH,CL,CN,CO,CR,CU,CZ,DE,DK,DM,DO,DZ,EC,EE,EG,ES,FI,GB,GD,GE,GH,GM,GT,HN,HR,HU,ID,IL,IN,IS,JP,KE,KG,KM,KN,KP,KR,KZ,LA,LC,LK,LR,LS,LT,LU,LY,MA,MD,ME,MG,MK,MN,MW,MX,MY,MZ,NA,NG,NI,NO,NZ,OM,PE,PG,PH,PL,PT,QA,RO,RS,RU,RW,SC,SD,SE,SG,SK,SL,SM,ST,SV,SY,TH,TJ,TM,TN,TR,TT,TZ,UA,UG,US,UZ,VC,VN

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Ｆターム(参考) 3K039 KA01 KA02 LB01 LB05 LB09 LC03 LC04 QA05 QA07
5C086 AA54 BA22 CA21 FA01 FA18
5C087 AA02 AA03 AA24 AA31 AA44 BB20 BB75 DD03 DD13 EE05
EE18 FF02 FF16 GG08 GG66 GG70 GG83
5H181 AA01 BB04 EE15 LL04 LL06

【公報種別】特許法第１７条の２の規定による補正の掲載
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【発行日】平成26年7月31日(2014.7.31)

【公表番号】特表2014-500550(P2014-500550A)
【公表日】平成26年1月9日(2014.1.9)
【年通号数】公開・登録公報2014-001
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【国際特許分類】
Ｇ０８Ｇ　1/09　(2006.01)
Ｇ０８Ｇ　1/16　(2006.01)
Ｇ０８Ｂ　21/00　(2006.01)
Ｇ０８Ｂ　25/10　(2006.01)
Ｂ６０Ｒ　21/00　(2006.01)
Ｂ６０Ｒ　21/017　(2006.01)
Ｂ６０Ｒ　21/0136　(2006.01)
Ｂ６０Ｑ　1/52　(2006.01)
【ＦＩ】
Ｇ０８Ｇ　1/09　Ｈ
Ｇ０８Ｇ　1/16　Ａ
Ｇ０８Ｂ　21/00　Ｕ
Ｇ０８Ｂ　25/10　Ｚ
Ｂ６０Ｒ　21/00　６３０Ｇ
Ｂ６０Ｒ　21/017
Ｂ６０Ｒ　21/0136
Ｂ６０Ｒ　21/00　６２８Ｂ
Ｂ６０Ｑ　1/52

【手続補正書】
【提出日】平成26年6月11日(2014.6.11)
【手続補正１】
【補正対象書類名】特許請求の範囲
【補正対象項目名】全文
【補正方法】変更
【補正の内容】
【特許請求の範囲】
【請求項１】
第１の車両に搭載されるように構築され、第１の危険を検出し、その結果として第１の出力をそこからもたらすようになっている第１の検出器、
前記第１の検出器と通信状態にあり、前記第１の出力を受信した後に第１の遠隔警告信号をそこからブロードキャストするように動作可能な第１の送信器、
前記第１の車両に搭載されるように構築され、別の送信器によって送信された外部遠隔警告信号を受信するように動作可能な第１の受信器、
前記第１の受信器と動作可能な通信状態にあり、前記第１の車両の乗員へ警告を提供するように構成された第１のローカル警告デバイスであって、前記警告は、前記外部遠隔警告信号の受信に対応する、前記第１のローカル警告デバイス、および
複数の音のうち、現在判定された状態に対応する少なくとも１つの音をブロードキャストように構成されたスピーカ、
を備え、
前記第１のローカル警告デバイスは、前記第１の遠隔警告信号および前記外部遠隔警告

信号の少なくとも１つと関連する属性の、強度の複数の異なった状態から選択された、強度のおよそ現在の状態を判定して、視覚により伝えるように構築され、前記複数の音のそれぞれは、強度の前記状態の１つに個別に割り当てられた、
システム。
【請求項２】
第２の車両に搭載されるように構築され、第２の危険を検出し、その結果として第２の出力をもたらすようになっている第２の検出器、
前記第２の検出器と通信状態にあり、前記第２の出力を受信した後に第２の遠隔警告信号をブロードキャストするように動作可能な第２の送信器、
前記第２の車両に搭載されるように構築され、前記第１の遠隔警告信号および前記外部遠隔警告信号の少なくとも１つを受信するように動作可能な第２の受信器、ならびに
前記第２の受信器と通信状態にあり、前記第２の車両の乗員へ警告を提供するように構成された第２のローカル警告デバイスであって、前記警告は、前記第１の遠隔警告信号および前記外部遠隔警告信号の少なくとも１つに対応する、前記第２のローカル警告デバイス、
をさらに備える、請求項１に記載のシステム。
【請求項３】
前記第１の検出器および前記第２の検出器の少なくとも１つは、前記第１の車両または前記第２の車両のエアバッグ展開回路のコンポーネントから入力を受信するために回路内に置かれた、請求項１または請求項２に記載のシステム。
【請求項４】
前記第１の車両および前記第２の車両の少なくとも１つに搭載されるように構築された警告灯であって、前記第１の出力または前記第２の出力に応答して、接近する車両の乗員に見えるように構成された警告灯出力をブロードキャストするようになっている前記警告灯
をさらに備える、請求項１または請求項２に記載のシステム。
【請求項５】
前記警告灯は、前記第１の車両または前記第２の車両の屋根の上に載せられるようになっている、請求項４に記載のシステム。
【請求項６】
前記警告灯は、ブレーキライト、方向指示ライト、テールライト、ランニングライト、フォグライト、およびヘッドライトからなる群から選択されたライトを備える、請求項４に記載のシステム。
【請求項７】
前記第１の車両および前記第２の車両の少なくとも１つに搭載されるように構築され、前記第１の出力または前記第２の出力に応答して、可聴警告をブロードキャストするようになっている警報
をさらに備える、請求項１または請求項２に記載のシステム。
【請求項８】
前記第１のローカル警告デバイスおよび前記第２のローカル警告デバイスの少なくとも１つは、出力メッセージを表示するように構成された画面を備える、請求項１または請求項２に記載のシステム。
【請求項９】
前記第１のローカル警告デバイスおよび前記第２のローカル警告デバイスの少なくとも１つは、前記第１の遠隔警告信号、前記第２の遠隔警告信号、および前記外部遠隔警告信号の少なくとも１つに応答して、出力メッセージを表示するように構成された画面をさらに備える、請求項１または請求項２に記載のシステム。
【請求項１０】
前記出力メッセージは、前記第１の遠隔警告信号、前記第２の遠隔警告信号、および前記外部遠隔警告信号の少なくとも１つの特徴に基づいて予めプログラムされたメッセージ

の群から選択された、請求項９に記載のシステム。
【請求項１１】
前記第１の遠隔警告信号および前記第２の遠隔警告信号の少なくとも１つのブロードキャストを停止するように動作可能なオーバーライド制御をさらに備える、請求項１または請求項２に記載のシステム。
【請求項１２】
前記オーバーライド制御は、前記第１の遠隔警告信号および前記第２の遠隔警告信号の前記少なくとも１つの第１のブロードキャスト後に予めプログラムされた期間が経過して初めて動作可能であるように構築された、請求項１１に記載のシステム。
【請求項１３】
前記第１の遠隔警告信号および前記第２の遠隔警告信号の少なくとも１つの送信範囲は、調節可能である、請求項１または請求項２に記載のシステム。
【請求項１４】
前記第１の送信器および前記第２の送信器の少なくとも１つは、前記第１の遠隔警告信号、前記第２の遠隔警告信号、および前記外部遠隔警告信号の少なくとも１つを再ブロードキャストするために動作可能に回路内に置かれた、請求項１または請求項２に記載のシステム。
【請求項１５】
前記第１の検出器および前記第２の検出器の少なくとも１つは、エアバッグ展開に応答して前記第１の出力または前記第２の出力を生成するように構成されたエアバッグ展開制御組立品のコンポーネントを備え、
前記第１のローカル警告デバイスおよび前記第２のローカル警告デバイスの少なくとも１つは、前記第１の受信器または前記第２の受信器と通信状態にあるディスプレイ・デバイスを備える、
請求項１または請求項２に記載のシステム。
【請求項１６】
前記ディスプレイ・デバイスは、前記第１の危険および前記第２の危険の少なくとも１つの場所への前記距離の見積もりを視覚により伝えるように構築され、
複数の可聴雑音のそれぞれが複数の離散的な距離見積もりの１つに個別に割り当てられ、
前記距離の前記見積もりに対応する前記雑音をブロードキャストするために、スピーカが前記システムと動作可能に結合された、
請求項１７に記載のシステム。
【請求項１７】
前記第１の検出器および前記第２の検出器の少なくとも１つは、衝突が発生したときに前記衝突を検出するようになっている、請求項１または請求項２に記載のシステム。
【請求項１８】
前記第１の送信器および前記第２の送信器の少なくとも１つは、前記第１の車両または前記第２の車両の運転者による始動の際に信号を送信し始めるように構成された、請求項１または請求項２に記載のシステム。
【請求項１９】
前記第１のローカル警告デバイスは、前記第１の車両が運転中であるときはいつでも動作するように構成された、請求項１に記載のシステム。
【請求項２０】
前記第１のローカル警告デバイスは、前記第１の車両の運転が停止した後に選択された期間にわたって動作し続けるように構成された、請求項１９に記載のシステム。
【請求項２１】
前記第１の送信器および前記第２の送信器の少なくとも１つは、選択された受信器へ信号を送信するように構成された、請求項１または請求項２に記載のシステム。
【請求項２２】

前記第１の検出器、前記第１の送信器、前記第１の受信器、および前記第１のローカル警告デバイスの少なくとも１つは、携帯電話を備える、請求項１に記載のシステム。

【請求項２３】

前記システムは、第２の遠隔警告信号をブロードキャストするように動作可能な第２の送信器をさらに備え、前記第２の送信器は、携帯電話を備える、請求項１に記載のシステム。

【請求項２４】

前記第１の危険にも前記第２の危険にも直接に巻き込まれていない、少なくとも１つの車両の少なくとも１人の乗員へ警告を提供することを備える、請求項１または請求項２に記載の前記システムを使用する方法。

【請求項２５】

前記第１の出力および前記第２の出力の少なくとも１つの供給源に少なくとも１つのワイヤを接続することを備える、請求項１または請求項２に記載の前記警告システムを形成する方法。

【請求項２６】

前記第１の出力および前記第２の出力の少なくとも１つの供給源に少なくとも１つのワイヤを接続することは、前記第１の車両および前記第２の車両の少なくとも１つの診断プラグへの電気的接続を形成することを備える、請求項２５に記載の方法。

【請求項２７】

歩行者、道路作業者、公共施設作業者、および自転車乗用者の少なくとも１人に前記第２の送信器を装着されることを備える、請求項２３の前記システムを使用する方法。

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	16991595	Filing Date	2020-08-12	Docket Number (if applicable)	012644_00013_PRV_UTL	Art Unit	3663
First Named Inventor	TUCKER			Examiner Name	Anwari, Maceeh		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 50-1971

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/david g. woodral/	Date (YYYY-MM-DD)	2024-07-22
Name	David G. WOODRAL	Registration Number	57277

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

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	1	20030141990		2003-07-31	Coon	
	2	20100159871		2010-06-24	Tester	
	3	20100250111		2010-09-30	Gutierrez, et al.	
	4	20100267379		2010-10-21	Stahlin, et al.	
	5	20120176254		2012-07-12	Imanaga, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
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	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	6	20120310517		2012-12-06	van den Oever	
	7	20140085107		2014-03-27	Gutierrez	

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	1	2010152648	JP	A	2010-07-08	Yukimasa et al		☒
	2	2014500550	JP	A	2014-01-09	Bennsoussan		☐
	3	2012071054	WO	A2	2012-05-31	Bennsoussan, et al.		☒

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	1		☐

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Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2024-07-22
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
31 May 2012 (31.05.2012)

WIPO | PCT

(10) International Publication Number
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B60Q 1/52 (2006.01) *B60Q 5/00* (2006.01)

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30 October 2011 (30.10.2011)

(25) Filing Language: English

(26) Publication Language: English

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(71) Applicant *(for all designated States except US)*: **BCS BUSINESS CONSULTING SERVICES PTE LTD** [SG/SG]; 230 Orchard Rd. #10-230, Faber Hse 238854 (SG).

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

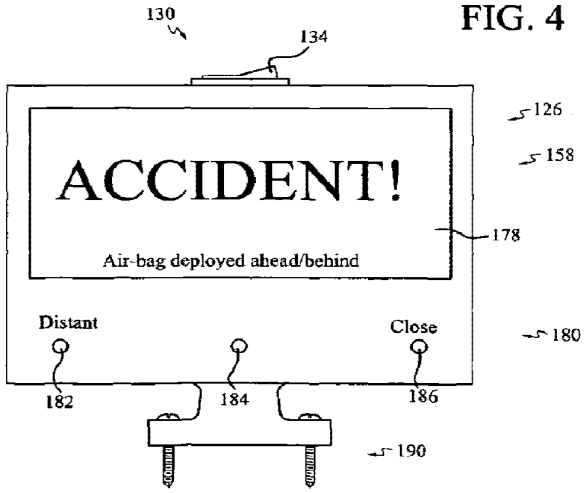
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(54) **Title**: HAZARD WARNING SYSTEM FOR VEHICLES

FIG. 4



(57) **Abstract**: A system adapted to provide a warning to a vehicle operator of nearby hazards, e.g., that a nearby vehicle has been in a collision or is otherwise inoperable. Embodiments include a detector operable to detect a hazard, a transmitter to transmit a warning signal, a receiver to receive a transmitted warning signal, and a display to warn the operator of an approaching vehicle of the hazard. Some embodiments incorporate feedback from a vehicle's airbag deployment circuitry to provide a trigger effective to broadcast the warning signal. The operator of an approaching vehicle may be provided with a visual and/or an audible warning signal, e.g., via a cellular telephone. Certain embodiments provide such warning to approaching vehicles via the transmitted warning signal and a display and/or speaker carried in the approaching vehicle. Audible and visual warnings may be transmitted directly from the crashed vehicle.

WO 2012/071054 A2

HAZARD WARNING SYSTEM FOR VEHICLES

PRIORITY CLAIM

This application claims the benefit of the filing date of United States Patent Application Serial No. 12/927,841, filed November 24, 2010, for "Crash Warning System for Motor Vehicles," the contents of which are incorporated herein by this reference.

TECHNICAL FIELD

The invention relates to warning devices. Preferred embodiments are adapted to detect occurrence of a hazard, such as a collision involving a vehicle, and then immediately broadcast a warning of such hazard to vehicle operators in the vicinity of the hazard.

BACKGROUND

A number of patents and patent application publications disclose structure and technology related to warning devices and systems that can be employed in a mobile environment. Each or the patents and publications referenced herein is hereby incorporated by reference in its entirety. U.S. Patent 7,523,000, dated April 21, 2009, describes a system of communication among cars, stationary towers, and satellites. When a rear-end collision is predicted, the system accelerates the vehicle in front to avoid the collision.

U.S. Patent Application Publication US 2008/0055068 A1, dated March 6, 2008, describes broadcasting warning messages among mobile nodes at optimal power levels to avoid network overload. A communication device senses a danger and triggers a warning message to be forwarded to neighboring vehicles. Received messages may be retransmitted to other vehicles. U.S. Patent Application Publication US 2010/0134271 A1, dated June 3, 2010, describes a visual warning system from one car to another. A driver who sees a hazard can press a button. An indicator will then illuminate; other drivers who see the indicator will then know of the hazard, and can plan accordingly. The warning may also be transmitted

wirelessly; drivers who have similarly equipped cars may receive an in-car warning even when they cannot see the other car's indicator.

U.S. Patent Application Publication US 2010/0114467 A1, dated May 6, 2010, describes a vehicle with sensors to determine when nearby vehicles have crashed, by determining that their speeds have fallen outside of normal ranges. This information may then be transmitted to other vehicles by vehicle-to-vehicle communications or by flashing lights. U.S. Patent Application Publication US 2010/0114418 A1, dated May 6, 2010, describes a vehicle with sensors to determine when nearby vehicles have crashed, by determining their movement outside of normal traffic lanes. This information may then be transmitted to other vehicles by vehicle-to-vehicle communications or by flashing lights.

U.S. Patent Application Publication US 2010/0020169 A1, dated January 28, 2010, describes a system that communicates with other vehicles. When a collision is predicted based on speed data from other vehicles, the system directs the driver where to go (*e.g.*, change lanes) to avoid collision. U.S. Patent Application Publication US 2007/0063824 A1, dated March 22, 2007, describes a system that can receive data from road construction transmitters, emergency vehicle transmitters, or other vehicles concerning road hazards. The system can also repeat signals to other vehicles. U.S. Patent Application Publication US 2008/0275618 A1, dated November 6, 2008, describes an alert system to warn drivers when vehicles ahead are moving more slowly than normal. The vehicles transmit their speed data to each other, and large speed discrepancies generate warnings to drivers. Other conditions may also be transmitted, such as hazard signal state (on or off) or trunk or door position (open or closed).

EP 1 149 371 B1, published October 31, 2001, describes a system of changing speed limits and speed bump size remotely and reporting collision information to first responders, traffic enforcement, *etc.* Communication is from a fixed point on or near a road to police, then to specific mobile officials as necessary.

International Publication WO 2009/140514 A2, dated November 19, 2009, describes a fleet of vehicles communicating with one another. Follower vehicles operate autonomously based on data from the leader vehicle. International Publication WO 2010/055509 A1, dated May 20, 2010, describes a vehicle

subsystem that collects information about the state of the vehicle. Information is communicated with a remote central server, which also transmits hazard information back to the vehicle and to other vehicles.

A number of articles and publications also describe relevant structure and technology. The article titled "A Shake May Prevent a Crash," Science Now, news.sciencemag.org/sciencenow/2009/05/26-02.html, May 26, 2009, describes using radar or lasers to detect impending collisions, then warning drivers via tactile warnings. The article titled "Car tech: Building the zero-fatality car," Computerworld, worldwideweb.computerworld.com/s/article/print/9179697/Car_tech_Building_the_zero_fatality_car, Aug. 5, 2010, describes sending out a "safety state—for example, the car's speed, the level of brake pressure the driver has applied and steering—to every other car in the vicinity." Similarly, the article "Crash Warning for Connected Cars?," ICT Results, worldwideweb.ec.europa.eu/information_society/activities/policy_link/documents/ict_results_factsheets/reposit.pdf, describes connected cars sharing their position, speed, and trajectory. A car receiving such data can then calculate the vehicles' relative positions to predict collisions. The publication "Features that prevent crashes," NZ Transport Agency, 210.48.109.8/vehicle/choosing/features-prevent.html, December 1, 2009, describes collision warning and avoidance systems that depend on a supporting network within the road system.

DISCLOSURE

As used herein, the term "collision" means and includes a contact between a vehicle and another object, including another vehicle, a fixed object (*e.g.*, a guardrail, a building, a tree, *etc.*), a human, an animal, cargo, debris, the ground, *etc.* Collisions include impacts among vehicles caused by accidental and purposeful acts (*e.g.*, a law-enforcement officer's ramming of a fleeing suspect's vehicle to disable the suspect's vehicle). Collisions also include impacts between the ground and any part of the vehicle other than its wheels. Collisions may be referred to in the art as "accidents," "wrecks," "crashes," "impacts," "fender-benders," "pileups," *etc.*

As used here, the term "hazard" means and includes a source of danger, such as a risk of collision. Hazards include, for example, collisions, animals, debris, work crews, pedestrians, and even other vehicles.

The invention may be embodied as a hazard warning system adapted to give vehicle operators an advance warning of a hazard, such as that a nearby vehicle has been in a collision. An exemplary such warning system includes a first detector structured to be carried onboard a first vehicle. Broadly, a workable detector is adapted to detect a collision involving the first vehicle and to consequently cause a first output. The detector may operate automatically without any input from the vehicle's operator.

A detector may include a collision-detecting component of the first vehicle's airbag deployment controls. A first detector may be disposed in-circuit to receive an input from a component of airbag deployment circuitry of the first vehicle. In such case, deployment of a vehicle's air bag may also generate a signal indicating that a collision has occurred involving the vehicle. In some embodiments, a detector may be configured to independently detect that an airbag has deployed (*i.e.*, independent of the airbag's circuitry). For example, a sensor may be configured to detect heat and/or pressure associated with an expanding airbag. One or more detectors may be arranged to detect a collision that occurs from any point of the compass, including from the front, side, or rear of a vehicle. For example, the detector may include one or more accelerometers.

The exemplary system also includes a first transmitter disposed in communication with the first detector and operable to broadcast a first remote warning signal subsequent to receiving the detector's first output. If the first vehicle experiences a sufficiently significant collision, the first remote warning signal is broadcast for reception by compatible hazard warning systems carried in nearby vehicles. The first remote warning signal may be transmitted from one vehicle directly to other vehicles, without passing through any intermediary. In some embodiments, the first remote warning signal may be transmitted to other vehicles via repeaters or amplifiers, such as repeaters mounted in satellites or in terrestrial infrastructure (*e.g.*, towers, underpasses, buildings, *etc.*). One advantage of automatic, direct vehicle-to-vehicle communication is that warnings may be more

immediate, and may be more effective at preventing additional collisions than conventional methods of warning of hazards. Furthermore, systems configured to communicate directly with other systems may be deployed without modifying infrastructure. Another benefit of the hazard warning systems disclosed herein is that warnings may be transmitted around curves or over hills, and may provide vehicle operators information regarding hazards beyond their immediate vision (which, when traveling at high speeds, may be a distance traveled in a relatively short period of time).

One determination of a sufficient level of significance is defined as a collision wherein an air bag is deployed. However, some hazards may not cause deployed airbags, but may nonetheless warrant broadcasting a remote warning signal, such as side-impact collisions, rear-end collisions, overturned vehicles, stalled vehicles, debris, *etc.*

A first exemplary remote warning transmitter may be embodied as a warning light structured to be carried onboard the first vehicle and adapted to broadcast a warning light output responsive to an output of the first detector. A warning light may be configured to be visible to an occupant of an approaching vehicle. One such warning light is adapted to be carried on top of the roof of the first vehicle. In some embodiments, a warning light may include one or more element selected from the group including a brake light, a turn signal light, a taillight, a running light, a fog light, and a headlight of the first vehicle.

A second exemplary remote warning transmitter may be embodied as an alarm structured to be carried onboard the first vehicle and adapted to broadcast an audible warning, for perception of the audible warning by an occupant of an approaching vehicle. An alarm may include, *e.g.*, a loud speaker and/or a siren.

A third exemplary remote warning transmitter may be embodied as a broadcasting device, such as a radio frequency or radar transmitter. In general, a remote warning transmitter may be configured to convey warning information from a hazard site to a remote site. Preferably, a remote warning transmitter is operably responsive to an actuating output of an associated detector. One or more remote warning signals may be substantially simultaneously broadcast from various hazard warning systems (*e.g.*, from different vehicles).

The exemplary system also includes a first receiver structured to be carried onboard the first vehicle and operable to receive a second remote warning signal that is transmitted by a different hazard warning system carried by a nearby vehicle. The exemplary system further includes a first local warning device in communication with the first receiver and effective to communicate a warning to an occupant disposed inside the first vehicle. The exemplary system is structured such that a remote warning signal from a different hazard warning system causes a local warning, perceptible to an occupant of the first vehicle, to be conveyed by the first local warning device. By extrapolation, a remote warning signal broadcast from a remote hazard site may cause a plurality of local warnings to alert operators of nearby vehicles of the remote hazard.

An exemplary first local warning device includes a display screen on which a printed message may be displayed for observation by an operator of the first vehicle. Display screens may include light emitting diodes ("LED"), liquid crystal displays ("LCD"), cathode ray tube ("CRT") devices, and the like. Desirably, the text message is presented in a format to draw the attention of the vehicle operator, such as in a highly visible color. Sometimes, a first local warning device is structured to visually convey the instantaneous intensity, selected from a range of intensities, of an attribute associated with a second signal. One exemplary local warning device is structured to determine and visually convey an approximate current state of intensity, selected from a plurality of different states of intensity, of an attribute associated with a received signal. For example, a distance between an approaching vehicle and a hazard site may be represented by a plurality of lights, a bar chart, or a picture of an analog dial and needle. In some embodiments, a first local warning device may include analog instruments. In certain cases, a plurality of audible sounds may be individually assigned to each one of the plurality of states of intensity, and a speaker may be associated with the warning device to broadcast one sound, selected from the sounds and corresponding to the currently determined state, for audible perception of the one sound by an occupant of the first vehicle.

A hazard warning system may include an override control or reset button, operable to terminate broadcast of one or more signal or to adjust an output of the warning system. In an exemplary case, the override control is structured to be

operable only after a first pre-programmed period of time has elapsed subsequent to first broadcast of a signal. Also, the transmission range for a transmitted remote warning signal may be adjustable based upon conditions disposed in the location of a hazard. A first transmitter carried in a nearby vehicle may be disposed, in-circuit, operably to rebroadcast a remote warning signal received from a crashed vehicle to extend the distance a signal is transmitted from a hazard site. In some embodiments, a first transmitter may rebroadcast a remote warning signal only after prompting a vehicle operator for approval to rebroadcast. In other embodiments, the remote warning signal may be rebroadcast automatically.

The exemplary system may be adapted for use in cooperation with at least a second hazard warning system. The second warning system is structured to be carried by a second vehicle to detect a collision involving the second vehicle and, consequently, broadcast a remote warning signal to warn occupants of nearby vehicles, such as the first vehicle. A plurality of hazard warning systems may be carried in a corresponding plurality of different vehicles. Desirably, such plurality of hazard warning systems are at least compatibly arranged to broadcast and receive mutually compatible remote warning signals. As more and more vehicles include hazard warning systems, the value or benefit of individual hazard warning systems may increase (*i.e.*, hazard warning systems may have a demand-side economy of scale). In a best-case situation, every vehicle on the road would include a hazard warning system able both to communicate a remote warning to nearby vehicles, and operably receive such a remote warning. Consequently, a broadcast remote warning signal would provide a local warning to each nearby vehicle in range to receive the remote warning signal.

The currently preferred hazard warning system includes a detector, a transmitter, a receiver, and a local warning device. Such a system may be encompassed within one or more independent modules that can be carried by a vehicle. Part of, or the entirety of, a hazard warning system may be built-in to a vehicle, or connected to one or more component of the vehicle.

In general, a detector is any device operable to generate an input signal resulting from a collision involving a vehicle in which the collision detector is carried or upon activation by an operator. The detector may detect a collision as the

collision occurs, or within a short period of time thereafter. A controller may be disposed in-circuit to evaluate the significance of a collision before actuating a transmitter. Desirably, the collision is first evaluated and determined to be above a certain threshold before the collision warning system is actuated. A currently preferred collision detector includes a component of an airbag deployment control assembly of the vehicle. In such case, the detector can be structured to cause an input signal to a controller or an actuation signal to a transmitter, responsive to a trigger caused by airbag deployment resulting from the collision.

The transmitter is disposed in communication with the detector. In general, an operable transmitter can broadcast a remote warning signal directed to nearby traffic. Certain remote warning signals include signals that are directly perceptible to humans, such as sounds and lights. A sound signal may be broadcast by an alarm, such as a loudspeaker or siren. A workable light signal may be cast from a dedicated warning light. A warning light may be carried on the roof of the vehicle, enabling observation of broadcast light from all points of the compass. Certain warning light arrangements may include a headlight, turn signal light, taillight, running light, fog light, or brake light as a broadcasting device. Another remote warning signal includes a signal that can be broadcast from a crashed vehicle for reception by a receiver and subsequent input to a local warning device carried in one or more nearby vehicles. Exemplary broadcastable signals include electromagnetic radiation (*e.g.*, infrared), radar, and radio frequency signals.

The receiver is structured to receive a remote warning signal from a different warning system. A local display device in communication with the receiver is effective to communicate a local warning, corresponding to the remote warning signal, to an occupant of the vehicle. A display device may be structured to visually convey an intensity of a parameter, such as an estimate of the distance to a hazard site. A plurality of audible noises may be individually assigned to a corresponding plurality of discrete parameter values. In such case, a speaker may be employed to broadcast the noise corresponding to the currently displayed parameter value.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a simplified schematic view representing elements of an assembly constructed according to certain principles of the instant disclosure.

FIG. 2 is a simplified schematic illustrating certain operable relationships between elements that may be included in an operable embodiment.

FIG. 3 is a simplified schematic view in elevation representing an assembly constructed according to certain principles of the instant disclosure.

FIG. 4 is a simplified front view in elevation of a workable display device operable in certain embodiments of the invention.

FIG. 5 is a first plan view of motor vehicles carrying embodiments of the invention.

FIG. 6 is a second plan view of motor vehicles carrying embodiments of the invention.

MODE(S) FOR CARRYING OUT THE INVENTION

Provided is an apparatus (or "system") adapted to warn vehicle operators (*e.g.*, motorists) that a hazard (*e.g.*, a collision involving another vehicle) is in the vicinity. Embodiments thereof may be structured in modular form for convenient aftermarket installation in a vehicle, or as an Original Equipment Manufactured (OEM) component or system.

An embodiment adapted to be carried by a vehicle is indicated generally at 100 in FIG. 1 and includes a controller 104 in communication with a detector, generally indicated at 106 and a remote signal transmitter, generally indicated at 108. A remote signal transmitter 108 may be capable of broadcasting a remote warning signal 110 to provide a warning to operators of other vehicles in the vicinity of a detected hazard. Remote warning signals 110 may include visible, audible, and other transmittable signals, such as radar, electromagnetic (*e.g.*, infrared, ultraviolet, *etc.*), and radio frequency (RF) signals. The remote signal transmitter 108 may be a low-power radio frequency transmitter 109. As one example, a remote signal transmitter 108 may operate under the open-source Class 1 Bluetooth protocol, which has a maximum permitted power of 100 mW and a range of about 100 meters.

A detector 106 may pass an informational signal to a controller 104 in response to a hazard or collision (*e.g.*, as the collision occurs or shortly thereafter). A detector 106 may incorporate one or more sensor components already present in a significant number of automotive vehicles. The detector may include a collision-detecting element 107, such as may be used in a vehicle's airbag deployment system.

Several types of collision-detecting sensors exist in commercial use in airbag deployment systems. Commercially available collision-detecting sensors include electrical systems, mechanical systems, and combinations of mechanical and electrical systems of operation. For example, some vehicles have "spring and mass" collision-detecting sensors in which a spring-loaded weight is deflected by an impact to close a switch. Some newer vehicles have solid-state collision-detecting sensors that contain either a piezoelectric crystal or a micromachined accelerometer chip, and that produce an electrical signal when sufficiently jolted. Sensors that close switches, open switches, or generate an electric signal responsive to a collision may easily be adapted to provide an informational signal to a controller that a collision has occurred.

Certain vehicles include self-contained mechanical air bag systems that trip a firing pin when jostled by a collision. The firing pin typically ignites a primer to fire a propellant used to inflate the airbag. Even a sensor of the mechanical type may be configured as a detector 106 to produce an electrically based informational output signal 112 or 114 responsive the deployment of an element such as: the firing pin configured also to function as an electrical switch; a temperature sensor disposed to measure a temperature of a propellant; a pressure sensor inside an air bag; or the like. In any event, a signal may be obtained from a variety of sensor element types for use as either an informational input 112 to a controller, or as a direct command input 114 to a remote signal transmitter 108. Put another way, a detector 106 may be characterized as causing an output, such as signal 112 or signal 114, to cause a transmitter, such as transmitter 108, to broadcast a remote warning signal.

One common airbag impact or collision-detecting sensor employs a ball confined inside an upwardly slanting tube having an electrical contact disposed at the elevated end of the slanted tube. A small magnet exerts a restraining force on

the ball at the bottom of the incline, which restraining force must be overcome by the deceleration effected by a collision. When a collision having a magnitude large enough to cause sufficient deceleration occurs, the ball rolls up the incline to make contact with, and close, the electric switch. Gas damping may be incorporated to provide further resistance to the ball's rolling up the incline. The ball typically rolls back to the bottom of the sloping tube subsequent to the collision, resetting the sensor. In such a sensor, an informational signal 112 or command signal 114 may be obtained indicating departure of the ball from its normally trapped position to the extent that the collision-detection switch is closed. When that switch is closed, a resulting electrical signal may be obtained and used, for example, as an informational signal 112 in a hazard warning system 100.

Another common collision sensor is the "Rolamite" design by TRW, which includes a small metal roller that rolls forward under sudden deceleration to trip a switch. Such sensors may provide an electrical informational signal 112 when the tripped switch is closed, or sometimes even when a different switch is opened, *i.e.*, indicating the roller element is away from its normally occupied position.

In many cases, a safety sensor arming sensor is incorporated into an airbag control module of an airbag deployment system to reduce false airbag deployment (*e.g.*, due to a slow-speed collision). Such safety sensor may be located at a different position, typically in the passenger compartment and farther away from the likely impact site, than the collision-detecting sensor. The airbag control module essentially requires proper signals from both of the collision-detecting sensor and the arming sensor before permitting deployment of the airbag. Closing or opening a switch in such an airbag control module during the course of an airbag deployment operation may also produce a signal that can be used in parallel as either an informational signal 112 or a direct command signal 114. A stand-alone collision-detecting system having similar operational features may be incorporated in a hazard warning system.

Access to a signal that may be used for informational signal 112 or command signal 114 may be obtained by appropriately connecting a wire, or wires, to a switch portion of a collision detector, control module, or other source of such signal. An aftermarket hazard warning system (*i.e.*, a system not integrated into a vehicle at the

time of the vehicle's manufacture) may simply plug into an On-Board Diagnostic ("OBD") plug of a current or future industry standard. Of course, an OEM version of a hazard warning system 100 may be built-in to a new vehicle, and may include access to an appropriate sensor or control module within an OEM wiring harness. Alternatively, an aftermarket wire may be operably connected directly to a collision detector element or module of an OEM airbag deployment system. Communication between a detector 106 and either, or both of, a controller 104 or remote warning signal transmitter 108 may also be provided using a wireless transmission protocol, such as the open-source Class 3 Bluetooth protocol, which has a maximum permitted power of 1 mW and range of about 1 meter. In such case, inter-component transmission of a hazard warning system disposed in one vehicle may be less likely to be accidentally received by an adjacent vehicle.

One or more detectors 106, dedicated solely to the hazard warning system 100, may be used to provide one or more directionally based input signals 112, or command signals 114. Many collision detection sensors are substantially directional in their capability to detect collisions. For example, a rolling ball element will not be urged to travel up a tube's incline if an appropriate change in acceleration is not directed in sufficient agreement with the tube's axis. Some air bags are designed to prevent the vehicle's occupants' heads from hitting the dashboard. Therefore, most collision sensors for air bags are oriented in agreement with a length axis of the vehicle. A plurality of collision sensors carried independently from the vehicle airbag deployment system may permit deployment of a remote warning signal responsive to a side-impact collision, or even a rear-impact collision, collisions which may not cause an air bag to deploy. A plurality of independent collision sensors may be carried in an aftermarket collision warning module to provide a plurality of directionally based input signals 112 or command signals 114. In some embodiments, a detector 106 may be configured to detect collisions from any direction of the compass. For example, a detector 106 may include an accelerometer capable of detecting changes in velocity in two or more directions, such as changes in velocity in 3-dimensional space, and/or changes in rotational velocity.

One or more independent sensors may be used in combination with a collision sensing element of a vehicle's airbag deployment system. For example,

one or more independent collision sensors may be carried in an aftermarket collision warning module disposable in communication with an OEM airbag deployment element to provide a plurality of directionally based input signals 112 or command signals 114. Such an independent sensor may be configured to detect a side-impact collision, and/or a rear impact collision, for example.

A controller 104 may include any suitable intervening device to actuate a transmitter 108 subsequent to detection of a collision involving the vehicle 100. In some cases, a controller 104 may be embodied as part of a detector 106. For example, a wire may be arranged directly to convey an input, such as the presence or absence of an electrical signal, from a collision detector to a transmitter and thereby cause broadcast of a remote warning signal. In some embodiments, a controller 104 may include a structure capable of at least rudimentary decision making, such as a programmable logic controller ("PLC"), a microprocessor, or the like. A controller 104 may include a microprocessing element conventionally carried by a vehicle, such as a processing element used for emissions control or operation and/or monitoring of some other vehicular system.

A controller 104 may be structured and arranged to receive and evaluate one or more input, such as input 112 from detector 106, before making an actuating output or command signal 114 to cause operation of a remote signal transmission device 108. For example, controller 104 may receive an informational signal 112 from a detector 106, evaluate the signal 112 compared to a pre-programmed range of responses, and make a corresponding output signal 114, causing broadcast of an RF warning signal 116 from RF transmitter 109.

A hazard warning system 100 may also include a receiver, generally indicated at 120, to receive a remote warning signal transmitted from a different hazard warning system carried in a different vehicle. For example, receiver 120 may include an RF antenna 121 structured to receive an RF signal 116' that is transmitted by the other vehicle. After receiving the signal 116', receiver 120 may pass its output 122 as an informational input 122 to controller 104. Consequently, controller 104 may make a command output 124 to cause operation of a local warning device, generally indicated at 126. A local warning device 126 may communicate a warning to the operator of the vehicle in which a hazard warning system 100 is installed. A

local warning device 126 may include a visual display device 128 on which text characters may be shown to communicate a message to an occupant of the vehicle in which a hazard warning system 100 is carried. Alternative local warning devices may nonexclusively include audible and other visually perceptible systems.

Components of the hazard warning system 100 may be configured to automatically begin operation when a vehicle in which the system 100 is disposed is in operation. The transmitter 108 may continue operating after the vehicle ceases operation. For example, when a vehicle stops due to a collision, the transmitter 108 may continue to operate to warn other vehicle operators. The local warning device 126 may be configured to begin operation when a vehicle in which the system 100 is started, such that the vehicle's operator need not remember to enable the local warning device 126 each time the vehicle is operated. The system 100, or portions thereof, may be configured such that a vehicle operator may not disable the system 100.

A hazard warning system 100 may include an additional apparatus, generally indicated at 130, to cause an input 132 for evaluation by the controller 104. For example, a user override control, such as a switch 134, may be actuated by a vehicle operator to turn off or otherwise adjust a signal 116. In some cases, the controller may be provided with programming instructions to enable such override only after a selected period of time has elapsed subsequent to activation of the warning system 100. Apparatus 130 may be structured to permit a vehicle operator to transmit a text message to other operators, to specific selected receivers (*e.g.*, via cellular telephone transmission to selected telephone numbers), or to authorities. Apparatus 130 may also be configured to permit a vehicle operator to transmit a warning to systems in other vehicles, such as when the operator detects that the vehicle has a flat tire, is running out of fuel, is hydroplaning, is stuck in snow, or is otherwise a hazard to other vehicles. Furthermore, a vehicle operator may activate the apparatus 130 upon observing a hazard, such as a collision, a disabled vehicle, debris in a roadway (*e.g.*, dropped cargo, fallen trees or rocks), wildlife, roadkill, an emergency vehicle, emergency or traffic control personnel, a pedestrian, a slippery road surface, a work crew, *etc.* Thus, the system 100 may be operable to generate a signal 116 based only

on the input of a vehicle operator, which signal 116 may warn operators of nearby vehicles of a hazard.

In some embodiments, the hazard warning system 100 may detect an event (*e.g.*, a sudden deceleration), but may be unable to determine if the event warrants transmitting a warning signal 116 to systems in other vehicles. For example, a deceleration above a selected threshold may automatically cause a warning signal 116, whereas a deceleration below that threshold may not. After such an event, the local warning device 126 may prompt the vehicle operator regarding the transmission of a warning signal 116. The operator may then direct the system 100, such as via apparatus 130, to transmit a warning signal 116 or to not transmit a warning signal 116.

In some embodiments, the system 100 may inform specific people or organizations of a collision. For example, a system 100 may include cellular or radio communication modules (*e.g.*, cellular telephones and associated equipment), and may send text or voice messages to family members, friends, emergency personnel, etc. Messages may include a location, information about the collision (*e.g.*, speed of the vehicle, direction of travel, *etc.*), and/or any other information.

With reference now to FIG. 2, a second embodiment, generally indicated at 140, includes a detector 106 in communication through a controller 104 to operate a remote warning signal transmitter 108. As illustrated, a remote warning signal transmitter 108 may be embodied as one or more of: an alarm 142 operable to transmit a loud sonic signal 144 that is audibly perceptible to approaching traffic (*e.g.*, a siren); a warning light 146 operable to transmit a warning signal 148 that is visibly perceptible to approaching traffic (*e.g.*, a flashing light); and a transmitter 150 operable to transmit a remote warning signal 152 that may be received by a signal receiving apparatus 120 carried in an approaching vehicle.

Embodiment 140 also includes a receiver 120 in communication through controller 104 to operate a local warning device 126. A local warning device 126 may include one or more of: a local display element 158 configured to transmit a local signal 160 that is visibly perceptible to an occupant of the vehicle; and a speaker 162 configured to produce a local sound output 164 that is audible to the occupant. Display elements 158 may include, for example, LED and LCD display

panels, one or more light that can emit individually distinguishable colors, an array of lights, a bar graph, a meter with a rotating needle, and the like. An audible signal 164 may be used in combination with a visual signal 160 to increase the likelihood that the operator of the vehicle will notice and heed the warning. The audible signal 164 and/or the visual signal 160 may be configured to be different from other signals conveyed to the vehicle operator (*e.g.*, a low-fuel light, an emissions-control system light, *etc.*). Vehicle operators may be more likely to notice a sound and/or light that is abnormal in relation to typical vehicle operation. Since a nearby hazard has the potential for immediate and catastrophic harm, it may be advantageous to draw the attention of a vehicle operator immediately to a warning of such a hazard. One or both of audible signal 164 and visible signal 160 may be configured to change in intensity (*e.g.* change in decibel level, color, amount of needle rotation, or bar length) responsive to a distance between the receiver 120 and a hazard site.

As illustrated in FIG. 3, a hazard warning system, such as embodiment 140, may be adapted to be carried in or on an automotive vehicle, generally 170. In general, such automotive vehicle 170 may encompass cars, trucks, motorcycles, heavy transport vehicles, delivery vehicles, and the like. Similar systems may be adapted for use in or on any type of vehicle, such as boats, bicycles, construction equipment, commercial semis, trains, race cars, *etc.* Certain hazard warning systems may include OEM assemblies built-in to particular vehicles.

Other hazard warning systems may be substantially modular components or assemblies that can be connected, as appropriate, to one or more elements carried by a vehicle. Preferably, one such element is associated with the airbag deployment system of the vehicle. Certain hazard warning systems may include modular stand-alone systems that can easily be transferred between vehicles.

In some embodiments, a hazard warning system may incorporate a cellular telephone (*e.g.*, an Apple IPHONE®, an ANDROID™ phone, a WINDOWS PHONE™, *etc.*), and may be configured to employ one or more sensors built in to the cellular telephone (*e.g.*, a microphone, an accelerometer, a global positioning system (GPS) receiver, *etc.*). Such a hazard warning system may operate as a software application or "App" on the phone. A hazard warning system operating as a software application on a cellular telephone may include logic to differentiate a

vehicle collision from other changes in velocity, such as a dropped phone, *etc.* A hazard warning system including a cellular telephone may be configured to communicate with hazard warning systems integrated or installed in vehicles.

With continued reference to FIG. 3, automotive vehicle 170 carries a controller 104 in communication with a detector 106 and a remote warning signal transmitter 150. When vehicle 170 is involved in a detectable collision, warning signal transmitter 150 broadcasts a remote warning signal 152 to operators of other vehicles in the local area of the collision. Additionally, alarm 142 may broadcast a remotely audible warning signal 144. An alarm 142 may include the vehicle's conventional horn, although a special purpose noise maker or siren may be used alternatively, or in addition to the vehicle's horn.

Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'. The beacon 172 or vehicle lights 174 may be integrated into the vehicle 170 such that the vehicle 170 retains its styling and/or aesthetic appeal.

Warning signals 144 and warning lights 146 may also alert others of a collision, even when there is no immediate hazard to other vehicles. For example, a vehicle equipped with a hazard warning system may leave a roadway, such as into a ditch or ravine, and may be disabled. Since it is out of the flow of traffic, the vehicle may not be a hazard to other vehicles. The operator, however, may be hurt, unconscious, or in danger, and may need assistance. Operators of other vehicles may be unaware of the existence of the disabled vehicle, but for the warning signal 144 and/or warning light 146. Upon seeing the warning light 146 and/or hearing the warning signal 144, an operator of another vehicle may call emergency personnel for help and/or render assistance. In some circumstances, an operator of a disabled vehicle may use the light from the warning light 146 to find a path through an otherwise dark area to seek assistance (*e.g.*, back to a roadway).

Embodiment 140 includes a receiver 120 in communication with controller 104 and adapted to receive a signal 152' that is transmitted by a second embodiment 140' carried in another vehicle in proximity to vehicle 170. When signal 152' is forwarded by receiver 120 as an information signal that is received and interpreted by controller 104, a controller 104 may cause a display 158 to emit an appropriate visible signal 160. Controller 104 may optionally cause speaker 162 to emit an appropriate audible alert 164. One or more speakers present in an audio system (*e.g.*, an audio entertainment system) of vehicle 170 may be used as speaker 162. Alternatively, a hazard warning system may include a dedicated speaker.

A transmitted remote warning signal 152 may be scalable in transmission power to effect a desired distance of signal transmission appropriate to the local operation of a vehicle 170 (*e.g.*, city, mountain, country, *etc.*) Some transmitters of remote warning signals 150 have a fixed transmission range. Transmitters may include low-power RF transmitters or low-power radar transmitters, such as those deployed in certain automobile parking radar systems. An embodiment 140' may be adapted to receive signal 152 from embodiment 140, and embodiment 140' may subsequently rebroadcast such signal as retransmitted signal 152". In such an arrangement, the remote warning signal may be transmitted a greater distance, and provide additional time for an operator of an approaching vehicle to prepare to arrive at the hazard site. Of course, a feedback signal may be included in such an arrangement, to prevent the signal 152 from being re-broadcast beyond a range useful to others. For example, it may not be beneficial to warn motorists that a collision has occurred 80 km away, or to warn motorists travelling in a parallel direction but offset in a direction transverse to a direction of travel toward the hazard site (*e.g.*, on a parallel street). Such extreme range warning may not be helpful to a person receiving a signal rebroadcast multiple times.

In some embodiments, a hazard warning system 140 may be configured such that a signal 152' may not be rebroadcast automatically as signal 152. Instead, an operator of a vehicle in which system 140 is disposed may be prompted to rebroadcast the signal 152' to other vehicles as signal 152. The system 140 may indicate to the operator of the vehicle the number of times the signal 152' has been transmitted previously. In some embodiments, the hazard warning system 140 may

be configured to automatically determine whether to rebroadcast a signal 152'. Such determination may be based in whole or in part upon the number of times the signal 152' has been transmitted, the distance to the original source of the signal 152', the speed and direction of travel of the vehicle carrying the system 140, the presence or absence of nearby roads, *etc.* A local display device 158 is illustrated in FIG. 4. Display device 158 may include a display panel 178 on which a text message and/or one or more indicator element may be indicated. The panel 178 may be configured to convey an appropriate text message to the operator of a vehicle in which the local display device 158 is carried. Messages may include simple warnings, such as "ACCIDENT!", "COLLISION AHEAD!", "CAUTION", "DISABLED VEHICLE!", "HAZARD!", or "WARNING!". The text may be displayed in manner or color to attract the attention of the vehicle's driver. Certain embodiments of display panel 178 may indicate more complicated messages. For one example, a receiver 120 may receive a signal that is broadcast from a traffic sign, and subsequently display a more complete message than can be perceived by a driver during a short interval during which such traffic sign is visible and decipherable. The driver may then review the message in more depth after passing the sign.

In some embodiments, details about the hazard location may be included, such as that the hazard is ahead of, or behind, the present vehicle. A display, generally indicated at 180, may indicate intensity of an attribute associated with a signal, such as distance to a hazard site. Intensity display 180 illustrated in FIG. 4 includes a yellow light emitting element 182, an orange light emitting element 184, and a red light emitting element 186. In such an arrangement, yellow element 182 may be enabled to indicate a distant hazard. Similarly, orange element 184 and red element 186 may individually be illuminated in appropriate sequence as the display 180 approaches the hazard location. An alternative intensity display may be presented on a multipixel screen, such as a CRT, LCD, or LED screen, which can illustrate such parameter graphically, and in various forms such as: a pie chart, a bar chart, and a picture of an analog dial with a rotating needle, *etc.*

A speaker 162 may emit a variable warning sound that may vary in pitch, volume, *etc.*, to indicate intensity levels of a parameter, such as distance to the hazard site. For example, a prerecorded voice may announce the distance to the

hazard site. A modular embodiment of a system 140 including a local warning device 126 may include a display element 158 and a speaker 162.

FIG. 4 also illustrates an additional input apparatus 130 that is embodied as a toggle switch 134. Such switch 134 may be employed as an on-off switch, and/or as an override control effective to terminate the output of one of more warning signal. Another alternative input apparatus 130 may include a device (*e.g.* keyboard or keypad, not illustrated) adapted to permit a vehicle occupant to input a text message for transmission by a transmitting element 108.

Provision may be made to anchor a local display 126 or 158 with respect to a vehicle in which such local display is carried. Anchoring means, generally indicated at 190, are therefore generally included. Anchoring means 190 may include screws, as illustrated, or various adhesive arrangements; including decoupling arrangements, such as hook and loop fasteners, which permit transport of a system 126 between different vehicles; friction mounting arrangements, suction-cup mounting arrangements, and other anchoring arrangements generally known in the art.

Certain embodiments may be incorporated in OEM installed systems, and may even be integrated into or available as an add-on for certain devices, such as commercially available media-playing systems, GPS receivers, cellular telephones, *etc.*, devices that may be carried in or installed in vehicles.

A hazard warning system incorporating a GPS receiver or another location-sensing device (*e.g.*, a device such as a cell phone that uses cell phone tower triangulation to determine location) may, for example, transmit information about the location of a hazard. For example, if a vehicle operator observes a hazard, the operator may activate a warning to systems in other vehicles. The warning may include an approximate location of the hazard and/or the time the hazard was observed. In some embodiments, the warning may be passively initiated by the hazard warning system without human intervention, and may nonetheless include information about the location and/or time of the hazard. In some embodiments, a hazard warning system may filter warnings by location and time to avoid unnecessarily distracting a vehicle operator with information about hazards outside the vehicle's path.

A hazard warning system may include a voice-recognition system. For example, upon observing a hazard, a vehicle operator may activate the hazard warning system, and may then orally report the nature of the hazard (*e.g.*, "debris in the center lane"). The voice-recognition system may convert the spoken words of the vehicle operator to text, and may transmit the text (*e.g.*, via Short Message Service (SMS) or Multimedia Messaging Service (MMS), *etc.*) to other hazard warning systems. Hazard warning systems in nearby vehicles may convert the text into computer-synthesized speech for aural reception by vehicle operators, as is known in the field of GPS-based navigation. Such a system may afford a wide variety of warnings for hazards not contemplated in advance, and may provide more detail about such hazards. In other embodiments, an audio recording of the operator who observes the hazard may be transmitted to and replayed by hazard warning systems in nearby vehicles.

In some embodiments, a hazard warning system may allow operators of later-arriving vehicles at the scene of the hazard to update information regarding the hazard. For example, a hazard warning system may alert an operator of a first vehicle that other vehicle operators noted a hazard near the current location of the first vehicle. The operator of the first vehicle may then confirm the hazard, such as through, for example, voice confirmation, a switch, a keypad, a keyboard, or a touch-screen. The operator may alternatively indicate that the hazard is no longer present. After a specified number of vehicle operators indicate that the hazard is no longer present (*e.g.*, after indications from one operator, two operators, three operators, *etc.*), hazard warning systems may stop transmitting warnings of such a hazard.

Hazard warning systems hereof may supplement and/or interact with anti-collision systems or pre-collision systems available in some automobiles (*e.g.*, systems that use radar to detect when a vehicle is at risk of collision, systems that pre-charge brakes before a predicted collision, systems that apply brakes to slow a vehicle before a predicted collision, or systems that tighten safety belts before a predicted collision). For example, a hazard warning system hereof may be configured to receive a signal from a pre-collision system indicating that a collision is imminent. The hazard warning system may transmit a warning of the impending

collision to other vehicles before the collision occurs. This may provide an additional period of time for operators of other vehicles to react, and may therefore prevent some vehicles from joining the collision that may otherwise join the collision if the warning signal were first sent after the collision had begun. For example, such early warnings may keep a two-vehicle collision from becoming a collision involving three, four, or more vehicles.

Hazard warning systems as disclosed herein may also be configured to receive signals from other compatible systems. For example, a pedestrian, road or utility worker, or bicyclist may carry a transmitter to transmit signals detectable by hazard warning systems. Such a transmitter may operate as a software application on a cellular telephone. Operators of nearby vehicles may thus receive an advance warning of the presence of such individuals.

FIGs. 5 and 6 illustrate two traffic situations in which embodiments of hazard warning systems can be effective to provide an increment of advance warning of a collision, and additional time in which an operator of a vehicle may take evasive action. In FIG. 5, the original direction of travel for vehicle 192 is indicated by arrow 194, and the direction of travel for vehicle 196 is indicated by arrow 198. Vehicle 192 is illustrated as having hit an obstruction that caused airbag deployment. As a consequence of the airbag deployment, a hazard warning system carried in vehicle 192 also broadcast a remote warning signal 152 to all cooperating vehicles within broadcast reach. Therefore, the operator of vehicle 196 is forewarned, and may employ a suitable amount of caution in the vicinity of the collision. Note that for efficiency of space utilization on the sheet, only one-half of the symmetrical broadcast signal 152 is illustrated. Because the resting orientation of a vehicle subsequent to a collision is indeterminate, a broadcast signal, such as signal 152, may be broadcast in all directions of the compass.

FIG. 6 illustrates a traffic situation in which the direction of traffic motion is indicated by arrows 200. Vehicles 202, 204, and 206 are spaced apart by about the minimum safe distance for operation at the speed of the illustrated traffic. Vehicles 208, 210, and 212 have just become involved in a collision, generally 213, and an airbag was deployed in at least vehicle 210, which caused broadcast of remote warning signal 152. While vehicle 214 may not be able to stop in time to avoid

joining the collision 213, the operator of vehicle 216 may receive warning signal 152 and gain an additional increment of time sufficient to avoid the collision 213.

Once a collision happens, a hazard warning system, such as hazard warning system 100, may be structured to transmit a remote warning signal 152 for a mandatory period of time to ensure approaching vehicles are sufficiently warned. For example, such mandatory period of time may be about 2 minutes. The operator of the transmitting vehicle may then be able to stop the signal if the operator determines that there is no further hazard. For example, a hazard warning system may be interrupted by pressing a "reset" button, or an on/off button associated with a local display screen inside the crashed vehicle. If the operator is unconscious or unable to push the reset button, the signal 152 may continue broadcasting until another person interferes.

CLAIMS

What is claimed is:

1. A system comprising:

a first detector structured to be carried onboard a first vehicle and adapted to detect a first hazard and to consequently cause a first output therefrom;

a first transmitter in communication with the first detector and operable to broadcast a first remote warning signal therefrom subsequent to receiving the first output;

a first receiver structured to be carried onboard the first vehicle and operable to receive an external remote warning signal transmitted by another transmitter; and

a first local warning device in operable communication with the first receiver and configured to provide a warning to an occupant of the first vehicle, the warning corresponding to receipt of the external remote warning signal.

2. The system of claim 1, further comprising:

a second detector structured to be carried onboard a second vehicle and adapted to detect a second hazard and to consequently cause a second output;

a second transmitter in communication with the second detector and operable to broadcast a second remote warning signal subsequent to receiving the second output;

a second receiver structured to be carried onboard the second vehicle and operable to receive at least one of the first remote warning signal and the external remote warning signal; and

a second local warning device in communication with the second receiver and configured to provide a warning to an occupant of the second vehicle, the warning corresponding to at least one of the first remote warning signal and the external remote warning signal.

3. The system of claim 1 or claim 2, wherein:

at least one of the first detector and the second detector is disposed in-circuit to receive an input from a component of airbag deployment circuitry of the first vehicle or the second vehicle.

4. The system of claim 1 or claim 2, further comprising:

a warning light structured to be carried onboard at least one of the first vehicle and the second vehicle, the warning light adapted to broadcast a warning light output configured to be visible to an occupant of an approaching vehicle, responsive to the first output or the second output.

5. The system of claim 4, wherein the warning light is adapted to be carried on top of a roof of the first vehicle or the second vehicle.

6. The system of claim 4, wherein the warning light comprises a light selected from the group consisting of a brake light, a turn signal light, a taillight, a running light, a fog light, and a headlight.

7. The system of claim 1 or claim 2, further comprising:

an alarm structured to be carried onboard at least one of the first vehicle and the second vehicle and adapted to broadcast an audible warning responsive to the first output or the second output.

8. The system of claim 1 or claim 2, wherein at least one of the first local warning device and the second local warning device comprises a screen configured to display a printed message.

9. The system of claim 1 or claim 2, wherein at least one of the first local warning device and the second local warning device is structured to visually convey the instantaneous intensity, selected from a range of intensity, of an attribute associated with at least one of the first remote warning signal, the second remote warning signal, and the another remote warning signal.

10. The system of claim 9, wherein:

at least one of the first local warning device and the second local warning device is structured to determine and visually convey an approximate current state of intensity, selected from a plurality of different states of intensity, of an attribute associated with at least one of the first remote warning signal, the second remote warning signal, and the another remote warning signal;

each of a plurality of sounds is individually assigned to one of the states of intensity; and

a speaker associated with the system is configured to broadcast at least one sound of the plurality and corresponding to the currently determined state.

11. The system of claim 10, wherein at least one of the first local warning device and the second local warning device further comprises a screen configured to display a printed message responsive to at least one of the first remote warning signal, the second remote warning signal, and the another remote warning signal.

12. The system of claim 11, wherein the message is selected from a group of pre-programmed messages based upon a characteristic of at least one of the first remote warning signal, the second remote warning signal, and the another remote warning signal.

13. The system of claim 1 or claim 2, further comprising an override control operable to terminate broadcast of at least one of the first remote warning signal and the second remote warning signal.

14. The system of claim 13, wherein the override control is structured to be operable only after a pre-programmed period of time has elapsed subsequent to first broadcast of the at least one of the first remote warning signal and the second remote warning signal.

15. The system of claim 1 or claim 2, wherein a transmission range of at least one of the first remote warning signal and the second remote warning signal is adjustable.

16. The system of claim 1 or claim 2, wherein at least one of the first transmitter and the second transmitter is disposed in-circuit operably to rebroadcast at least one of the first remote warning signal, the second remote warning signal, and the another remote warning signal.

17. The system of claim 1 or claim 2, wherein:

at least one of the first detector and the second detector comprises a component of an airbag deployment control assembly configured to produce the first output or the second output in response to airbag deployment; and

at least one of the first local warning device and the second local warning device comprises a display device in communication with the first receiver or the second receiver.

18. The system of claim 17, wherein:

the display device is structured to visually convey an estimate of the distance to a location of at least one of the first hazard and the second hazard;

each of a plurality of audible noises is individually assigned to one of a plurality of discrete distance estimates; and

a speaker is operably associated with the system to broadcast the noise corresponding to the estimate of the distance.

19. The system of claim 1 or claim 2, wherein at least one of the first detector and the second detector is adapted to detect a collision as the collision occurs.

20. The system of claim 1 or claim 2, wherein at least one of the first transmitter and the second transmitter is configured to begin transmitting a signal upon activation by an operator of the first vehicle or the second vehicle.

21. The system of claim 1, wherein the first local warning device is configured to operate whenever the first vehicle is in operation.

22. The system of claim 21, wherein the first local warning device is configured to continue to operate for a selected time period after operation of the first vehicle ceases.

23. The system of claim 1 or claim 2, wherein at least one of the first transmitter and the second transmitter is configured to transmit a signal to a selected receiver.

24. The system of claim 1, wherein at least one of the first detector, the first transmitter, the first receiver, and the first local warning device comprises a cellular telephone.

25. The system of claim 1, further comprising a second transmitter operable to broadcast a second remote warning signal, wherein the second transmitter comprises a cellular telephone.

26. A method of using the system of claim 1 or claim 2, comprising providing a warning to at least one occupant of at least one vehicle not involved in either the first hazard or the second hazard.

27. A method of forming the warning system of claim 1 or claim 2, comprising connecting at least one wire to a source of at least one of the first output and the second output.

28. The method of claim 27, wherein connecting at least one wire to a source of at least one of the first output and the second output comprises forming an electrical connection to a diagnostic plug of at least one of the first vehicle and the second vehicle.

29. A method of using the system of claim 25, comprising outfitting at least one of a pedestrian, a road worker, a utility worker, and a bicyclist with the second transmitter.

5

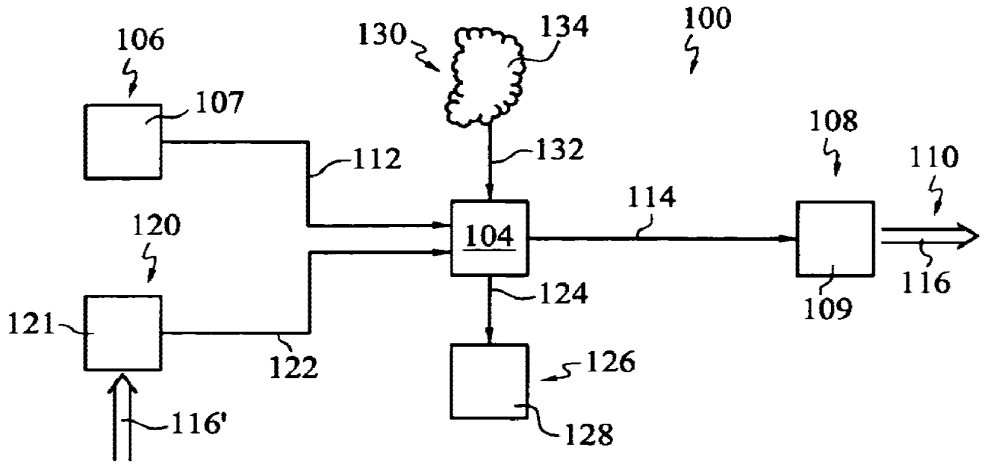

106
107
130
134
100
112
132
108
110
114
120
104
124
109
116
121
122
126
116'
128

FIG. 1

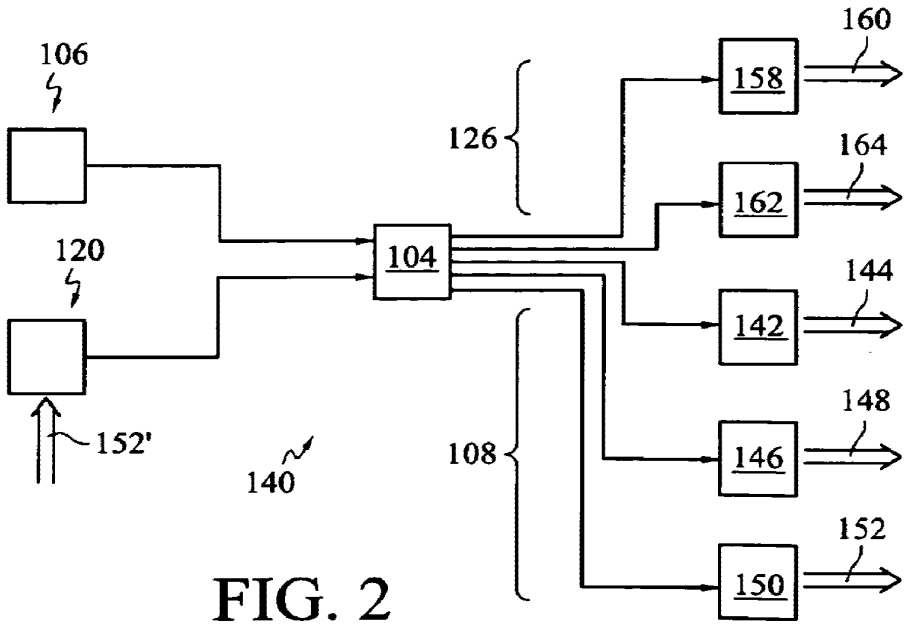

106
160
158
126
164
162
120
104
144
142
148
152'
108
146
140
152
150

FIG. 2

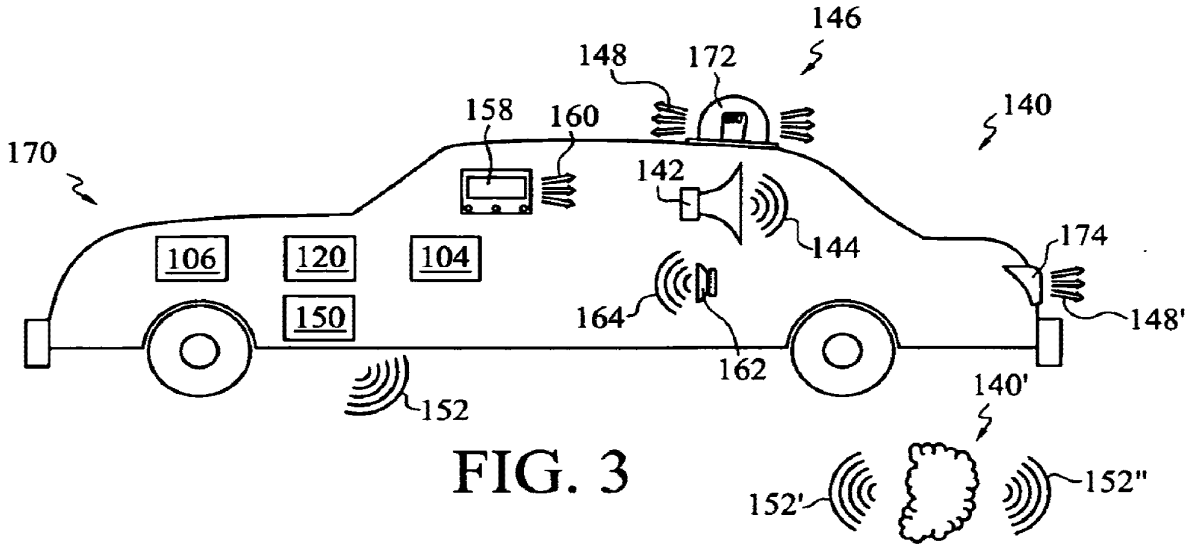

146
148
172
158
160
140
170
142
144
106
120
104
174
150
164
148'
162
152
140'
152'
152"

FIG. 3

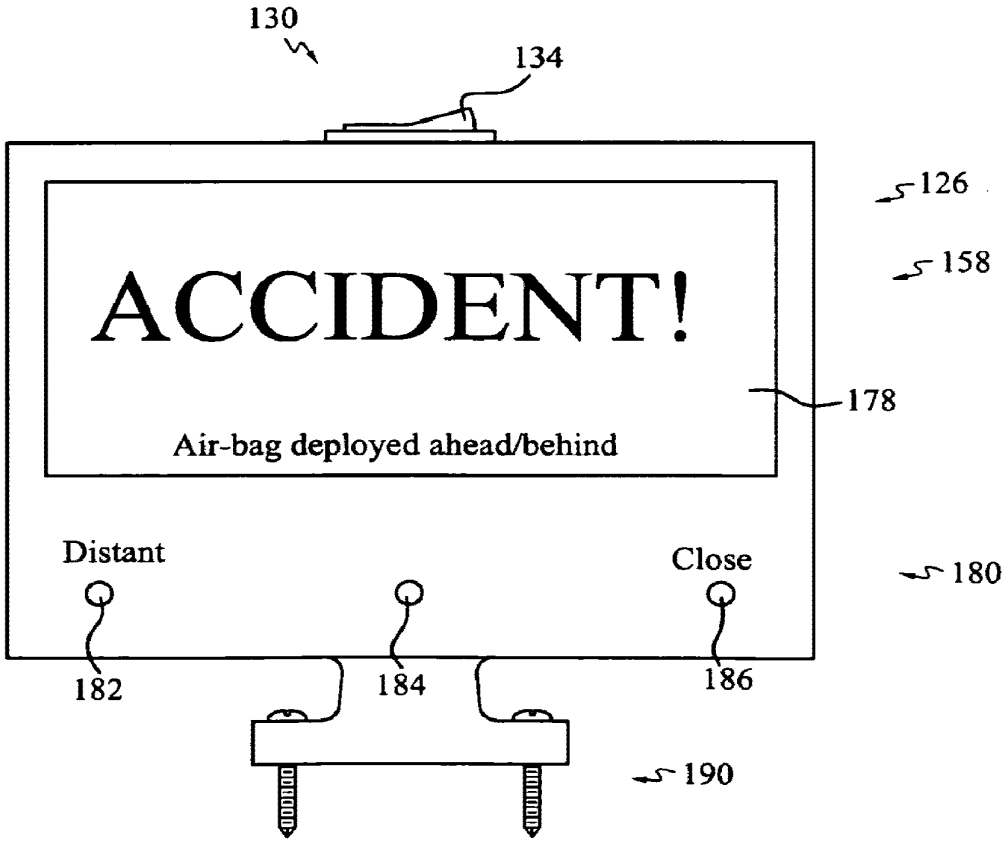

130
134
126
158
ACCIDENT!
178
Air-bag deployed ahead/behind
Distant
Close
180
182
184
186
190

FIG. 4

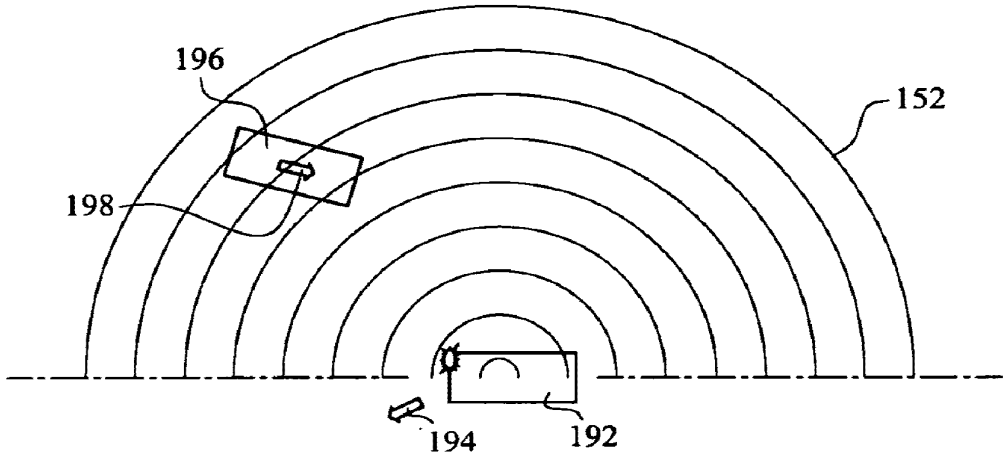

196
152
198
194
192

FIG. 5

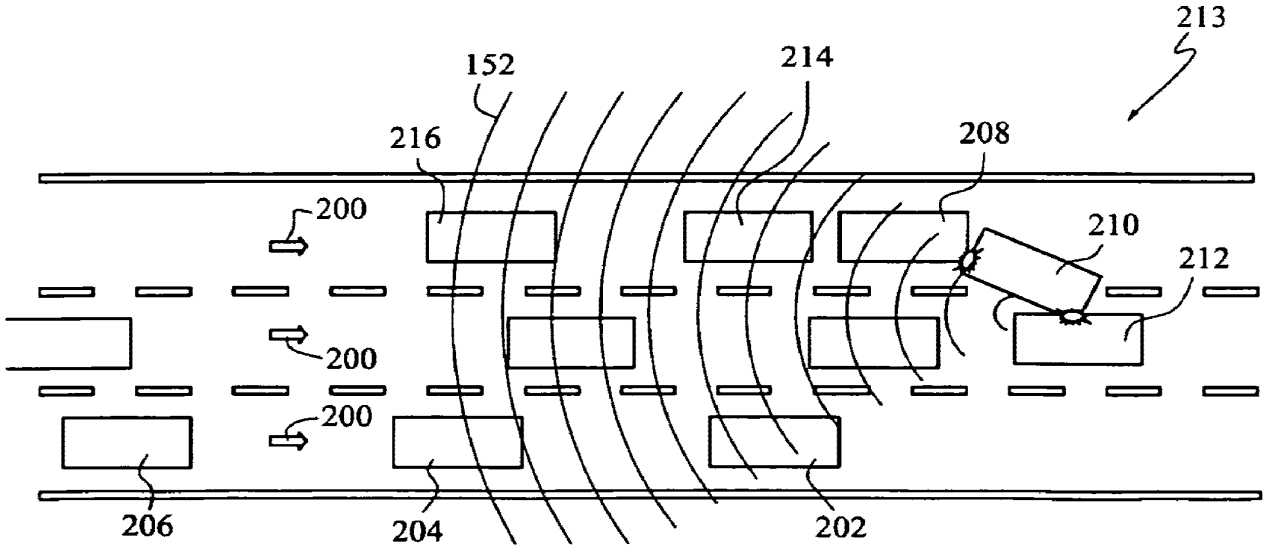

213
152
214
216
208
200
210
212
200
200
206
204
202

FIG. 6

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ESS-Help, Inc. Inventor(s): TUCKER, et al. Application No.: 16/991,595 Filed: 08/12/2020 Title: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS Attorney Docket No.: 012644_00013_PRV_UTL	Confirmation No.: 6990 Art Unit: 3663 Examiner: Anwari, Maceeh

Commissioner for Patents
Box 1450
Alexandria, VA 22313-1450

CONCISE STATEMENT UNDER 37 CFR 1.98(C)

Dear Sir:

Reference WO 2012071054 by Bensoussan listed on the attached IDS is a PCT publication corresponding to Japanese national stage application no. 2014500550. WO 2012071054 is believed to be a translation of at least the specification and figures of the Japanese national stage application no. 2014500550.

Respectfully submitted,

Date: July 22, 2024

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G08G 1/16	(2006.01)	G08G	1/16	A	5H181
B60R 21/00	(2006.01)	B60R	21/00	630H	
B60R 16/02	(2006.01)	B60R	21/00	630G	

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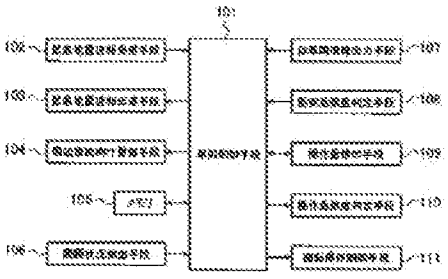
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(22)出願日　平成20年12月25日 (2008.12.25)

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弁理士　高松　俊雄

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(54)【発明の名称】車両制御装置

(57)【要約】
【課題】緊急地震速報を受信した際の対処法を改善して、車両走行の安全性を向上することを課題とする。
【解決手段】緊急地震速報を受信する緊急地震速報受信手段１０２と、緊急地震速報受信手段１０２で緊急地震速報を受信したことを車室外に通知する周辺車両向け警報手段１０４と、緊急地震速報受信手段１０２で緊急地震速報を受信したことを車室内に通知する緊急地震速報伝達手段１０３とを有する車両制御装置において、緊急地震速報を受信したことを周辺車両向け警報手段１０４によって車室外に通知した後、緊急地震速報受信手段１０２で緊急地震速報を受信したことを車室内に通知することを特徴とする。
【選択図】図１



【特許請求の範囲】
【請求項１】
緊急地震速報を受信する緊急地震速報受信手段と、
前記緊急地震速報受信手段により緊急地震速報を受信したことを車室外に通知する車室外通知手段と、
前記緊急地震速報受信手段により緊急地震速報を受信したことを車室内に通知する車室内通知手段と
を有する車両制御装置において、
前記緊急地震速報受信手段により緊急地震速報を受信したことを前記車室外通知手段によって車室外に通知した後、前記車室内通知手段によって車室内に通知する
ことを特徴とする車両制御装置。
【請求項２】
自車両と周辺車両との接触危険度を判定する接触危険度判定手段を有し、
前記緊急地震速報を受信したことを前記車室外通知手段によって車室外に通知した後、前記接触危険度判定手段によって接触危険度が予め設定された閾値以下となった場合には、前記車室内通知手段によって車室内に通知する
ことを特徴とする請求項１に記載の車両制御装置。
【請求項３】
前記緊急地震速報受信手段により緊急地震速報を受信したことを前記車室内通知手段によって車室内に通知した後、運転者による車両操舵及び車両制動の操作を抑制する
ことを特徴とする請求項１または２に記載の車両制御装置。
【請求項４】
自車両の運転者がパニックになったか否か判定するパニック判定手段を有し、
前記車室内通知手段によって車室内に通知した後、前記パニック判定手段によって運転者がパニックでないと判定された場合には、運転者による車両操舵及び車両制動の操作の抑制を解除する
ことを特徴とする請求項３に記載の車両制御装置。
【請求項５】
前記車室外通知手段は、車室外に配置された車外ランプ装置で構成され、
前記車室内通知手段は、車室内に配置された車内ランプ装置で構成されている
ことを特徴とする請求項１～４のいずれか１項に記載の車両制御装置。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、地震が発生した際に、地震速報を受けて乗員に地震の発生を伝える車両制御装置に関する。
【背景技術】
【０００２】
従来、この種の技術としては、例えば以下に示す文献に記載されたものが知られている（特許文献１参照）。この文献には、地震発生が検出されると、直ちに乗員に各種メッセージ伝達手段により地震が発生したことを報知し、乗員に地震および非常事態であることを速やかに伝える発明が記載されている。
【特許文献１】特開２００７－１７９０９６
【発明の開示】
【発明が解決しようとする課題】
【０００３】
上記従来例では、地震発生を検知したら直ちに乗員に警告するため、運転者がパニックになり急ブレーキ、急ハンドル、急アクセルなどによって自車両の挙動が不安定になり、周辺車両と接触するなどのおそれがあった。
【０００４】

そこで、本発明は、上記に鑑みてなされたものであり、その目的とするところは、緊急地震速報を受信した際の対処法を改善して、車両走行の安全性を向上した車両制御装置を提供することにある。

【課題を解決するための手段】

【０００５】

上記目的を達成するために、本発明の課題を解決する手段は、緊急地震速報受信手段で緊急地震速報を受信したことを車室外通知手段によって車室外に通知した後、車室内通知手段によって車室内に通知することを特徴とする。

【発明の効果】

【０００６】

本発明によれば、車両が緊急地震速報を受信すると、まず車室外の車両に緊急地震速報が受信されたことが通知された後、車室内の運転者に通知されるため、運転者がパニックになり急ブレーキ、急ハンドル、急アクセルなどの危険な行動によって自車両の挙動が不安定になっても、周辺車両との接触などを抑制することができる。

【発明を実施するための最良の形態】

【０００７】

以下、図面を用いて本発明を実施するための最良の実施例を説明する。

【実施例１】

【０００８】

図１は本発明の実施例１に係る車両制御装置の構成を示す図である。図１に示す実施例１の車両制御装置は、緊急地震速報を受信した際に車両を制御する装置であり、車両制御手段１０１、緊急地震速報受信手段１０２、緊急地震速報伝達手段１０３、周辺車両向け警報手段１０４、メモリ１０５、周囲状況検出手段１０６、自車両情報出力手段１０７、衝突危険度判定手段１０８、操作量検出手段１０９、操作危険度判定手段１１０ならびに運転操作制御手段１１１を備えて構成されている。

【０００９】

緊急地震速報受信手段１０２は、車載されたラジオ、カーナビ、緊急地震速報受信専用端末などで構成されている。

【００１０】

緊急地震速報伝達手段１０３は、車載されたラジオ、カーナビなどの音声出力手段、計器パネルや車室内に設置されるランプ、インパネ画面やフロントウィンドにハットマークなどを表示させる手段で構成される。

【００１１】

周辺車両向け警報手段１０４は、ハザードランプ、ブレーキランプ、ヘッドランプなどで構成される。

【００１２】

メモリ１０５は、後述するフローチャートの処理ルーチンを実行制御するプログラムや各種のパラメータ等、本発明に係る処理動作を実現する際に必要となる情報を記憶する記憶装置で構成される。

【００１３】

周囲状況検出手段１０６は、車両の前方の障害物や、周辺車両の有無、位置、周囲車両との相対速度、相対加速度、車間距離などを検出する手段であり、例えば車両前部、側部、後部に設置されるカメラ７、電波センサー８、超音波センサー９などの少なくとも１つ以上で構成される。

【００１４】

自車両情報出力手段１０７は、自車両の速度、加速度を出力する手段である。

【００１５】

衝突危険度判定手段１０８は、周囲状況検出手段１０６で検出した周辺車両の位置に応じて、周辺車両との相対速度、相対加速度、車間距離、予めメモリ１０５に記憶されている自車両が急制動したと仮定した場合の減速度、自車両が急加速したと仮定した場合の加

速度から算出される衝突予測時間と予めメモリ１０５に記憶されている衝突予測時間の閾値との比較、もしくは自車両の速度とその速度の閾値との比較により、周辺車両との衝突危険度を判定する手段である。

【００１６】

操作量検出手段１０９は、運転者が操作するブレーキペダルやアクセルペダルの踏込速度、踏込力、ハンドルの回転軸速度を検出する手段である。

【００１７】

操作危険度判定手段１１０は、操作量検出手段１０９により検出された運転者のブレーキ、ハンドル、アクセルの操作量と、予めメモリ１０５に記憶されているそれぞれの操作量の閾値を比較して、その操作の危険度を判定する手段である。

【００１８】

運転操作制御手段１１１は、急ブレーキ、急ハンドル、急アクセルにならないように、制動力、操舵角、駆動力を制御する手段であり、かつプレビューブレーキ、自動ブレーキ、自動運転を制御する手段である。

【００１９】

車両制御手段１０１は、本装置を制御する制御中枢として機能し、上記各手段の作動を制御し、プログラムに基づいて各種動作処理を制御するコンピュータに必要な、ＣＰＵ、記憶装置、入出力装置等の資源を備えた例えばマイクロコンピュータ等により実現される。車両制御手段１０１は、上記各手段との間で制御に必要な情報を入出力し、メモリ１０５に記憶された制御ロジック（プログラム）に基づいて、上記各手段に指令を送り、以下に説明する、緊急地震速報を受信した際の車両の制御に必要な動作を統括管理して統御する。

【００２０】

図２は緊急地震速報が車両で受信された際の様子を示している。図２において、緊急地震速報送信所４から車両（自車両）１のラジオ、カーナビ、緊急地震速報受信専用端末などの緊急地震速報受信手段１０２に緊急地震速報５が届くと、車両１は周辺車両２に、今後車両１の運転者３が危険な行動をとるかもしれないこと、および地震がしばらく後に来ることを知らせるために、周辺向け警報手段１０４は例えば車両１のハザードランプ６を点滅させる。この際、周辺向け警報手段１０４によって点滅したハザードランプ６に運転者３が気づいてパニックになることを防ぐため、車両１の室内ハザードランプは点滅させないようにし、また点滅音もさせないようにする。

【００２１】

図３は車両１における周囲状況検出手段１０６の配置例を示している。図３において、車両１の運転者３に緊急地震速報５を伝達するために、車両１と周辺車両２との衝突危険度を判定する際に使用する周囲状況検出手段１０６を構成するカメラ７、電波センサー８、超音波センサー９の少なくと１つ以上は、図３に示すように車両１の周辺に設置される。

【００２２】

図４は緊急地震速報伝達手段１０３を示す。図４において、車両１と周辺車両２の衝突危険度が小さくなったと判定された後に、緊急地震速報伝達手段１０３は車両１の運転者３に緊急地震速報５を伝達する。

【００２３】

緊急地震速報受信手段１０２であるラジオ、カーナビ、緊急地震速報受信専用端末から音声１０で運転者３に伝える方法や、運転者３をよりパニックにさせない方法として、例えば図４（ａ）に示すように車内のルームランプ１１や計器盤１２に地震用ランプ１３や室内ハザードランプ１４を点滅もしくは点灯させたり、インパネ上の例えばナビゲーションシステムの画面１５やフロントウィンド１６にハットマーク１７を表示させる方法、あるいは同図（ｂ）に示すようにインパネ上の画面１５に音声１０とともに警告文章１８を表示させる方法などがある。

【００２４】

図５は車両１に対して周辺車両２が存在する可能性のある領域区分を示す。車両１はハザードランプ６を点滅させると、図３に示す車両前部、側部、後部に設置されたカメラ７、電波センサー８、超音波センサー９などにより、図５に示す車両１周辺のＡ～Ｅ領域の分割領域のどこに周辺車両２がいるかセンシングする。このセンシングは、緊急地震速報受信前から行っていてもかまわない。

【００２５】

図６は車両１周辺の周辺車両２の存在位置および存在位置判定方法の手順を示すフローチャートであり、図７は図５に示す領域区分における周辺車両２の位置を示す。図６において、まず判定ステップＳ６０１で、車両前部、側部、後部に設置されたカメラ７、電波センサー８、超音波センサー９などにより、車両１周辺に周辺車両２がいるか否か判定する。存在しない場合には、周囲には周辺車両２はいないと判断する（ステップＳ６０２）。一方、存在する場合には、次に判定ステップＳ６０３で、その周辺車両２は反対車線の車両か否かを判定する。反対車線の車両である場合は、周辺車両２は車両１周辺にはいないと判定する（ステップＳ６０２）。

【００２６】

一方、反対車線の車両でない場合は、判定ステップＳ６０４で周辺車両２は車両１の後端線２Ａより後方か否かを判定する。後方の場合には、続いて判定ステップＳ６０５で周辺車両２は車両１側端線２Ｂをまたいでいるか否か判定する。またいでいる場合には、図７（ａ）に示すように周辺車両２はＡ領域にいると判定する（ステップＳ６０６）。

【００２７】

一方、またいでいない場合には、続いて判定ステップＳ６０７で周辺車両２は車両１の車幅中心線２Ｃをまたいでいるか否か判定する。またいでいる場合には、周辺車両２はＡ領域にいると判定する一方、またいでいない場合は、図７（ｂ）に示すように周辺車両２はＢ領域にいると判定する（ステップＳ６０８）。

【００２８】

先の判定ステップＳ６０４で後方でない場合には、続いて判定ステップＳ６０９で周辺車両２は車両１の後端線２Ａをまたいでいるか否かを判定する。またいでいる場合には、図７（ｃ１）に示すように周辺車両２はＣ領域にいると判定する（ステップＳ６１０）。

一方、またいでいない場合は、続いて判定ステップＳ６１１で周辺車両２は車両１の前端線２Ｄより後方か否かを判定する。後方である場合は、図７（ｃ２）に示すように周辺車両２はＣ領域にいると判定する。一方、後方でない場合は、続いて判定ステップＳ６１２で周辺車両２は車両１の前端線２Ｄをまたいでいるか否かを判定する。またいでいる場合は、図７（ｃ３）に示すように周辺車両２はＣ領域にいると判定する（ステップＳ６１０）。

【００２９】

一方、またいでいない場合は、続いて判定ステップＳ６１３で周辺車両２は車両１の側端線２Ｂをまたいでいるか否かを判定する。またいでいる場合には、周辺車両２は図７（ｅ）に示すようにＥ領域にいると判定する（ステップＳ６１４）。一方、またいでいない場合には、続いて判定ステップＳ６１５で周辺車両２は車両１の車幅中心線２Ｃをまたいでいるか否かを判定する。またいでいない場合には、周辺車両２は図７（ｄ）に示すようにＤ領域にいると判定する（ステップＳ６１６）。一方、またいでいる場合は、周辺車両２は図７（ｅ）に示すようにＥ領域にいると判定する（ステップＳ６１４）。

【００３０】

図８は後方衝突予測時間ｔＲの算出方法ならびに後方衝突危険度の判定を説明するための図である。後方衝突予測時間ｔＲは、車両１の急ブレーキによる周辺車両２との衝突の危険が考えられるＡ領域、および車両１の急ハンドルもしくは急ブレーキ＋急ハンドルによる周辺車両２との衝突の危険が考えられるＢ領域での衝突危険度を判定するパラメータである。

【００３１】

ここで、図８（ｂ）に示すように車両進行方向をｘ方向、車幅方向をｙ方向とし、ｘ方

向速度Ｖｘ１で走行する車両１が、予め設定されたｘ方向減速度ｇｄで急ブレーキをかけたと仮定した際に、ｘ方向速度Ｖｘ２、ｘ方向加速度ｇｘ２で走行する周辺車両２が衝突するものと仮定する。

【００３２】

図８（ａ）はＡ領域またはＢ領域に周辺車両２がいる際の衝突危険度判定方法の手順を示すフローチャートである。先ず車両１の急ブレーキ時の減速度ｇｄ、衝突危険度を判定する際の衝突予測時間閾値ｔｃＲを設定する（ステップＳ８０１）。ここで、衝突予測時間閾値ｔｃＲは、図８（ｄ）に示すように車両１の速度Ｖｘ１に依存し、車両１の速度Ｖｘ１が大きくなるにつれて大きくなるような値に設定される。

【００３３】

次に、図８（ｂ）に示すように仮定された衝突の場合に、車両１の後部に設置されるカメラ７、電波センサー８、超音波センサー９により車両１に対する周辺車両２のｘ方向相対速度Ｖｘ１２、ｘ方向相対加速度ｇｘ１２および車両１後端と周辺車両２の前端のｘ方向距離ｄＲを検出する（ステップＳ８０２）。また、車両１に搭載された加速度計やＣＡＮ等の車内ＬＡＮのデータなどから車両１のｘ方向の加速度ｇｘ１を計測する（ステップＳ８０３）。その後、上記により得られた値に基づいて、図８（ｃ）に示す式（８－１）～（８－５）を用いて後方衝突予測時間ｔＲを算出する（ステップＳ８０４）。

【００３４】

算出後、算出された後方衝突予測時間ｔＲは、先に設定した後方衝突予測時間の閾値ｔｃＲと比較する（ステップＳ８０５）。後方衝突予測時間ｔＲが大きければ衝突危険度は小さいものと判断し（ステップＳ８０６）、後方衝突予測時間ｔＲが小さければ衝突危険度は大きいとものと判断する（ステップＳ８０７）。

【００３５】

図９は前方衝突予測時間ｔＦの算出方法ならびに前方衝突危険度の判定を説明するための図である。前方衝突予測時間ｔＦは、車両１の急ハンドルもしくは急アクセル＋急ハンドルによる周辺車両２との衝突の危険が考えられるＤ領域、もしくは車両１の急アクセルによる周辺車両２との衝突の危険が考えられるＥ領域での衝突危険度を判定するパラメータである。

【００３６】

ここで、図９（ｂ）に示すように車両進行方向をｘ方向、車幅方向をｙ方向とし、ｘ方向速度Ｖｘ１で走行する車両１が予め設定するｘ方向加速度ｇａで急アクセルした際に、ｘ方向速度Ｖｘ２、ｘ方向加速度ｇｘ２で走行する周辺車両２に衝突するものと仮定する。

【００３７】

図９（ａ）はＤ領域またはＥ領域に周辺車両２がいる際の衝突危険度判定方法の手順を示すフローチャートである。先ず車両１の急アクセル時の加速度ｇａ、衝突危険度を判定する際の衝突予測時間閾値ｔｃＦを設定する（ステップＳ９０１）。ここで、衝突予測時間閾値ｔｃＦは、図９（ｄ）に示すように車両１の速度Ｖｘ１に依存し、車両１の速度Ｖｘ１が大きくなるにつれて大きくなるような値に設定される。

【００３８】

次に、図９（ｂ）に示すように仮定された衝突の場合に、車両１の前部に設置されるカメラ７、電波センサー８、超音波センサー９により車両１に対する周辺車両２のｘ方向相対速度Ｖｘ１２、ｘ方向相対加速度ｇｘ１２および車両１の前端と周辺車両２の後端のｘ方向距離ｄＦを検出する（ステップＳ９０２）。また、車両１に搭載された加速度計やＣＡＮ等の車内ＬＡＮのデータなどから車両１のｘ方向の加速度ｇｘ１を計測する（ステップＳ９０３）。その後、上記により得られた値に基づいて、図９（ｃ）に示す式（９－１）～（９－６）を用いて前方衝突予測時間ｔＦを算出する（ステップＳ９０４）。

【００３９】

算出後、算出された前方衝突予測時間ｔＦは、先に設定した前方衝突予測時間の閾値ｔｃＦと比較する（ステップＳ９０５）。前方衝突予測時間ｔＦが大きければ衝突危険度は

小さいものと判断し（ステップＳ９０６），前方衝突予測時間ｔＦが小さければ衝突危険度は大きいとものと判断する（ステップＳ９０７）。

【００４０】

図１０は周辺車両２が各Ａ、Ｂ、Ｃ、Ｄ、Ｅ領域に存在する場合における車両１と周辺車両２との衝突状況を判定する手順を示すフローチャートである。図１０において、先ず周辺車両２が、先の図８で説明したようにＡ、Ｂ領域にいる場合に、後方衝突予測時間ｔＲと後方衝突予測時間の閾値ｔｃＲとを比較し（ステップＳ１００１、Ｓ１００２）、ｔＲ＞ｔｃＲでなく衝突危険度が大きい場合に、Ａ領域の場合はＣａｓｅ（ケース）Ａと判定し（ステップＳ１００３）、Ｂ領域の場合はＣａｓｅＢと判定する（ステップＳ１００４）。ここで、ＣａｓｅＡは車両１が急ブレーキをかけると衝突の可能性がある場合であり、ＣａｓｅＢは車両１が急ハンドルかつ急ブレーキをかけると衝突の可能性がある場合である。一方、ｔＲ＞ｔｃＲで衝突危険度が小さい場合には、予め設定された処理（フローチャートにおいて結合子Ｐ１で結合される処理ステップ）を続けて実行する。

【００４１】

周辺車両２がＣ領域にいる場合は、車両１のｘ方向速度Ｖｘ１が予め設定しておく速度の閾値Ｖｃｘより大きいか否かを判定し（ステップＳ１００５）、大きい場合は、ＣａｓｅＣと判定し（ステップＳ１００６），大きくない場合には、予め設定された処理（フローチャートにおいて結合子Ｐ１で結合される処理ステップ）を続けて実行する。ここで、ＣａｓｅＣは車両１が急ハンドルすると衝突の可能性がある場合である。

【００４２】

周辺車両２が，先の図９で説明したように，Ｄ，Ｅ領域にいる場合に、前方衝突予測時間ｔＦと前方衝突予測時間の閾値ｔｃＦとを比較し（ステップＳ１００７，Ｓ１００８）、ｔＦ＞ｔｃＦでなく衝突危険度が大きい場合に、Ｄ領域の場合はＣａｓｅＤと判定し（ステップＳ１００９）、Ｅ領域の場合はＣａｓｅＥと判定する（ステップＳ１０１０）。ここで、ＣａｓｅＤは車両１が急ハンドルかつ急アクセルすると衝突の可能性がある場合であり、ＣａｓｅＥは車両１が急アクセルすると衝突の可能性がある場合である。一方、ｔＦ＞ｔｃＦで衝突危険度が小さい場合には、予め設定された処理（フローチャートにおいて結合子Ｐ１で結合される処理ステップ）を続けて実行する。

【００４３】

また、周辺車両２が存在しない場合には、予め設定された処理（フローチャートにおいて結合子Ｐ１で結合される処理ステップ）を続けて実行する。

【００４４】

図１１、図１２は先の図１０に示す判定処理でＣａｓｅＡと判定された直後の車両１および周辺車両２の挙動について示す。ＣａｓｅＡと判定された直後の車両１と周辺車両２の挙動は、図１１（ａ）に示すように、ＣａｓｅＡ－１：車両１、２の位置関係変化なし、ＣａｓｅＡ－２：車両１が車線変更、ＣａｓｅＡ－３：周辺車両２が車線変更、ＣａｓｅＡ－４：その他、のような場合が考えられる。

【００４５】

さらに、図１２に示すように、ＣａｓｅＡ－１は、ＣａｓｅＡ－１－１：車両１、２の位置関係変化なし、ＣａｓｅＡ－１－２：車両１，２接近、ＣａｓｅＡ－１－３：車両１、２遠ざかる、ＣａｓｅＡ－２は、ＣａｓｅＡ－２－１：車両１の車線変更のみ、ＣａｓｅＡ－２－２：周辺車両２が車両１を追い越す、ＣａｓｅＡ－２－３：車両１が走り去る、ＣａｓｅＡ－３は、ＣａｓｅＡ－３－１：周辺車両２の車線変更のみ、ＣａｓｅＡ－３－２：周辺車両２が車両１を追い越す、ＣａｓｅＡ－３－３：車両１が走り去る、のような場合が考えられる。

【００４６】

図１３は上述のＣａｓｅＡの各Ｃａｓｅへの判定方法の手順を示すフローチャートである。ここで、図１１（ｂ）に示すように、車両進行方向をｘ方向、車両幅方向をｙ方向とし、車両１のｘ方向およびｙ方向速度をＶｘ１，Ｖｙ１、周辺車両２のｘ方向およびｙ方向速度をＶｘ２、Ｖｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対速度を

Ｖｘ１２、Ｖｙ１２とする。また、車両１のｘ方向およびｙ方向の加速度をｇｘ１、ｇｙ１、周辺車両２のｘ方向およびｙ方向の加速度をｇｘ２、ｇｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対加速度をｇｘ１２、ｇｙ１２とする。

【００４７】

図１３において、判定ステップＳ１３０１でＶｙ１２が０か否かを判定し、０である場合は、車両１と周辺車両２のｙ方向の相対的な動きはないＣａｓｅＡ－１と判定する（ステップＳ１３０２）。続いて、判定ステップＳ１３０３でＶｘ１２が０か正か負かを判定する。判定の結果、０の場合には、車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＡ－１－１と判定し（ステップＳ１３０４）、正の場合には、車両１と周辺車両２は近づいているＣａｓｅＡ－１－２と判定し（ステップＳ１３０５）、負の場合には、車両１と周辺車両２は遠ざかっているＣａｓｅＡ－１－３と判定する（ステップＳ１３０６）。

【００４８】

一方、先の判定ステップＳ１３０１で０でない場合には、車両１と周辺車両２の車幅方向に相対的な動きがあると判定し、続いて判定ステップＳ１３０７でＶｙ１２と－Ｖｙ１が等しいか否か、すなわち車両１が車線変更しようとしているか否かを判定する。両者が等しく車両１が車線変更しようとしていると判定した場合は、車両１が車線変更しようとしているＣａｓｅＡ－２と判定する（ステップＳ１３０８）。続いて、判定ステップＳ１３０９でＶｘ１２が０か正か負かを判定する。

【００４９】

判定の結果、０の場合には、車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＡ－２－１と判定し（ステップＳ１３１０）、正の場合には、車両１と周辺車両２は近づいている、すなわち周辺車両２が車両１を追い越そうとしているＣａｓｅＡ－２－２と判定し（ステップＳ１３１１）、負の場合には、車両１と周辺車両２は遠ざかっている、すなわち車両１が走りおろうとしているＣａｓｅＡ－２－３と判定する（ステップＳ１３１２）。

【００５０】

一方、先の判定ステップＳ１３０７で両者が等しくなく車両１が車線変更しようとしていないと判定した場合には、続いて判定ステップＳ１３１３でＶｙ１が０か否か、すなわち周辺車両２が車線変更しようとしているか否かを判定する。車線変更しようとしていると判定した場合は、周辺車両２が車線変更しようとしているＣａｓｅＡ－３と判定し（ステップＳ１３１４）、続いて判定ステップＳ１３１５でＶｘ１２が０が正か負かを判定する。

【００５１】

判定の結果、０の場合には、車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＡ－３－１と判定し（ステップＳ１３１６）、正の場合には、車両１と周辺車両２は近づいている、すなわち周辺車両２が車両１を追い越そうとしているＣａｓｅＡ－３－２と判定し（ステップＳ１３１７）、負の場合には、車両１と周辺車両２は遠ざかっている、すなわち車両１が走りおろうとしているＣａｓｅＡ－３－３と判定する（ステップＳ１３１８）。

【００５２】

一方、先の判定ステップＳ１３１３で０でない場合は、車両１と周辺車両２の車幅方向の動きは様々考えられるのでその他のＣａｓｅＡ－４と判定する（ステップＳ１３１９）。

【００５３】

以上、ＣａｓｅＡ－１－１、ＣａｓｅＡ－１－２、ＣａｓｅＡ－１－３、ＣａｓｅＡ－２－１、ＣａｓｅＡ－２－３、ＣａｓｅＡ－３－１、ＣａｓｅＡ－３－３、ＣａｓｅＡ－４の場合には、周辺車両２は、Ａ、Ｂ領域にいる可能性が高いと判断し、後述する処理（フローチャートにおいて結合子Ｐ２で結合される処理ステップ）を続けて実行する。

【００５４】
一方、ＣａｓｅＡ－２－２、ＣａｓｅＡ－３－２の場合は、続いて判定ステップＳ１３２０で周辺車両２がＡ領域にいるか否かを、先の図６に示す処理フローを実行して判定する。周辺車両２がＡ領域にいると判定した場合には、後述する処理（フローチャートにおいて結合子Ｐ１で結合される処理ステップ）を続けて実行する。
【００５５】
一方、Ａ領域にいないと判定された場合には、続いて判定ステップＳ１３２１で周辺車両２がＣ領域にいるか否かを先の図６に示す処理フローを実行して判定する。判定の結果、Ｃ領域にいる場合には、後述する処理（フローチャートにおいて結合子Ｐ３で結合される処理ステップ）を続けて実行する。
【００５６】
一方、Ｃ領域にいない場合には、続いて判定ステップＳ１３２２で車両１の加速度ｇｘ１と車両１と周辺車両２の相対加速度ｇｘ１２とから算出される周辺車両２の加速度ｇｘ２が予め設定された加速度の閾値ｇｃｘより大きいか否かを判定する。大きくない場合には、周辺車両２はＢ領域にいる可能性が高いと判断し、後述する処理（フローチャートにおいて結合子Ｐ２で結合される処理ステップ）を続けて実行する。一方、大きい場合には、周辺車両２はＣ、Ｄ、Ｅ領域のいずれかの領域にいる、もしくは移動する可能性が高いと判断し、後述する処理（フローチャートにおいて結合子Ｐ３で結合される処理ステップ）を続けて実行する。
【００５７】
図１３に示す処理フローにおいて、判定ステップＳ１３２０を実行することで、周辺車両２がＡ領域にいる場合は、周辺車両２は車両１を追い越そうとしていないことをより精度良く判定することができる。また、判定ステップＳ１３２１を実行することで、周辺車両２がＣ領域にいる場合は、周辺車両２は車両１を追い越そうとしていることをより精度良く判定することができる。さらに、判定ステップＳ１３２２を実行することで、ｇｘ２＞ｇｃｘの場合は、周辺車両２はＡ、Ｃ領域にいない、すなわちＢ領域にいて車両１を追い越そうとしていること、ｇｘ２＞ｇｃｘでない場合には、周辺車両２はＢ領域にいて車両１を追い越そうとしていないことをより精度良く判定することができる。
【００５８】
図１４は先の図１３に示すフローチャートにおける結合子Ｐ１，Ｐ２で結合される処理を示すフローチャートである。図１４において、結合子Ｐ２で結合される処理を実行する場合に、周辺車両２はＡ、Ｂ領域にいる可能性が高いため、判定ステップＳ１４０１で後方衝突予測時間の閾値ｔｃＲより後方衝突予測時間ｔＲが大きいか否か、すなわち衝突危険度が小さいか否かを判定する。大きい場合（危険度が小さい場合）は、結合子Ｐ１で結合される処理を続けて実行し、緊急地震速報伝達手段１０３により車両１の運転者３に緊急地震速報５を伝え（ステップＳ１４０２）、周囲の安全を確認して停車するよう、またはトンネルや橋など地震発生時に危険である可能性の高い危険区域に入らないように伝える（ステップＳ１４０３）。その後、後述する運転者３に緊急地震速報を伝えた後の処理を実行する（ステップＳ１４０４）。
【００５９】
一方、先の判定ステップＳ１４０１において大きくない場合には、続けて判定ステップＳ１４０２で予め設定された所定のΔｔ時間が経過したか否かを判定し、経過していない場合は、再度判定ステップＳ１４０１を実行する。すなわち、Δｔだけ時間が経過するまで車両１はハザードランプ６を点滅させることで、周辺車両２に警告し続ける。Δｔ時間が経過するまでの間にｔＲ＞ｔｃＲになれば先の処理ステップＳ１４０２以降を実行する。
【００６０】
一方、Δｔ時間が経過してもｔＲ＞ｔｃＲにならない場合には、ハザードランプ６の点滅速度や明るさを大きくして（ステップＳ１４０５）、結合子Ｐ０で結合される先の図６に示す処理フローを実行する。判定ステップＳ１４０２で所定の時間Δｔだけ待機するこ

とで、車両１のハザードランプ６の点滅に気づいた周辺車両２が危険を察知し、車両１の後方へと車両１との車間をあけるような挙動をとる可能性が高まる。

【００６１】

その結果、図１５に示すように、後方衝突予測時間ｔＲを大きくすることが可能となり、後方衝突予測時間ｔＲが後方衝突予測時間の閾値ｔｃＲより小さくなることで、車両１の運転者３に緊急地震速報５を伝達することができる。これにより、主要動（Ｓ波）が到達する前に地震に対する備え、例えば周囲の安全を確認して停車させるなどの対処をすることができる。また、Δｔ時間経過しても、衝突危険度が小さくならない場合には、車両１のハザードランプ６の点滅速度や明るさを大きくすることで、周辺車両２に対する警告をさらに強調することが可能となる。

【００６２】

次に、図１４に戻って、結合子Ｐ３で結合される処理を実行する場合には、周辺車両２はＣ、Ｄ、Ｅ領域にいる、もしくは至る可能性が高いため、周辺車両２は車両１のハザードランプ６の点滅を確認しても車両１の後方へと車両１との車間をあけるような挙動をとり、後方衝突予測時間ｔＲが大きくなり衝突危険度が小さくなる可能性は低いと考えられる。

【００６３】

したがって、衝突危険度判定パラメータは後方衝突予測時間ｔＲではなく、前方衝突予測時間ｔＦに変更する。この場合には、図１６に示すように、車両１は運転者３がパニックにならない程度に徐々に自動ブレーキをかける（ステップＳ１４０７）。自動ブレーキをかけることで、自動ブレーキをかけない場合に比べて相対的に周辺車両２をより速く車両１より前方方向のＤ領域へと移動させることが可能となる。その結果、前方衝突予測時間ｔＦをより早く大きくすることが可能となる。

【００６４】

自動ブレーキを作動させた後、判定ステップＳ１４０７で前方衝突予測時間の閾値ｔｃＦより前方衝突予測時間ｔＦが大きいか否か、すなわち衝突危険度が小さいか否かを判定する。大きい場合には、先の処理ステップＳ１４０２以降を実行する。一方、大きくない場合には、先の処理ステップＳ１４０５以降を実行する。

【００６５】

上述したように自動ブレーキを作動させることで、図１７に示すように、周辺車両２が車両１を追い越そうとしているときに、より早く衝突危険度を小さくすることができる。その結果、より早く車両１の運転者３に緊急地震速報５を伝えることが可能となり、主要動（Ｓ波）が到達するまでの時間をより多くとることができ、地震に対する備え、例えば周囲の安全を確認して停車させるなどの対処をすることが可能となる。

【００６６】

図１８は先の図１４に処理ステップＳ１４０４で示す、車両１と周辺車両２の衝突危険度が小さくなり車両１の運転者３に緊急地震速報を伝えた後の処理フローを示すフローチャートである。

【００６７】

車両１の運転者３は、緊急地震速報５を聞いた後、周囲の安全を確認して車両を停車させることが望ましい。しかし、緊急地震速報５を聞くことでパニックになり、急ブレーキ、急ハンドル、急アクセルなどの危険な行動をとる可能性が想定される。

【００６８】

そこで、このような状況を踏まえた上で、運転者３に緊急地震速報５を伝えた後、先ず判定ステップＳ１８０１で図３に示すカメラ７、電波センサー８、超音波センサー９により車両１の前方に歩行者や車両などの回避すべき障害物があるか否かを判定する。回避すべき障害物がない場合には、運転者３がパニックになって急ブレーキ、急ハンドル、急アクセルに及ぶ可能性があるので、図１０（ａ）～（ｃ）に示すように、急ブレーキ、急ハンドル、急アクセルとならないように、運転者３のそれぞれの運転操作に対する出力となる制動力、操舵角、駆動力が大きくならないようにそれぞれの出力を制御する（ステップ

Ｓ１８０２）。このような出力制御を行うことで、運転者３がパニックに陥って急ブレーキ、急ハンドル、急アクセルの操作をしても、車両１が危険な状態になることを防ぐことが可能である。

【００６９】

次に、判定ステップＳ１８０３で操作急険度判定手段１１０により運転者３が緊急地震速報５を聞いた後に、以下に示す急ブレーキ操作、急ハンドル操作、もしくは急アクセル操作をしたか否かを判定する。すなわち、ブレーキペダル踏込み速度（もしくはブレーキペダル踏込力）が予め設定された所定の閾値以上である場合には、急ブレーキ操作がなされたものと判定する（ステップＳ１８０４）。また、ステアリング軸（ＳＴＲＧ軸）回転速度が予め設定された所定の閾値以上である場合には、急ハンドル操作がなされたものと判定する（ステップＳ１８０５）。また、アクセルペダル踏込み速度（もしくはアクセルペダル踏込力）が予め設定された所定の閾値以上である場合には、急アクセル操作がなされたものと判定する（ステップＳ１８０６）。

【００７０】

上記操作の少なくともいずれか１つの操作がなされた場合には、運転者３はパニックになったと判定する（ステップＳ１８０７）。その後、車両１はラジオやカーナビなどの緊急地震速報伝達手段１０３などで音声により自動運転に変更することを運転者３に伝えた後自動運転に変更され（ステップＳ１８０８）、図６に示すカメラ７、電波センサー８、超音波センサー９などにより周囲状況を確認した後、車両１を主要動（Ｓ波）が到達するまでに道路脇に停車させる（ステップＳ１８０９）。上記処理ステップＳ１８０８で、車両１が自動運転になったことを運転者３に伝えることで、運転者３のパニックの助長を防ぐことが可能である。

【００７１】

一方、先の処理ステップＳ１８０３で、いずれの操作も行われなかった場合には、運転者３はパニックではないと判定し（ステップＳ１８１０）、先の処理ステップＳ１８０２で施したブレーキ、ハンドル、アクセル制御を解除した後（ステップＳ１８１１）、ラジオやカーナビなどの緊急地震速報伝達手段１０３などで音声により再度周囲の安全を確認して車両１を停車させる旨を伝える（ステップＳ１８１２）。上記処理ステップＳ１８１１でブレーキ、ハンドル、アクセル制御を解除することにより、運転者３が周囲の安全を確認して、主要動（Ｓ波）が到達するまでに車両１を道路脇など安全な場所に停車することが可能となる。

【００７２】

一方、先の判定ステップＳ１８０１で前方に障害物がある場合には、別途設定される障害物がある場合の処理フローを実行する（ステップＳ１８１３）。

【００７３】

このように、上記実施例１では、車両１が緊急地震速報を受信すると、まず車室外通知することによって、車室外の周辺車両、例えば追従車などに緊急地震速報が受信されたことが通知されて注意を促し、その後車室内の運転者３に通知されるため、運転者３がパニックになり急ブレーキ、急ハンドル、急アクセルなどの危険な行動によって車両１の挙動が不安定になっても、周辺車両２との接触などを抑制回避することができる。

【００７４】

また、車両１と周辺車両２との接触危険度が閾値以下となった場合に、車室内の運転者３に緊急地震速報が受信されたことを通知するので、さらに周辺車両２と接触などを抑制回避することができる。

【００７５】

さらに、緊急地震速報を受信したことを車室内に通知した後、運転者による車両操舵及び車両制動の操作を抑制することで、緊急地震速報を受信したことが車室内の運転者３に通知されることで、運転者３がパニックになり急ブレーキ、急ハンドル、急アクセルなどの危険な行動によって自車両の挙動が不安定になることを抑制することができる。

【００７６】

運転者３がパニックでないと判定された場合には、運転者３による車両操舵及び車両制動の操作の抑制を解除することで、パニックではない運転者３がより安全な自車両の挙動を選択することができる。

【実施例２】

【００７７】

図２０は本発明の実施例２に係る処理フローの手順を示すフローチャートである。この実施例２は、先の図１８に示すフローチャートにおける処理ステップＳ１８１３の処理フローの具体的な実施例であり、他は先の実施例１と同様であるので、その説明は省略する。

【００７８】

図２０において、運転者３に緊急地震速報を伝えた後、判定ステップＳ２００１で車両１の前方に回避すべき障害物があるか否かを判定し、障害物がある場合には、図２１に示すように、ブレーキのあそびをなくし、ブレーキペダルの踏込みと同時にブレーキの制動力がかかるように、追突事故防止手段として利用されるプレビューブレーキを施す（ステップＳ２００２）。このように、プレビューブレーキを施すことでより迅速に安全に障害物を回避することが可能になる。

【００７９】

その後、図１９（ｃ）で示したようなアクセル制御を施す（ステップＳ２００３）。アクセル制御を施すことで、運転者３が緊急地震速報５を聞いてパニックになり、車両１の前方に回避すべき障害物があるにもかかわらず、急アクセルを踏んだ場合に、車両１が急加速を防止することが可能になる。

【００８０】

続いて、判定ステップＳ２００４で操作危険度判定手段１１０により、運転者３が緊急地震速報５を聞いた後にアクセルペダル踏込み速度（もしくはアクセルペダル踏込力）が予め設定された所定の閾値以上の操作をしたか否かを判定する。閾値以上の場合には、運転者３はパニックになり、障害物の回避操作がなされていないものと判定する（ステップＳ２００５）。その後、車両１はラジオやカーナビなどの緊急地震速報伝達手段１０３などで音声により自動運転に変更することを運転者３に伝えた後自動運転に変更され（ステップＳ２００６）、図６に示すカメラ７、電波センサー８、超音波センサー９などにより周囲状況を確認した後自動運転により障害物を回避し（ステップＳ２００７）、車両１を主要動（Ｓ波）が到達するまでに道路脇に停車させる（ステップＳ２００８）。

【００８１】

一方、先の判定ステップＳ２００４で閾値以上でない場合には、続けて判定ステップＳ２００９で運転者３は障害物回避のためにブレーキ、ハンドル操作をしたか否かを判定する。操作がなされていない場合には、運転者３は車両１の前方に回避すべき障害物があるにもかかわらず、緊急地震速報５を聞くことでパニックになり、回避操作ができていないと判定し（ステップＳ２００５）、先の処理ステップＳ２００６以降の処理を実行する。

【００８２】

一方、操作がなされた場合には、運転者３はパニックに陥っていないものと判定し（ステップＳ２０１０）、先の処理ステップＳ２００３で施したアクセル制御を解除した後（ステップＳ２０１１）、ラジオやカーナビなどの緊急地震速報伝達手段１０３などで音声により再度周囲の安全を確認して車両１を停車させる旨を伝える（ステップＳ２０１２）。

【００８３】

このように、上記実施例２では、先の実施例１と同様の効果を得ることができることに加えて、車両１の前方に障害物がある場合でも車両を適切に制御することが可能となる。

【実施例３】

【００８４】

図２２は本発明の実施例３に係る車両１および周辺車両２の挙動について示す図である。この実施例３は、先の図１０の処理ステップＳ１００４でＣａｓｅＢと判定された直後

の車両１および周辺車両２の挙動、ならびにその挙動の判定方法に関する実施例であり、他は先の実施例１または２と同様であるので、その説明は省略する。

【００８５】

図２２（ａ）において、ＣａｓｅＢと判定された直後の車両１と周辺車両２の挙動は、ＣａｓｅＢ－１：車両１と周辺車両２の位置関係変化なし、ＣａｓｅＢ－２：車両１、２近づく、ＣａｓｅＢ－３：車両１、２遠ざかる、ＣａｓｅＢ－４：車両１が周辺車両２側に車線変更する、ＣａｓｅＢ－５：周辺車両２が車両１側に車線変更する、ＣａｓｅＢ－６：その他、のような場合が考えられる。

【００８６】

図２３は上述のＣａｓｅＢの各Ｃａｓｅへの判定方法の手順を示すフローチャートである。ここで、図２２（ｂ）に示すように、車両進行方向をｘ方向、車両幅方向をｙ方向とし、車両１のｘ方向およびｙ方向速度をＶｘ１、Ｖｙ１、周辺車両２のｘ方向およびｙ方向速度をＶｘ２、Ｖｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対速度をＶｘ１２、Ｖｙ１２とする。また、車両１のｘ方向およびｙ方向の加速度をｇｘ１、ｇｙ１、周辺車両２のｘ方向およびｙ方向の加速度をｇｘ２、ｇｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対加速度をｇｘ１２、ｇｙ１２とする。

【００８７】

図２３において、先ず判定ステップＳ２３０１でＶｙ１２が０か否かを判定し、０である場合には、車両１と周辺車両２のｙ方向の相対的な動きはないと判定し、続いて判定ステップＳ２３０２でＶｘ１２が０か正か負かを判定する。判定の結果、０の場合には、車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＢ－１と判定し（ステップＳ２３０３）、正の場合には、車両１と周辺車両２は近づいているＣａｓｅＢ－２と判定し（ステップＳ２３０４）、負の場合には、車両１と周辺車両２は遠ざかっているＣａｓｅＢ－３と判定する（ステップＳ２３０５）。

【００８８】

一方、先の判定ステップＳ２３０１で０でない場合には、車両１と周辺車両２の車幅方向に相対的な動きがあると判定し、続いて判定ステップＳ２３０６でＶｙ１２とーＶｙ１が等しいか否か、すなわち車両１が車線変更しようとしているか否かを判定する。両者が等しい場合は、車両１が車線変更しようとしているＣａｓｅＢ－４と判定する（ステップＳ２３０７）。

【００８９】

一方、両者が等しくない場合には、続いて判定ステップＳ２３０８でＶｙ１が０か否か、すなわち周辺車両２が車線変更しようとしているか否かを判定する。判定の結果、０である場合は、周辺車両２が車線変更しようとしているＣａｓｅＢ－５と判定し（ステップＳ２３０９）、０でない場合には、車両１と周辺車両２の車幅方向の動きは様々考えられるのでその他ＣａｓｅＢ－６と判定する（ステップＳ２３１０）。

【００９０】

以上、ＣａｓｅＢ－１、ＣａｓｅＢ－３、ＣａｓｅＢ－４、ＣａｓｅＢ－５、ＣａｓｅＢ－６の場合には、周辺車両２は、Ａ、Ｂ領域にいる可能性が高いと判断し、先に説明した結合子Ｐ２で結合される処理ステップを順次実行する。

【００９１】

一方、ＣａｓｅＢ－２と判定した場合には、続いて判定ステップＳ２３１１で周辺車両２がＣ領域にいるか否かを先の図６に示す処理フローを実行して判定する。周辺車両２がＣ領域にいると判定した場合には、先に説明した結合子Ｐ３で結合される処理ステップを順次実行する。

【００９２】

一方、Ｃ領域にいない場合には、続いて判定ステップＳ２３１２でｘ方向の車両１の加速度ｇｘ１と車両１と２の相対加速度ｇｘ１２とから算出される周辺車両２の加速度ｇｘ２が予め設定された加速度の閾値ｇｃｘより大きいか否かを判定する。大きい場合には、周辺車両２は、Ｃ、Ｄ、Ｅ領域のいずれかの領域にいる、もしくは移動する可能性が高い

と判断し、先に説明した結合子Ｐ３で結合される処理ステップを順次実行する。一方、大きくない場合には、周辺車両２は、Ａ、Ｂ領域にいる可能性が高いと判断し、先に説明した結合子Ｐ２で結合される処理ステップを順次実行する。

【００９３】

このような判定手順において、判定の処理ステップＳ２３１１を実行することで、周辺車両２がＣａｓｅＢ－２の車両１と周辺車両２が近づいている場合において周辺車両２がＣ領域にいるか否かを判定し、Ｃ領域にいる場合は周辺車両２はＢ領域からＣ領域へ移動している。すなわち周辺車両２が車両１を追い越そうとしていることをより精度良く判定することができる。また、処理ステップＳ２３１２を実行することで、大きい場合には周辺車両２はＢ領域にいて車両１を追い越そうとしている。大きくない場合には周辺車両２はＢ領域にいて車両１を追い越そうとしていないことをより精度良く判定することができる。

【００９４】

このように、上記実施例３では、先の実施例１，２で得られる効果に加えて、ＣａｓｅＢを的確に判定することが可能となり、ＣａｓｅＢに対する適切な対処法を提供することができる。

【実施例４】

【００９５】

図２４は本発明の実施例４に係る車両１および周辺車両２の挙動について示す図である。この実施例４は、先の図１０の処理ステップＳ１００６でＣａｓｅＣと判定された直後の車両１および周辺車両２の挙動、ならびにその挙動の判定方法に関する実施例であり、他は先の実施例１または２と同様であるので、その説明は省略する。

【００９６】

図２４（ａ）において、ＣａｓｅＣと判定された直後の車両１と周辺車両２の挙動は、ＣａｓｅＣ－１：車両１と周辺車両２の位置関係変化なし、ＣａｓｅＣ－２：周辺車両２が車両１を追い越す、ＣａｓｅＢ－３：車両１が周辺車両２を追い越す、のような場合が考えられる。

【００９７】

図２５は上述のＣａｓｅＣの各Ｃａｓｅへの判定方法の手順を示すフローチャートである。ここで、図２４（ｂ）に示すように、車両進行方向をｘ方向、車両幅方向をｙ方向とし、車両１のｘ方向およびｙ方向速度をＶｘ１、Ｖｙ１、周辺車両２のｘ方向およびｙ方向速度をＶｘ２、Ｖｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対速度をＶｘ１２、Ｖｙ１２とする。また、車両１のｘ方向およびｙ方向の加速度をｇｘ１、ｇｙ１、周辺車両２のｘ方向およびｙ方向の加速度をｇｘ２、ｇｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対加速度をｇｘ１２、ｇｙ１２とする。

【００９８】

図２３において、先ず判定ステップＳ２５０１でＶｘ１２が０か正か負かを判定する。判定の結果、０の場合には車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＣ－１と判定し（ステップＳ２５０２）、正の場合には周辺車両２が車両１を追い越すＣａｓｅＣ－２と判定し（ステップＳ２５０３）、負の場合には車両１が周辺車両２を追い越すＣａｓｅＣ－３と判定する（ステップＳ２５０４）。

【００９９】

以上、ＣａｓｅＣ－３の場合は、周辺車両２はＡ，Ｂ領域にいる可能性が高いと判断し、先に説明した結合子Ｐ２で結合される処理ステップを順次実行する。一方、ＣａｓｅＣ－１、　ＣａｓｅＣ－２の場合は、周辺車両２はＣ、Ｄ、Ｅ領域にいる、もしくは移動する可能性が高いと判断し、先に説明した結合子Ｐ３で結合される処理ステップを順次実行する。

【０１００】

このように、上記実施例４では、先の実施例１，２で得られる効果に加えて、ＣａｓｅＣを的確に判定することが可能となり、ＣａｓｅＣに対する適切な対処法を提供すること

ができる。

【実施例５】

【０１０１】

図２６は本発明の実施例５に係る車両１および周辺車両２の挙動について示す図である。この実施例５は、先の図１０の処理ステップＳ１００９でＣａｓｅＤと判定された直後の車両１および周辺車両２の挙動、ならびにその挙動の判定方法に関する実施例であり、他は先の実施例１または２と同様であるので、その説明は省略する。

【０１０２】

図２６（ａ）において、ＣａｓｅＤと判定された直後の車両１と周辺車両２の挙動は、ＣａｓｅＤ－１：車両１と周辺車両２の位置関係変化なし、ＣａｓｅＤ－２：車両１、２遠ざかる、ＣａｓｅＤ－３：車両１、２近づく、ＣａｓｅＤ－４：車両１が周辺車両２側に車線変更する、ＣａｓｅＤ－５：周辺車両２が車両１側に車線変更する、ＣａｓｅＤ－６：その他、のような場合が考えられる。

【０１０３】

図２７は上述のＣａｓｅＤの各Ｃａｓｅへの判定方法の手順を示すフローチャートである。ここで、図２６（ｂ）に示すように、車両進行方向をｘ方向、車両幅方向をｙ方向とし、車両１のｘ方向およびｙ方向速度をＶｘ１、Ｖｙ１、周辺車両２のｘ方向およびｙ方向速度をＶｘ２、Ｖｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対速度をＶｘ１２、Ｖｙ１２とする。また、車両１のｘ方向およびｙ方向の加速度をｇｘ１、ｇｙ１、周辺車両２のｘ方向およびｙ方向の加速度をｇｘ２、ｇｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対加速度をｇｘ１２、ｇｙ１２とする。

【０１０４】

図２７において、先ず先に触れたプレビューブレーキを施した後（ステップＳ２７０１）、判定ステップＳ２７０２でＶｙ１２が０か否かを判定する。０の場合には、車両１と周辺車両２のｙ方向の相対的な動きはないと判定し、続いて判定ステップＳ２７０３でＶｘ１２が０か正か負かを判定する。０の場合には、車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＤ－１と判定し（ステップＳ２７０４）、正の場合には、車両１と周辺車両２は近づいているＣａｓｅＤ－２と判定し（ステップＳ２７０５）、負の場合には、車両１と周辺車両２は遠ざかっているＣａｓｅＤ－３と判定する（ステップＳ２７０６）。

【０１０５】

一方、先の判定ステップＳ２７０２で０でない場合には、車両１と周辺車両２の車幅方向に相対的な動きがあると判定し、続いて判定ステップＳ２７０７でＶｙ１２と－Ｖｙ１が等しいか否か、すなわち車両１が車線変更しようとしているか否かを判定する。両者が等しい場合は、車両１が車線変更しようとしているＣａｓｅＤ－４と判定する（ステップＳ２７０８）。

【０１０６】

一方、両者が等しくない場合には、続いて判定ステップＳ２７０９でＶｙ１が０か否かすなわち周辺車両２が車線変更しようとしているか否かを判定する。０の場合には、周辺車両２が車線変更しようとしているＣａｓｅＤ－５と判定し（ステップＳ２７１０）、０でない場合には、車両１と周辺車両２の車幅方向の動きは様々考えられるのでその他のＣａｓｅＤ－６と判定する（ステップＳ２７１１）。

【０１０７】

以上、ＣａｓｅＤ－１、ＣａｓｅＤ－２、ＣａｓｅＤ－４、ＣａｓｅＤ－５、ＣａｓｅＤ－６の場合には、周辺車両２はＣ、Ｄ、Ｅ領域にいる可能性が高いと判断し、先に説明した結合子Ｐ３に結合する処理ステップを順次実行する。

【０１０８】

一方、ＣａｓｅＤ－３の場合には、続けて判定ステップＳ２７１２で車両１の加速度ｇｘ１が予め設定された加速度の閾値ｇｅｘよりも大きいか否かを判定する。大きい場合には、周辺車両２はＡ、Ｂ領域にいる、もしくは移動する可能性が高いと判断し、先に説

明した結合子Ｐ２に結合する処理ステップを順次実行する。一方、大きくない場合には、周辺車両２はＣ、Ｄ、Ｅ領域にいる可能性が高いと判断し、先に説明した結合子Ｐ３に結合する処理ステップを順次実行する。上記判定ステップＳ２７１２を実行することで、車両１が周辺車両２を追い越そうとしていることをより精度良く判定することができる。

【０１０９】

このように、上記実施例５では、先の実施例１，２で得られる効果に加えて、ＣａｓｅＤを的確に判定することが可能となり、ＣａｓｅＤに対する適切な対処法を提供することができる。

【実施例６】

【０１１０】

図２８、図２９は本発明の実施例６に係る車両１および周辺車両２の挙動について示す図である。この実施例６は、先の図１０の処理ステップＳ１０１０でＣａｓｅＥと判定された直後の車両１および周辺車両２の挙動、ならびにその挙動の判定方法に関する実施例であり、他は先の実施例１または２と同様であるので、その説明は省略する。

【０１１１】

図２８（ａ）において、ＣａｓｅＥと判定された直後の車両１と周辺車両２の挙動は、ＣａｓｅＥ－１：周辺車両２は車両１の後のまま、ＣａｓｅＥ－２：車両１が車線変更、ＣａｓｅＥ－３：周辺車両２が車線変更、ＣａｓｅＥ－４：その他の場合が考えられる。

【０１１２】

さらに、図２９に示すように、　ＣａｓｅＥ－１は、ＣａｓｅＥ－１－１：車両１と周辺車両２の位置関係変化なし、ＣａｓｅＥ－１－２：車両１、２離れる、ＣａｓｅＥ－１－３：車両１，２接近、ＣａｓｅＥ－２は、ＣａｓｅＥ－２－１：車両１の車線変更のみ、ＣａｓｅＥ－２－２：周辺車両２が走り去る、ＣａｓｅＥ－２－３：車両１が周辺車両２を追い越す、ＣａｓｅＥ－３は、ＣａｓｅＥ－３－１：周辺車両２の車線変更のみ、ＣａｓｅＥ－３－２：周辺車両２が走り去る、ＣａｓｅＥ－３－３：車両１が周辺車両２を追い越す、の場合が考えられる。

【０１１３】

図３０は上述のＣａｓｅＥの各Ｃａｓｅへの判定方法の手順を示すフローチャートである。ここで、図２８（ｂ）に示すように、車両進行方向をｘ方向、車両幅方向をｙ方向とし、車両１のｘ方向およびｙ方向速度をＶｘ１、Ｖｙ１，周辺車両２のｘ方向およびｙ方向速度をＶｘ２、Ｖｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対速度をＶｘ１２、Ｖｙ１２とする。また、車両１のｘ方向およびｙ方向の加速度をｇｘ１、ｇｙ１、周辺車両２のｘ方向およびｙ方向の加速度をｇｘ２、ｇｙ２、車両１に対する周辺車両２のｘ方向およびｙ方向の相対加速度をｇｘ１２、ｇｙ１２とする。

【０１１４】

図３０において、先ず先に触れたプレビューブレーキを施した後（ステップＳ３００１），判定ステップＳ３００２でＶｙ１２が０か否かを判定し、０である場合には、車両１と周辺車両２のｙ方向の相対的な動きはないＣａｓｅＥ－１と判定する（ステップＳ３００３）。続いて、判定ステップＳ３００４でＶｘ１２が０か正か負かを判定し、０の場合には、車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＥ－１－１と判定し（ステップＳ３００５），正の場合には、車両１と周辺車両２は遠ざかるＣａｓｅＥ－１－２と判定し（ステップＳ３００６）、負の場合には、車両１と周辺車両２は近づくＣａｓｅＥ－１－３と判定する（ステップＳ３００７）。

【０１１５】

一方、判定ステップＳ３００２で０でない場合には、車両１と周辺車両２の車幅方向に相対的な動きがあると判定し、続いて判定ステップＳ３００８でＶｙ１２と－Ｖｙ１が等しいか否か、すなわち車両１が車線変更しようとしているか否かをを判定する。判定の結果、両者が等しい場合は、車両１が車線変更しようとしているＣａｓｅＥ－２と判定する（ステップＳ３００９）。

【０１１６】

続いて、判定ステップＳ３０１０でＶｘ１２が０か正か負かを判定し、０の場合には、車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＥ－２－１と判定し（ステップＳ３０１１）、正の場合には、車両１と周辺車両２は遠ざかっている、すなわち周辺車両２が走り去ろうとしているＣａｓｅＥ－２－２と判定し（ステップＳ３０１２）、負の場合には、車両１と周辺車両２は近づいている、すなわち車両１が周辺車両２を追い越そうとしているＣａｓｅＥ－２－３と判定する（ステップＳ３０１３）。

【０１１７】

一方、先の判定ステップＳ３００８で等しくない場合は、続いて判定ステップＳ３０１４でＶｙ１が０か否か、すなわち周辺車両２が車線変更しようとしているか否かを判定する。０の場合には、周辺車両２が車線変更しようとしているＣａｓｅＥ－３と判定する（ステップＳ３０１５）。続いて、判定ステップＳ３０１６でＶｘ１２が０か正か負かを判定し、０の場合には、車両１と周辺車両２のｘ方向の相対的な動きはないＣａｓｅＥ－３－１と判定し（ステップＳ３０１７）、正の場合には、車両１と周辺車両２は遠ざかっている、すなわち周辺車両２が走り去ろうとしているＣａｓｅＥ－３－２と判定し（ステップＳ３０１８）、負の場合には、車両１と周辺車両２は近づいている、すなわち車両１が周辺車両２を追い越そうとしているＣａｓｅＥ－３－３と判定する（ステップＳ３０１９）。一方、先の判定ステップＳ３０１４で０でない場合は、車両１と周辺車両２の車幅方向の動きは様々考えられるのでその他のＣａｓｅＥ－４と判定する（ステップＳ３０２０）。

【０１１８】

以上、ＣａｓｅＥ－１－１、ＣａｓｅＥ－１－２、ＣａｓｅＥ－１－３、ＣａｓｅＥ－２－１、ＣａｓｅＥ－２－２、ＣａｓｅＥ－３－１、ＣａｓｅＥ－３－２、ＣａｓｅＥ－４の場合は、周辺車両２は、Ｃ、Ｄ、Ｅ領域にいる可能性が高いと判断し、先に説明した結合子Ｐ３に結合する処理ステップを順次実行する。

【０１１９】

一方、ＣａｓｅＥ－２－３、ＣａｓｅＥ－３－３の場合は、続いて判定ステップＳ３０２１で周辺車両２がＥ領域にいるか否かを判定する。Ｅ領域にいる場合には、結合子Ｐ３に結合する処理ステップを順次実行する。

【０１２０】

一方、Ｅ領域にいない場合には、続けて判定ステップＳ３０２２で車両１の加速度ｇｘ１が予め設定された加速度の閾値ｇｃｘよりも大きいか否かを判定し、大きくない場合は、周辺車両２はＣ、Ｄ領域にいる可能性が高いと判断し、結合子Ｐ３に結合する処理ステップを順次実行する。一方、大きい場合には、周辺車両２はＡ、Ｂ領域にいる、もしくは移動する可能性が高いと判断し、先に説明した結合子Ｐ２に結合する処理ステップを順次実行する。

【０１２１】

ここで、判定ステップＳ３０２１を実行することで、周辺車両２がＥ領域にいる場合は、車両１は周辺車両２を追い越そうとしていないことをより精度良く判定することができる。また、判定ステップＳ３０２２を実行することで、加速度が閾値よりも大きい場合には、車両１は周辺車両２を追い越そうとしていること、大きくない場合は、車両１は周辺車両２を追い越そうとしていないことをより精度良く判定することができる。

【０１２２】

このように、上記実施例６では、先の実施例１，２で得られる効果に加えて、ＣａｓｅＥを的確に判定することが可能となり、ＣａｓｅＥに対する適切な対処法を提供することができる。

【実施例７】

【０１２３】

次に、本発明に係る実施例７について説明する。この実施例７の特徴とするところは、先の図１０の処理フローにおいて、判定ステップＳ１００１、Ｓ１００２、Ｓ１００５、Ｓ１００７ならびにＳ１００８で大きい場合と判定された場合、もしくは周辺車両が２が

いない場合には、フローチャートにおいて結合子Ｐ１で結合される処理ステップを順次実行するようにしたことにあり、他は先の実施例１～６と同様であるので、その説明は省略する。

【０１２４】

このような場合には、図１４のフローチャートに示すように、先ず緊急地震速報伝達手段１０３により車両１の運転者３に緊急地震速報５を伝え（ステップＳ１４０２）、周囲の安全を確認して停車するよう、またはトンネルや橋など地震発生時に危険である可能性の高い危険区域に入らないように伝える（ステップＳ１４０３）。その後、後述する運転者３に緊急地震速報を伝えた後の処理を実行する（ステップＳ１４０４）。

【０１２５】

このように、上記実施例７では、先の実施例１、２で得られる効果と同様の効果を得ることができる。

【実施例８】

【０１２６】

図３１～図３３は本発明に係る実施例８で採用した技術を説明する際に使用する図であり、図３１は車両１の周辺に複数の周辺車両がいる場合の位置関係を示す図であり、図３２、図３３はその場合の処理手順を示すフローチャートである。なお、実施例８は、システムの全体構成、周辺車両２の存在位置判定方法、車両１と周辺車両２の衝突危険度判定方法、運転者に緊急地震速報５を伝えた後の処理フロー（図１８、図２０）は先の実施例１～実施例７と同様であるため、ここでは説明を省略する。

【０１２７】

車両１の周辺に例えば図３１に示すように複数の周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ、図３１ではＮ＝３の３台の周辺車両が存在するものとする）がいる状況では、図３２のフローチャートに示すように、先ず緊急地震速報５が車両１に届いた後（ステップＳ３２０１）、車両１はハザードランプ６等で周囲に警告し（ステップＳ３２０２）、フローチャートにおける結合子Ｐ０で結合される図３３のフローチャートに示す処理ステップを順次実行する。

【０１２８】

図３３において、先ず判定ステップＳ３３０１で車両１の周辺に周辺車両が存在することが判定され、続いて判定ステップＳ３３０２で周辺車両２が反対車線でない車線に存在することが判定された後、周辺車両２が何台あるかを車両１の前部、側部、後部に設置されたカメラ７、電波センサー８、超音波センサー９などの手段により判定し（ステップＳ３３０３）、Ｎ台の周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ）が存在すると判定する（ステップＳ３３０４）。

【０１２９】

その後、ループ処理Ｓ３３０５を実行し、周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ）について、図６に示す処理ステップＳ６０４以降の各処理ステップＳ３３０６で周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ）の存在位置を判定する。続いて、判定ステップＳ３３０７で各領域の周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ）と車両１の衝突危険度を図１０に示す処理フローを実行して判定する。

【０１３０】

衝突危険度が小さいと判定された場合には、結合子Ｐｉに結合される衝突危険度が小さい状態の処理ステップを順次実行し、ＶＩ（Ｐｉ）＝ｉ、Ｐｉ＝Ｐｉ＋１で結合子Ｐｉに結合する処理フローを実行している状態の車両数をカウントする（ステップＳ３３０８）。

【０１３１】

一方、衝突危険度が大きいと判定され、図１０に示すＣａｓｅＡ～ＣａｓｅＥのいずれかのケースに判別されると、各ケースに応じて図１３、図２３、図２６、図２７もしくは図３０に示す各Ｃａｓｅの処理を実行した後（ステップＳ２２０９）、周辺車両２がＡ，Ｂ領域にいる状態である場合には結合子Ｐ２に結合される処理ステップを順次実行し、Ｖ

２（Ｐ２）＝１、Ｐ２＝Ｐ２＋１で結合子Ｐ２に結合する処理フローを実行している状態の車両数をカウントする（ステップＳ３３１０）。周辺車両２がＣ、Ｄ、Ｅ領域にいる状態である場合には結合子Ｐ３に結合する処理ステップを順次実行し、Ｖ３（Ｐ３）＝１、Ｐ３＝Ｐ３＋１で結合子Ｐ３に結合する処理フローを実行している状態の車両数をカウントする（ステップＳ３３１１）。

【０１３２】

このようにして、Ｎ台すべての周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ）について同様の処理を施した後（ステップＳ３３１２）、Ｎ台の周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ）が、結合子Ｐ１、Ｐ２、Ｐ３で結合されるいずれの処理フローを実行しているかを判定する。

【０１３３】

次に、判定ステップＳ３３１３では、結合子Ｐ２に結合する処理フローを実行している状態の周辺車両２－ｉ（ｉ＝１、２、３…、Ｐ２）が存在するか否かを判定し、存在しない場合は、続いて後述する判定ステップＳ３３１７を実行する。

【０１３４】

一方、存在する場合には、ループ処理Ｓ３３１４、Ｓ３３１６を開始し、結合子Ｐ２に結合される処理フローを実行している状態と判定された周辺車両２－ｊ（ｊ＝１、２、…、Ｐ２）に対して、図１４の結合子Ｐ２に結合される処理フローから結合子Ｐ１に結合される処理フローまでの一連の各処理を実行する（ステップＳ３３１５）。

【０１３５】

このようなループ処理により結合子Ｐ２で結合される処理フローを実行している状態と判定された周辺車両２－ｊ（ｊ＝１、２、…、Ｐ２）がすべて衝突危険度が小さい状態の、結合子Ｐ１で結合される処理フローを実行した後（ステップＳ３３１６）、判定ステップＳ３３１７を実行する。

【０１３６】

次に、判定ステップＳ３３１７では、結合子Ｐ３で結合される処理フローを実行している状態の周辺車両２－ｋ（ｋ＝１、２、３…、Ｐ３）が存在するか否かを判定し、存在しない場合には、Ｎ台すべての周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ）との衝突危険度が小さくなったものと判断し、車両１の運転者３に緊急地震速報５を伝える（ステップＳ３３１８）。

【０１３７】

一方、存在する場合には、ループ処理Ｓ３３１９、Ｓ３３２１を開始し、結合子Ｐ３に結合される処理フローを実行している状態と判定された周辺車両２－ｋ（ｋ＝１、２、…、Ｐ３）に対して、図１４の結合子Ｐ３に結合される処理フローから結合子Ｐ１に結合される処理フローまでの一連の各処理を実行する（ステップＳ３３２０）。

【０１３８】

このようなループ処理により結合子Ｐ３に結合される処理フローを実行している状態と判定された周辺車両２－ｋ（ｋ＝１、２、…、Ｐ３）がすべて衝突危険度が小さい状態の、結合子Ｐ１で結合される処理フローを実行すると、Ｎ台すべての周辺車両２－ｉ（ｉ＝１、２、３…、Ｎ）の車両１との衝突危険度が小さくなったと判断し、車両１の運転者３に緊急地震速報５を伝える（ステップＳ３３１８）。

【０１３９】

上記処理フローでは、先ず結合子Ｐ２に結合される処理フローを実行している状態のすべての周辺車両２－ｊ（ｊ＝１、２、…、Ｐ２）が結合子Ｐ１に結合される処理フローを実行している状態、すなわち衝突危険度が小さくなった状態になった後、結合子Ｐ３に結合される処理フローを実行している状態のすべての周辺車両２（ｋ）（ｋ＝１、２、…、Ｐ３）が結合子Ｐ１に結合される処理フローを実行している状態、すなわち衝突危険度が小さくなった状態に移行するようにしている。

【０１４０】

このように、結合子Ｐ３に結合される処理フローを実行している状態にある周辺車両２

－ｋ（ｋ＝１、２、…、Ｐ３）との衝突危険度を小さくするために、車両１において、図１４に示す処理ステップＳ１４０６の自動ブレーキにより積極的に車両１を結合子Ｐ３に結合される処理フローを実行している状態にある周辺車両２－ｋ（ｋ＝１、２、…、Ｐ３）の後方向に離間させる。

【０１４１】

結合子Ｐ２に結合される処理フローを実行している状態の周辺車両２－ｊ（ｊ＝１、２、…、Ｐ２）も同時に存在するときには、結合子Ｐ２に結合される処理フローを実行している状態の周辺車両２－ｊ（ｊ＝１、２、…、Ｐ２）と車両１との衝突危険度が大きい状態で車両１が自動ブレーキを作動させると、結合子Ｐ２に結合される処理フローを実行している状態の周辺車両２－ｊ（ｊ＝１、２、…、Ｐ２）と衝突する可能性が大きくなる。しかし、まず結合子Ｐ２に結合される処理フローを実行している状態のすべての周辺車両２－ｊ（ｊ＝１、２、…、Ｐ２）が結合子Ｐ１に結合される処理フローを実行している状態、すなわち衝突危険度が小さくなった状態にすることにより、このような不具合を防止することが可能になる。

【０１４２】

このように、上記実施例８では、周辺車両が複数の場合であっても、先の実施例１，２で得られる効果と同様の効果を得ることができる。

【実施例９】

【０１４３】

図３４は本発明の実施例９に係る車両制御装置の構成を示す図である。図３４に示す実施例９の車両制御装置は、先の図１に示す車両制御装置の構成に加えて、室内状況検出手段１１２ならびに画像処理手段１１３を備えて構成され、室内状況検出手段１１２ならびに画像処理手段１１３の他は実施例１と同様であるので、ここでは説明は省略する。また、この実施例９は、周辺車両２の存在位置判定方法、車両１と周辺車両２の衝突危険度判定方法、運転者に緊急地震速報５を伝えた後の処理は先の実施例１～８と同様であるため、ここでは説明を省略する。

【０１４４】

室内状況検出手段１１２は、図３５に示すように、乗員の挙動を検出するために車室内の天井３５Ａやステアリング上部３５Ｂに設置されるカメラなどで構成される。

【０１４５】

画像処理手段１１３は、室内状況検出手段１１２により得られた画像情報を入力して処理する手段であり、例えば　ＤＳＰ（ディジタル・シグナル・プロセッサ）やマイクロコンピュータ等で構成される。

【０１４６】

このような構成において、先の図１３、図２３、図２７ならびに図３０に示す処理フローでＣａｓｅＡ－２、　ＣａｓｅＢ－４、ＣａｓｅＤ－４、ＣａｓｅＥ－２の車両１が車線変更しようとしているか否かは、それぞれ処理ステップＳ１３０７，Ｓ２３０６，Ｓ２７０７，Ｓ３００８でＶｙ２と－Ｖｙ１が等しいか否かを判定することで判断していたが、この実施例９では、この判定にさらに加えて、図３６（ａ）に示すように車両１の運転者３の目３６Ａの動き３６Ｂ、同図（ｂ）に示すように頭３６Ｃの動き３６Ｄを室内に設置された室内状況検出手段１１２のカメラなどにより撮像された画像を画像処理手段１１３で画像処理することで検出し、検出結果を加味して車線の変更を判定する。

【０１４７】

運転者３の目３６Ａがサイドミラーの方向などを向く頻度や向いている時間，頭３６Ｃがサイドミラーの方向などを向く頻度や向いている時間、頭３６Ｃの回転角などのパラメータが予め設定された閾値以上であるか否かを判定する。閾値以上である場合には、車両１の運転者３は車線変更しようとしていると判定し、上記Ｖｙ２と－Ｖｙ１が等しいか否かの判定に加える。

【０１４８】

これにより、この実施例９では、先の実施例１，２と同様の効果を得ることができるこ

とに加えて、車両１が車線変更しようとしていることをより精度良く判定することが可能となる。

【実施例１０】

【０１４９】

図３７は本発明の実施例１０に係る車両制御装置の構成を示す図である。図３７に示す実施例１０の車両制御装置は、先の図１に示す車両制御装置の構成に加えて、方向指示手段１１４を備えて構成され、この方向指示手段１１４の他は実施例１と同様であるので，ここでは説明は省略する。また、この実施例１０は、周辺車両２の存在位置判定方法、車両１と周辺車両２の衝突危険度判定方法、運転者に緊急地震速報５を伝えた後の処理は先の実施例１～８と同様であるため、ここでは説明を省略する。

【０１５０】

方向指示手段１１４は、車両１が周辺車両に右折、左折、車線変更などをする旨を伝える手段であり、図３８に示すように車両１内に設置されたウィンカーレバー３８の操作により車両１に取り付けられたウィンカーランプが作動することで機能する。

【０１５１】

このような構成において、先の図１３、図２３、図２７ならびに図３０に示す処理フローでＣａｓｅＡ－２、　ＣａｓｅＢ－４、ＣａｓｅＤ－４、ＣａｓｅＥ－２の車両１が車線変更しようとしているか否かは、それぞれ処理ステップＳ１３０７、Ｓ２３０６、Ｓ２７０７、Ｓ３００８でＶｙ１２と－Ｖｙ１が等しいか否かを判定することで判断している。　これに対して、この実施例１０では、車両１の運転者３がウィンカーレバー３８を操作しているか否かの判定を、上記Ｖｙ１２と－Ｖｙ１が等しいか否かの判定に加える。これにより、車両１が車線変更しようとしていることをより精度良く判定することができる。

【０１５２】

これにより、この実施例１０では、先の実施例１，２と同様の効果を得ることができることに加えて、車両１が車線変更しようとしていることをより精度良く判定することが可能となる。

【実施例１１】

【０１５３】

次に、本発明に係る実施例１１について説明する。この実施例１１の構成，ならびに周辺車両２の存在位置判定方法、車両１と周辺車両２の衝突危険度判定方法は、先の図１に示す実施例１と同様であり、また運転者３に緊急地震速報５を伝えた後の処理は先の実施例１～８と同様であるため，ここでは説明を省略する。

【０１５４】

先の図１３、図２３、図２７ならびに図３０に示す処理フローでＣａｓｅＡ－２、　ＣａｓｅＢ－４、ＣａｓｅＤ－４、ＣａｓｅＥ－２の車両１が車線変更しようとしているか否かは、それぞれ処理ステップＳ１３０７、Ｓ２３０６、Ｓ２７０７、Ｓ３００８でＶｙ１２と－Ｖｙ１が等しいか否かを判定することで判断している。

【０１５５】

これに対して、この実施例１１では、図１に示す操作量検出手段１０９により車両１の運転者３のステアリング軸の回転角などを検出し、この回転角が予め設定された閾値以上であるか否かを判定する。閾値以上である場合には、車両１の運転者３は車線変更しようとしていると判定し、上記Ｖｙ１２と－Ｖｙ１が等しいか否かの判定に加える。これにより、車両１が車線変更しようとしていることをより精度良く判定することができる。

【０１５６】

これにより、この実施例１１では、先の実施例１，２と同様の効果を得ることができることに加えて、車両１が車線変更しようとしていることをより精度良く判定することが可能となる。

【実施例１２】

【０１５７】

次に、本発明に係る実施例１２について説明する。この実施例１２において、装置の構成、周辺車両２の存在位置判定方法、車両１と周辺車両２の衝突危険度判定方法、運転者に緊急地震速報５を伝えた後の処理、ならびに車線変更の判定方法は、先の実施例１～１１と同様であるため、ここでは説明を省略する。

【０１５８】

図３９は車両１が車線変更しようとしている状況例を示しており、例えば同図（ａ）に示すように走行車線３９Ａを走行中に車両１が隣接車線３９Ｂに矢印で示すように車線変更しようとする場合、同図（ｂ）に示すように高速道路などの合流地点で、合流車線３９Ｃから走行車線３９Ｄに車両１が矢印で示すように車線変更しようとする場合、高速道路などで走行車線３９Ｄを走行している車両１が、合流車線３９Ｃから走行車線３９Ｄに矢印で示すように車線変更しようとする車両４０を避けるために、走行車線に隣接する走行車線３９Ｅに矢印で示すように車線変更しようとする場合などが想定される。

【０１５９】

このような車線変更の状況において、車両１と周辺車両２との衝突危険度が大きい場合は、先の図１３、図２３、図２７ならびに図３０に示す処理フローにおけるＣａｓｅＡ－２、ＣａｓｅＢ－４、ＣａｓｅＤ－４、ＣａｓｅＥ－２と同様なので説明は省略する。

【０１６０】

一方、この実施例１２では、車両１と周辺車両２との衝突危険度が小さい場合に、車両１が上述した図３９で示すように車線変更しようとしている際の実施例である。

【０１６１】

車両１が車線変更ようとしているか否か、すなわち車線変更開始時もしくは車線変更中かの判定方法は、車両１のｙ方向（車幅方向速度）のＶｙ１を自車両情報出力手段１０７より出力し、この値が０でないか否かを判定する方法や、先の実施例１０～１２で採用した運転者３の挙動に基づく判定方法、ウィンカーの点滅の有無に基づく判定方法、ステアリング軸の回転量に基づく判定などがある。

【０１６２】

図４０は車両１に緊急地震速報５が届き、周辺車両２との衝突危険度が小さいと判定され、車両１が車線変更しようとしている場合に、緊急地震速報５を運転者３に伝える手順を示すフローチャートである。

【０１６３】

図４０において、先ず車両１に緊急地震速報５が届き（ステップＳ４００１）、車両１はハザードランプ６を点滅させる一方（ステップＳ４００２）、室内ハザードランプ１４は点滅させない。

【０１６４】

その後、車両１と周辺車両２との衝突危険度が小さいと判定され（ステップＳ４００３）、上記判定方法により車両１は車線変更開始時もしくは車線変更中と判定された場合には、車両１の運転者３に直ちには緊急地震速報５を報知しない。緊急地震速報が車両１に届いてから所定時間後に車両１のｙ方向（車幅方向速度）Ｖｙ１が０になったり、ウィンカーの点滅がなくなったり、ステアリングの回転量が０になることで、車両１の車線変更が完了したものと判定された後、運転者３に緊急地震速報５を伝える。

【０１６５】

これにより、この実施例１２では、先の実施例１，２と同様の効果を得ることができることに加えて、車線変更開始時や車線変更中に、運転者３が緊急地震速報５を聴取することでパニックとなり、適切な車線変更ができなくなることを防止することが可能になる。

【実施例１３】

【０１６６】

次に、本発明に係る実施例１３について説明する。この実施例１３において、装置の構成、周辺車両２の存在位置判定方法、車両１と周辺車両２の衝突危険度判定方法、運転者に緊急地震速報５を伝えた後の処理は、先の実施例１～１２と同様であるため、ここでは説明を省略する。

【０１６７】
車両１が緊急地震速報５を受信することにより、受信後の経過時間ｔとともに変化する主要動（Ｓ波）の到達予想時間Ｔｓ（ｔ）が緊急地震速報受信手段１０２で把握することができる。すなわち、図４１に示すように、地震襲来に備えて車両１を停車させたりするなどの地震対策に要する時間をＴｃとすると、Ｓ波到達予想時間ＴｓがＴｃより大きい間に、車両１の運転者３に緊急地震速報５を伝達する必要がある。
【０１６８】
そこで、この実施例１３では、図４２のフローチャートに示すように、緊急地震速報が車両１に届いた後（ステップＳ４２０１）、車両１の運転者３に緊急地震速報５を伝えるまで先の実施例１～１２で採用した各処理ステップＳ４２０２を実行し、その実行中に判定ステップＳ３２０３でＴｓ（ｔ）がＴｃより大きいか否かを判定する。大きい場合には各処理を続行する一方、大きくない場合には、直ちに結合子Ｐ１に結合する処理ステップを順次実行し、すなわち先の図１４に示すように、緊急地震速報伝達手段１０３により車両１の運転者３に緊急地震速報５を伝え（ステップＳ１４０２）、周囲の安全を確認して停車するよう、またはトンネルや橋など地震発生時に危険である可能性の高い危険区域に入らないように伝えた後（ステップＳ１４０３）、運転者３に緊急地震速報を伝えた後の処理を実行する（ステップＳ１４０４）。
【０１６９】
このように、この実施例１３では、Ｔｓ（ｔ）とＴｃを比較することで、地震襲来前に緊急地震速報５を運転者３に確実に伝達することができ、運転者３が緊急地震速報５を聞くことでパニックになって、急ブレーキ、急ハンドル、急アクセルをした場合でも、図１４に示す運転者３に緊急地震速報５を伝えた後の処理を施すことで、地震襲来前までに車両１を停車させる等の地震対策を施すことができる。
【０１７０】
なお、上記実施例１～１３において本発明の車両制御装置は、以下に記載する特徴を有し、その特徴により以下に記載する効果を得ることができる。
【０１７１】
（１）衝突危険度判定手段１０８は、車両１に設置される周囲状況検出手段１０６により周辺車両２との衝突危険度を判定する判定手段であることを特徴する。
【０１７２】
上記特徴により、周辺車両との衝突危険度を判定して、衝突危険度が小さくなってから運転者３に緊急地震速報を伝えることで、運転者３がパニックになって危険な行動をすることで事故が発生する可能性を低減することができる。
【０１７３】
（２）周囲状況検出手段１０６は、車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの車外周辺検知センサーで構成され、車両１と周辺車両２との相対速度、相対加速度、相対距離を検出する検出手段であることを特徴とする。
【０１７４】
上記特徴により、カメラ、電波センサー、超音波センサーなどの車外周辺検知センサーを用いたことで、より精度良く車両１と周辺車両２との相対速度、相対加速度、相対距離などを検出することができる。
【０１７５】
（３）周囲状況検出手段１０６は、車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーで構成され、周辺車両２の車両１に対する存在位置を判定する周辺車両存在位置判定手段として機能することを特徴とする。
【０１７６】
上記特徴により、周辺車両２の存在位置を判定することにより、適切に衝突危険度を判定することができる。
【０１７７】
（４）上記周辺車両存在位置判定手段は、車両１の前端線、側端線、後端線、車幅中心

線に対して、周辺車両２がまたいでいるか、前方にあるか、後方にあるかを判定し、車両１に対する周辺車両２の存在位置を判定することを特徴とする。

【０１７８】

上記特徴により、自車両の前端線、側端線、後端線、車幅中心線と周辺車両との位置関係により周辺車両２の存在位置を判定するので、周辺車両２の存在位置を適切に判定することができる。

【０１７９】

（５）衝突危険度判定手段１０８で判定される衝突危険度は、後方の周辺車両２に対しては、周辺車両２と車両１との相対速度、相対加速度、相対距離、車両１の速度、加速度、予め設定される車両１の急制動時の減速度から算出される車両１と周辺車両２との衝突予測時間であることを特徴とする。

【０１８０】

上記特徴により、車両１の後方に存在する周辺車両２との衝突危険度を判定するパラメータを算出することができる。

【０１８１】

（６）衝突危険度判定手段１０８で判定される衝突危険度は、前方の周辺車両２に対しては、周辺車両２と車両１との相対速度、相対加速度、相対距離、車両１の速度、加速度、予め設定される車両１の急加速時の加速度から算出される車両１と周辺車両２との衝突予測時間であることを特徴とする。

【０１８２】

上記特徴により、車両１の前方に存在する周辺車両２との衝突危険度を判定するパラメータを算出することができる。

【０１８３】

（７）衝突危険度判定手段１０８で判定される衝突危険度は、側方の周辺車両２に対しては、車両１の速度であることを特徴とする。

【０１８４】

上記特徴により、車両１の側方に存在する周辺車両２との衝突危険度を判定するパラメータを算出することができる。

【０１８５】

（８）衝突危険度判定手段１０８は、衝突予測時間、車両１の速度、予め設定される衝突予測時間の閾値、車両１の速度の閾値とを比較することで衝突危険度を判定することを特徴とする。

【０１８６】

上記特徴により、車両１と周辺車両２との衝突危険度を適切に判定することができる。

【０１８７】

（９）車両制御手段１０１は、車両１および周辺車両２が車線変更するか否かを判定する車線変更判定手段を備えていることを特徴とする。

【０１８８】

上記特徴により、衝突危険度を判定する際に、時々刻々と変化する車両１と周辺車両２との車幅方向の相対的な位置変化を判定することができる。

【０１８９】

（１０）車両制御手段は、車両１と周辺車両２が前後方向に相対的に近づくのか、あるいは遠ざかるのかを判定することを特徴とする。

【０１９０】

上記特徴により、衝突危険度を判定する際に、時々刻々と変化する車両１と周辺車両２との前後方向の相対的な位置変化を判定することができる。

【０１９１】

（１１）車線変更判定手段は、車両１と周辺車両２との車幅方向の相対速度と車両１の車幅方向の速度を比較することで、車両１、周辺車両２が車線変更開始時、もしくは車線変更中であるのかを判定することを特徴とする。

【0192】
上記特徴により、車両1の車幅方向の速度と車両1と隣接車両2との車幅方向の相対速度を比較することで、適切に車両1および隣接車両2との車線変更の判定を行うことができる。

【0193】
(12) 車線変更判定手段は、車両1の車幅方向の速度に基づいて車両1が車線変更開始であるかどうか、もしくは車線変更中であるかを判定することを特徴とする。

【0194】
上記特徴により、車両1の車幅方向の速度に基づいて、適切に車両1の車線変更の判定を行うことができる。

【0195】
(13) 車線変更判定手段は、車両1の室内に設置されたカメラなどにより、車両1の運転者3の目、もしくは鼻やマイクなどの方向を検出する際の動き量、頻度、時間などに基づいて車両1が車線変更開始であるかどうか、もしくは車線変更中であるかを判定することを特徴とする。

【0196】
上記特徴により、車両1の室内に設置されたカメラなどにより、車両1の運転者3の目、顔がサイドミラーなどの方向を視る際の動き量、頻度、時間などを検出することで、より適切に車両1の車線変更の判定を行うことができる。

【0197】
(14) 車線変更判定手段は、車両1の左右ウインカーレバー操作の有無に基づいて車両1が車線変更開始であるかどうか、もしくは車線変更中であるかを判定することを特徴とする。

【0198】
上記特徴により、車両1のウインカーレバーの操作の有無を検出することで、より適切に車両1の車線変更の判定を行うことができる。

【0199】
(15) 車線変更判定手段は、車両1のハンドルの操作量から車両1が車線変更開始であるかどうか、もしくは車線変更中であるかを判定することを特徴とする。

【0200】
上記特徴により、車両1のハンドル操作量を検出することで、より適切に車両1の車線変更の判定を行うことができる。

【0201】
(16) 車線制御手段101は、車両1と隣接車両2との前後方向の相対速度の大きさにより、車両1と隣接車両2との前後方向の相対位置変化を判定することを特徴とする。

【0202】
上記特徴により、車両1と隣接車両2との前後方向の相対速度の大きさにより、車両1と隣接車両2との前後方向の相対位置変化を適切に判定することができる。

【0203】
(17) 車両制御手段101は、車両1の前後方向の加速度から車両1と隣接車両2との前後方向の相対位置変化を判定することを特徴とする。

【0204】
上記特徴により、車両1と隣接車両2との前後方向の加速度の大きさにより、車両1と隣接車両2との前後方向の相対位置変化を適切に判定することができる。

【0205】
(18) 車両制御手段101は、車両1の前後方向の加速度と車両1と隣接車両2との前後方向の相対速度から算出される隣接車両2の前後方向の加速度から車両1と隣接車両2との前後方向の相対位置変化を判定することを特徴とする。

【0206】

上記特徴により、車両１の前後方向の加速度の大きさにより、車両１と周辺車両２との前後方向の相対位置変化を適切に判定することができる。

【０２０７】

（１９）緊急地震速報伝達手段１０３は、ラジオ、カーナビなどから出力される音声、計器盤やルームランプなどに設置される地震用ランプ、インパネ画面やフロントウィンドなどに表示されるハットマーク、インパネ画面に表示される警告文、室内ハザードランプなどで構成されることを特徴する。

上記特徴により、車両１の運転者３に適切に緊急地震速報を伝えることができる。

【０２０８】

（２０）車両制御手段１０１は、乗員状態判定手段を備え、この乗員状態判定手段は、車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの周囲状況検出手段１０６により車両１の前方に回避すべき障害物がないと判定された場合に、運転者３のブレーキ、ハンドル、アクセルの操作量のうち少なくとも１つが、予め設定された操作量の閾値より大きいか否かに基づいて、運転者３がパニックに陥ったか否かを判定することを特徴とする。

【０２０９】

上記特徴により、車両１の前方に回避すべき障害物がない場合には、運転者３が急ブレーキ、急ハンドル、急アクセルをしたか否かを判定することで、運転者が緊急地震速報を聞くことでパニックになったか否かを適切に判定することができる。

【０２１０】

（２１）乗員状態判定手段は、車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの周囲状況検出手段１０６により車両１の前方に回避すべき障害物があると判定された場合には、運転者のアクセル操作量が予め設定された操作量の閾値より大きいか否かに基づいて、運転者がパニックに陥ったか否かを判定することを特徴とする。

【０２１１】

上記特徴により、車両１の前方に回避すべき障害物がある場合には、運転者３が急アクセルをしたか否かを判定することで、運転者が緊急地震速報を聞くことでパニックになったか否かを適切に判定することができる。

【０２１２】

（２２）乗員状態判定手段は、車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの周囲状況検出手段１０６により車両１の前方に回避すべき障害物がないと判定された場合には、運転者３が障害物回避のためのブレーキ、ハンドル操作をしたか否かに基づいて、運転者がパニックに陥ったか否かを判定することを特徴とする。

【０２１３】

上記特徴により、車両１の前方に回避すべき障害物がない場合に、運転者が障害物回避のためのブレーキ、ハンドル操作をしたか否かに基づいて、運転者が緊急地震速報を聞くことでパニックになったか否かを適切に判定することができる。

【０２１４】

（２３）車両制御手段１０１は操作出力制御手段を備え、この操作出力制御手段は、車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの周囲状況検出手段１０６により車両１の前方に回避すべき障害物がないと判定された場合には、運転者の急ブレーキ、急ハンドル、急アクセル操作に対して出力される制動力、操舵量、駆動力を制御することを特徴とする。

【０２１５】

上記特徴により、車両１の前方に回避すべき障害物がない場合には、ブレーキ、ハンドル、アクセルを制御することで、運転者が緊急地震速報を聞いてパニックになり、急ブレーキ、急ハンドル、急アクセルなどの危険な行動により車両１が危険な状況に陥ることを防止することができる。

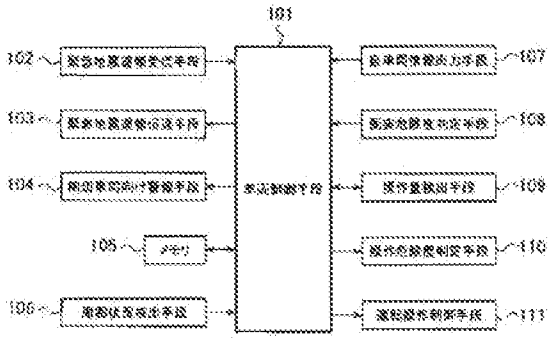
【０２１６】
（２４）操作出力制御手段は、車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの周囲状況検出手段１０６により車両１の前方に回避すべき障害物があると判定された場合には、運転者の急アクセル操作に対して出力される駆動力を制御することを特徴とする。
【０２１７】
上記特徴により、車両１の前方に回避すべき障害物がある場合には、アクセルを制御することで、運転者が緊急地震速報を聞いてパニックになり、急ブレーキ、急ハンドル、急アクセルなどの危険な行動により車両１が危険な状況に陥ることを防止することができる。
【０２１８】
（２５）操作出力制御手段は、上記周辺車両存在位置判定手段により周辺車両２が車両１の前方にいると判定され、衝突危険度判定手段１０８により車両１と周辺車両２との衝突危険度が大きいと判定された場合には、自動ブレーキを施すことを特徴とする。
【０２１９】
上記特徴により、衝突危険度判定の際に、周辺車両２が前方方向にいて衝突危険度が大きいと判定された場合には、車両１が自動ブレーキを施すことで、積極的に前方の周辺車両２を車両１のより前方に相対的に移動させることが可能となり、これにより衝突危険度を速やかに小さくすることができる。
【０２２０】
（２６）操作出力制御手段は、車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの周囲状況検出手段１０６により車両１の前方に回避すべき障害物があると判定された場合には、ブレーキの遊びをなくす等のプレビューブレーキを施すことを特徴とする。
【０２２１】
上記特徴により、車両１の前方に回避すべき障害物がある場合には、ブレーキの遊びをなくす等のプレビューブレーキを施すことにより、速やかに障害物を回避することができる。
【０２２２】
（２７）操作出力制御手段は、周辺車両存在位置判定手段により周辺車両２が車両１の前方にいると判定され、衝突危険度判定手段１０８により車両１と周辺車両２との衝突危険度が大きいと判定された場合には、ブレーキの遊びをなくす等のプレビューブレーキを施すことを特徴とする。
【０２２３】
上記特徴により、衝突危険度を判定する際に、周辺車両２が車両１の前方方向にいると判定された場合には、ブレーキの遊びをなくす等のプレビューブレーキを施すことにより、前方の車両が緊急地震速報を聞くことで急ブレーキ操作をした場合でも、より速やかに対処することができる。
【０２２４】
（２８）操作出力制御手段は、乗員状態判定手段により運転者３が緊急地震速報を聞いてもパニックにならなかったと判定された場合には、制御が設けられていたブレーキ、ハンドル、アクセルの制御を解除することを特徴とする。
【０２２５】
上記特徴により、運転者が緊急地震速報を聞いてもパニックにならなかった場合には、ブレーキ、ハンドル、アクセルの制御を解除することにより、地震が来るまでに運転者が、周囲の安全を確認しながら車両１を停止させるなどの適切な地震対策を行うことができる。
【０２２６】
（２９）操作出力制御手段は、乗員状態判定手段により運転者が緊急地震速報を聞いてパニックになったと判定された場合には、自動運転を行うことを特徴とする。

【０２２７】
上記特徴により、運転者が緊急地震速報を聞いてパニックになった場合には、車両１が自動運転に変更されることで、回避すべき障害物が車両１の前方にない場合は、車両１が車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの周囲状況検出手段１０６により周囲の安全を確認しながら、地震が到達する前に自動運転により車両１を停車させることができる。また、回避すべき障害物が車両１の前方にある場合には、自動運転により車両１の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの周囲状況検出手段１０６により周囲の安全を確認しながら、障害物を回避し、さらに車両１が地震が到達する前に自動運転により車両１を停車させることができる。

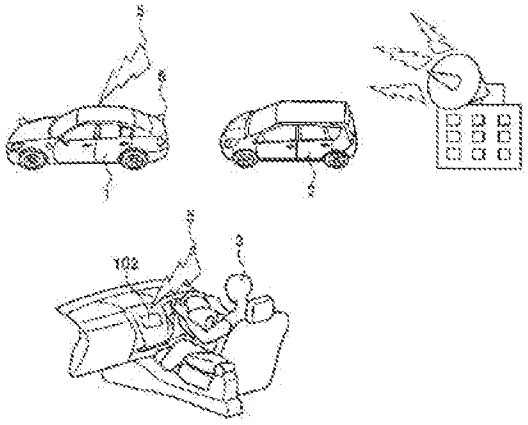
【図面の簡単な説明】
【０２２８】
【図１】本発明の実施例１に係る車両制御装置の構成を示す図である。
【図２】緊急地震速報を受信する際の様子を示す図である。
【図３】車両の前部、側部、後部に設置されるカメラ、電波センサー、超音波センサーなどの配置例を示す図である。
【図４】緊急地震速報を伝達する際の様子を示す図である。
【図５】周辺車両が存在する領域を示す図である。
【図６】周辺車両の存在位置を判定する手順を示すフローチャートである。
【図７】各領域に存在する周辺車両を示す図である。
【図８】周辺車両がＡ，Ｂ領域に存在する場合の処理に関する図である。
【図９】周辺車両がＤ，Ｂ領域に存在する場合の処理に関する図である。
【図１０】各Ｃａｓｅを判定する手順を示すフローチャートである。
【図１１】実施例１に係るＣａｓｅＡと判定された場合の車両１と周辺車両２との相対位置変化を示す図である。
【図１２】実施例１に係るＣａｓｅＡと判定された場合の車両１と周辺車両２との相対位置変化を示す図である。
【図１３】実施例１に係るＣａｓｅＡに関する処理手順を示すフローチャートである。
【図１４】衝突危険度の判定結果から運転者に緊急地震速報を伝えるまでの処理手順を示すフローチャートである。
【図１５】後方車両との衝突危険度が小さくなるイメージを示す図である。
【図１６】自動ブレーキの特性を示す図である。
【図１７】前方車両との衝突危険度がよりはやく小さくなるイメージを示す図である。
【図１８】前方に障害物がない場合に、運転者に緊急地震速報を伝えた後の処理手順を示すフローチャートである。
【図１９】各運転操作量に対する出力の変化を示す図である。
【図２０】前方に障害物がある場合に、運転者に緊急地震速報を伝えた後の処理手順を示すフローチャートである。
【図２１】プレビューブレーキの特性を示す図である。
【図２２】実施例３に係るＣａｓｅＢと判定された場合の車両１と周辺車両２との相対位置変化を示す図である。
【図２３】実施例３に係るＣａｓｅＢに関する処理手順を示すフローチャートである。
【図２４】実施例４に係るＣａｓｅＣと判定された場合の車両１と周辺車両２との相対位置変化を示す図である。
【図２５】実施例４に係るＣａｓｅＣに関する処理手順を示すフローチャートである。
【図２６】実施例５に係るＣａｓｅＤと判定された場合の車両１と周辺車両２との相対位置変化を示す図である。
【図２７】実施例５に係るＣａｓｅＤに関する処理手順を示すフローチャートである。
【図２８】実施例６に係るＣａｓｅＥと判定された場合の車両１と周辺車両２との相対位置変化を示す図である。

【図２９】実施例６に係るＣａｓｅＥと判定された場合の車両１と周辺車両２との相対位置変化を示す図である。
【図３０】実施例６に係るＣａｓｅＥに関する処理手順を示すフローチャートである。
【図３１】実施例８に係る周辺車両の存在位置を示す図である。
【図３２】実施例８に係る緊急地震速報受信した後の処理手順を示す図である。
【図３３】実施例８に係る処理手順を示すフローチャートである。
【図３４】本発明の実施例９に係る車両制御装置の構成を示す図である。
【図３５】車室内に設置されるカメラの配置例を示す図である。
【図３６】運転者の目、頭の動きをイメージした図である。
【図３７】本発明の実施例１０に係る車両制御装置の構成を示す図である。
【図３８】ウィンカーレバーの配置を示す図である。
【図３９】本発明の実施例１２に係る車両１が車線変更する際の事例を示す図である。
【図４０】実施例１２に係る処理手順を示すフローチャートである。
【図４１】運転者に緊急地震速報を伝えるべき時間について示す図である。の
【図４２】実施例１３に係る処理手順を示すフローチャートである。
【符号の説明】
【０２２９】
１０１…車両制御手段
１０２…緊急地震速報受信手段
１０３…緊急地震速報伝達手段
１０４…警報手段
１０５…メモリ
１０６…周囲状況検出手段
１０７…自車両情報出力手段
１０８…衝突危険度判定手段
１０９…操作量検出手段
１１０…操作危険度判定手段
１１１…運転操作制御手段
１１２…室内状況検出手段
１１３…画像処理手段
１１４…方向指示手段

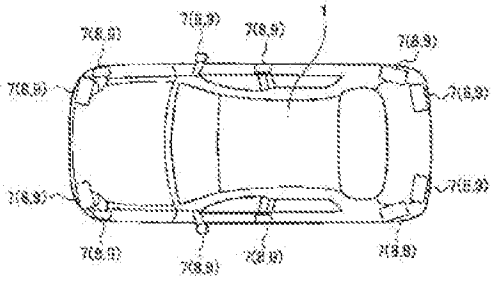
【図１】



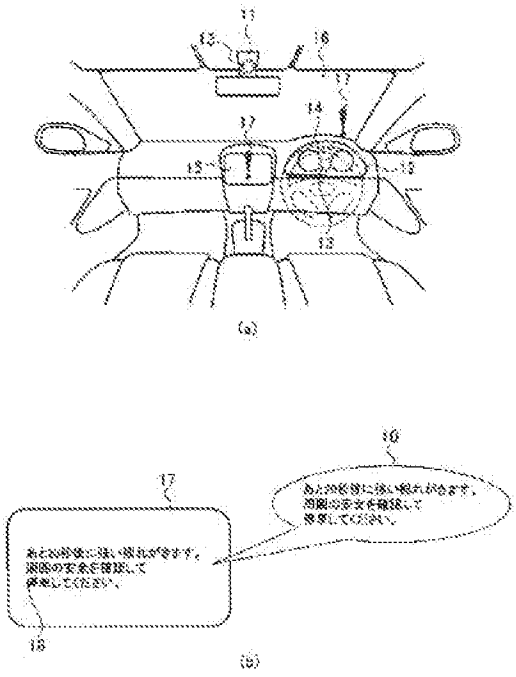
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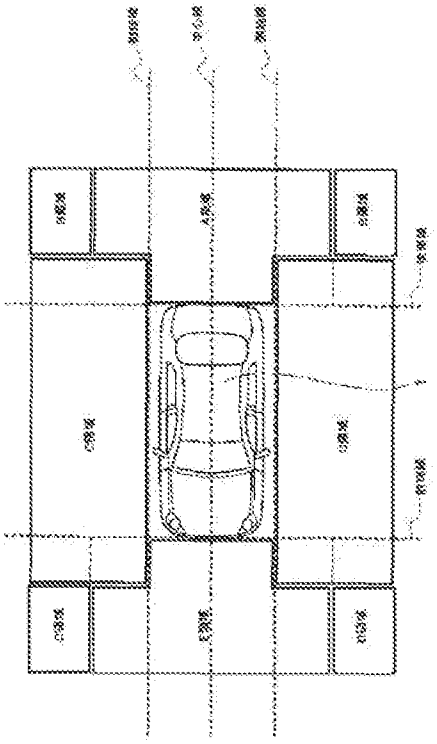
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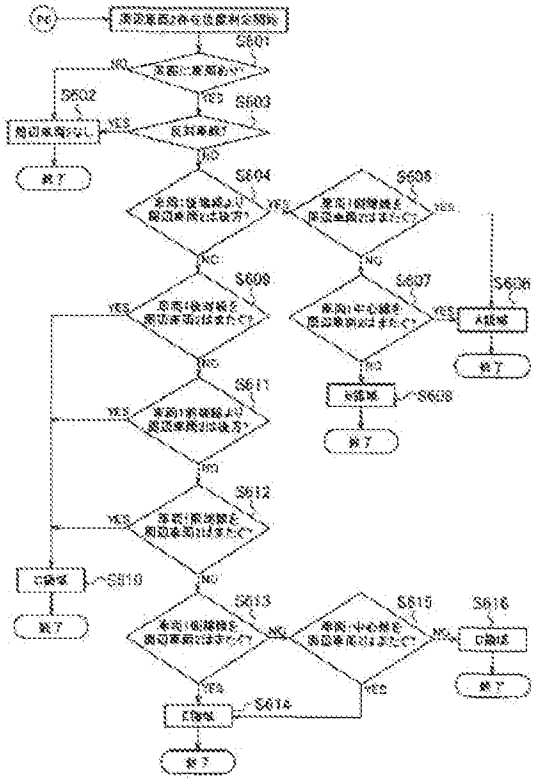
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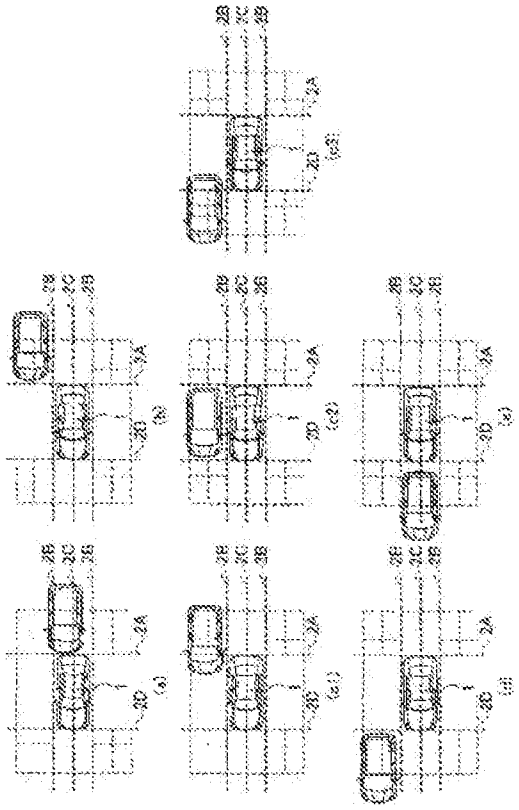
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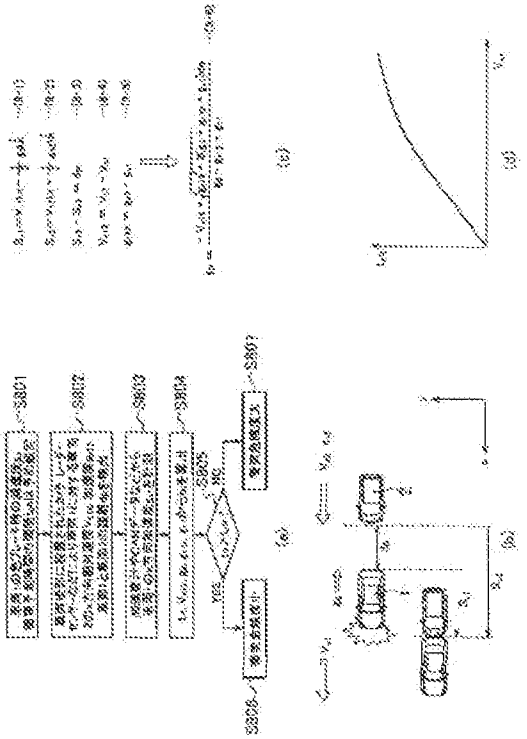
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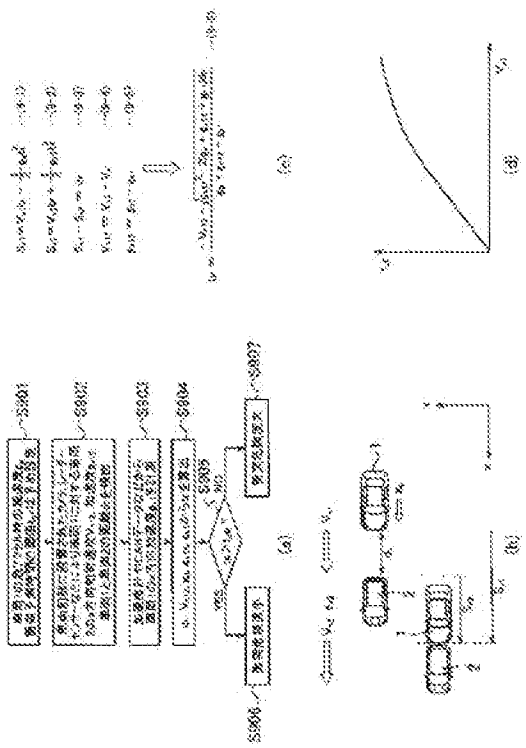
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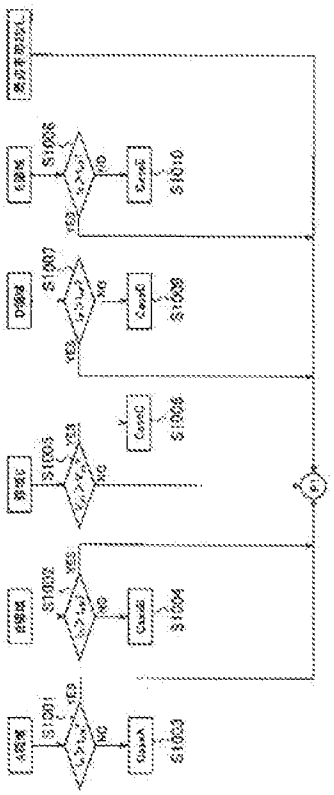
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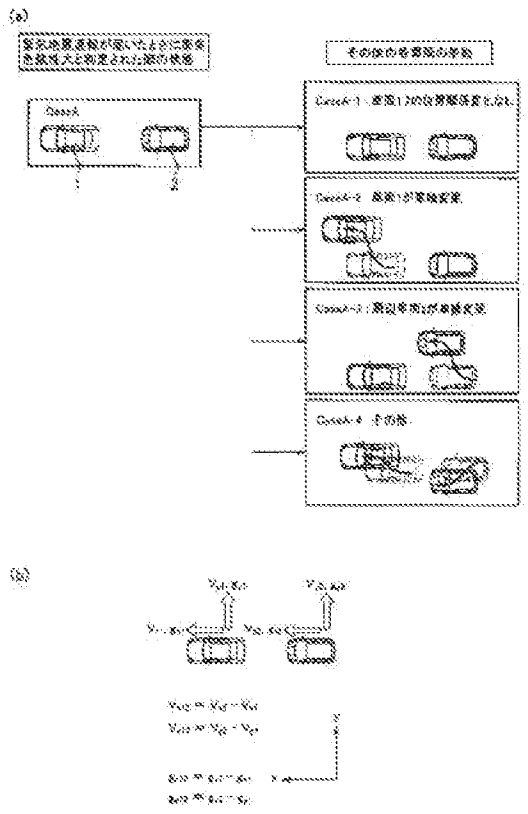
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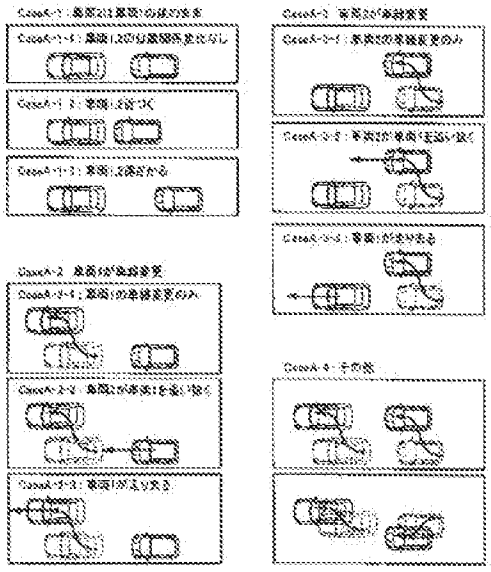
【図１０】



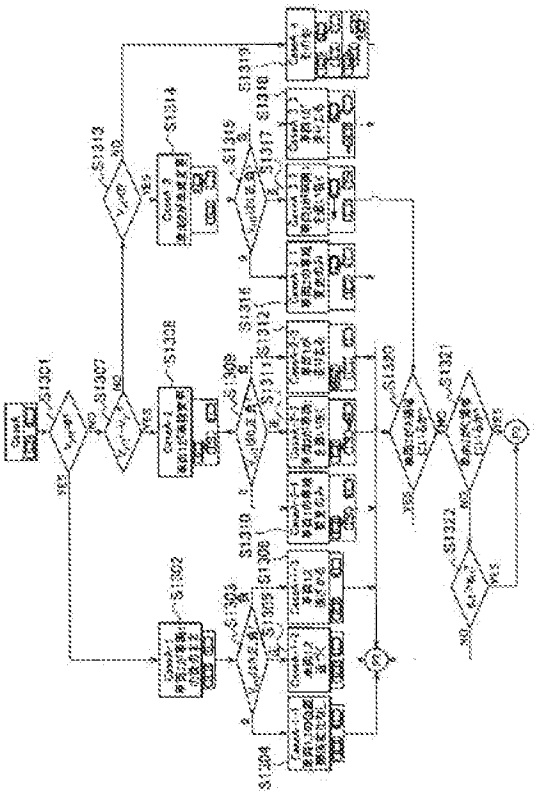
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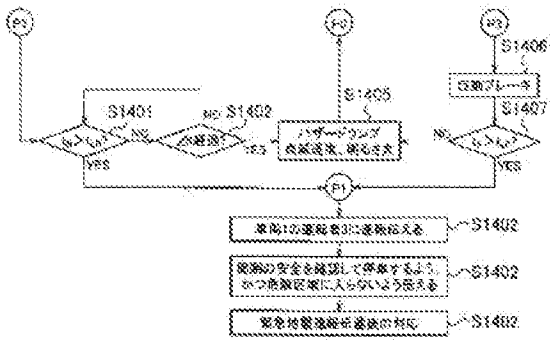
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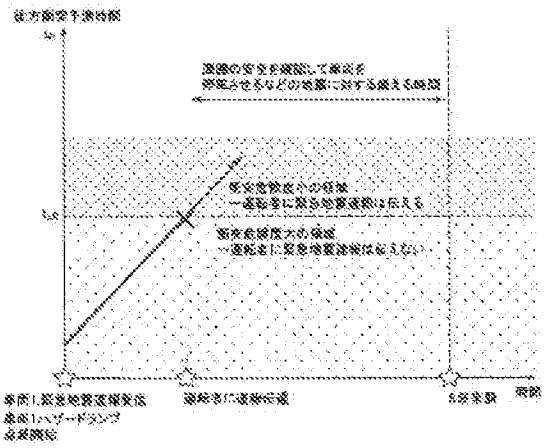
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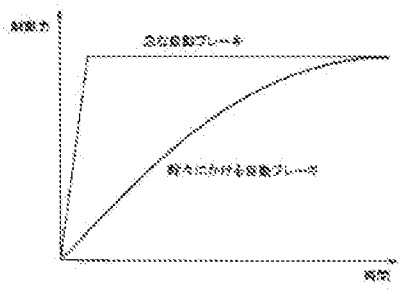
【図１４】



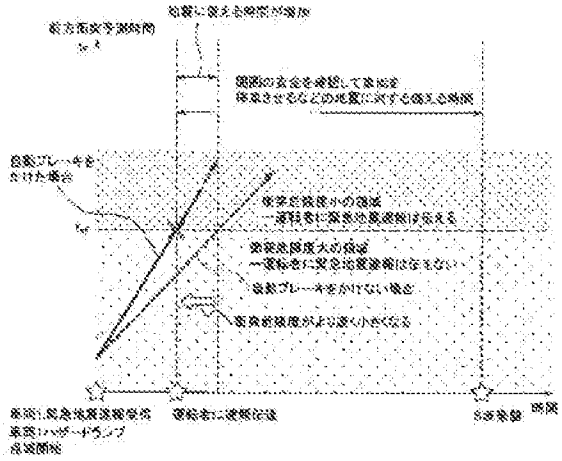
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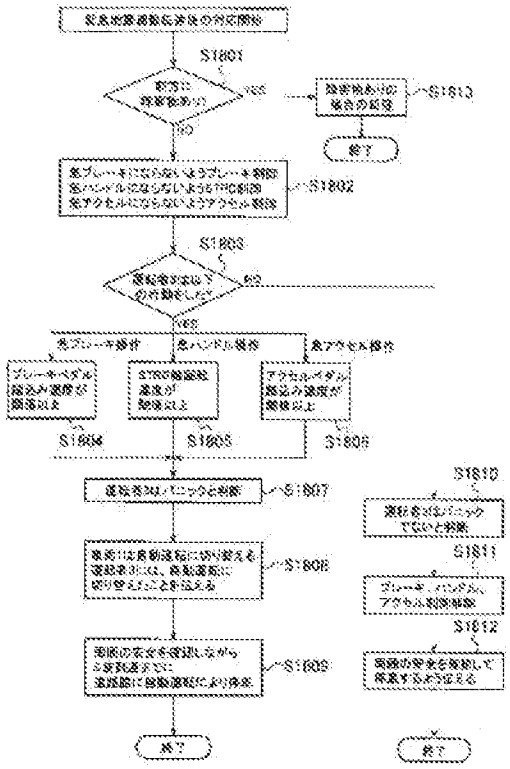
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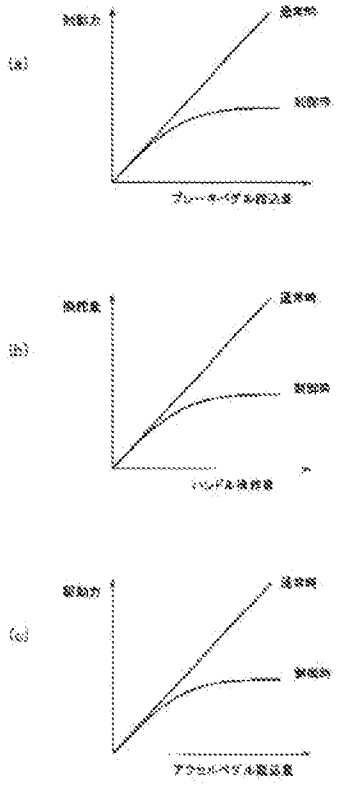
【図１７】



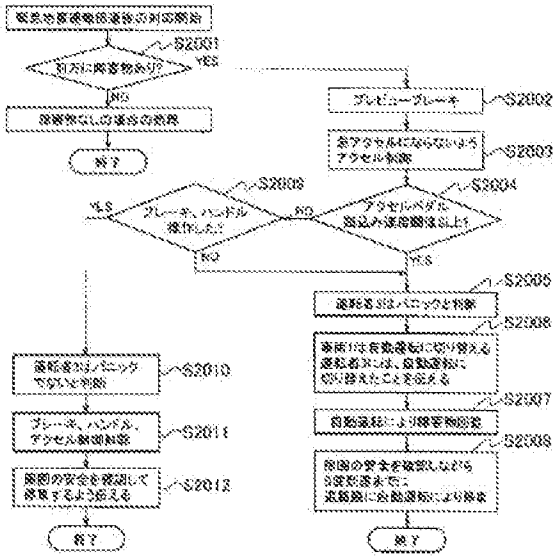
【図１８】



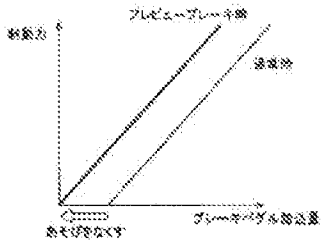
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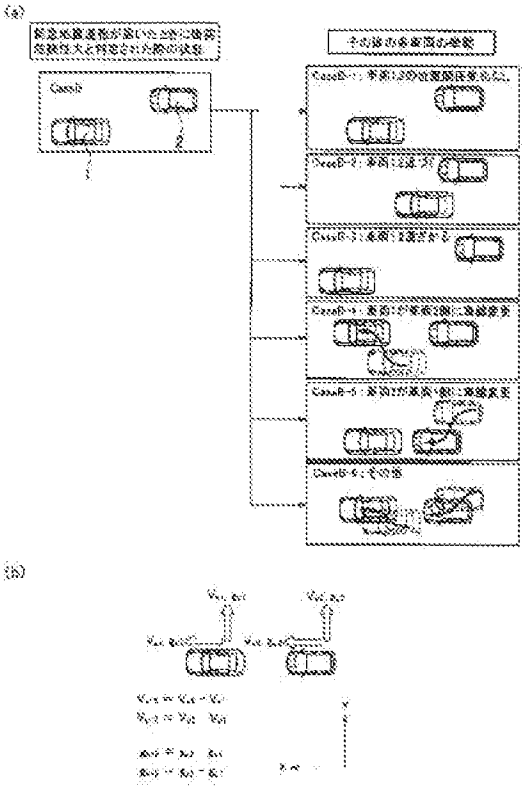
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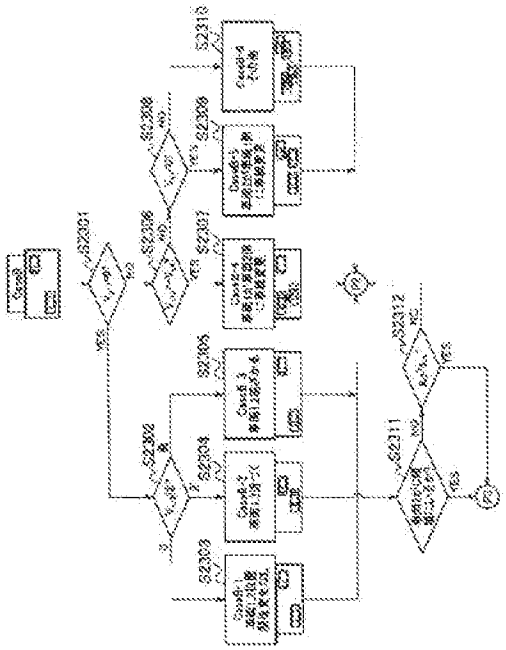
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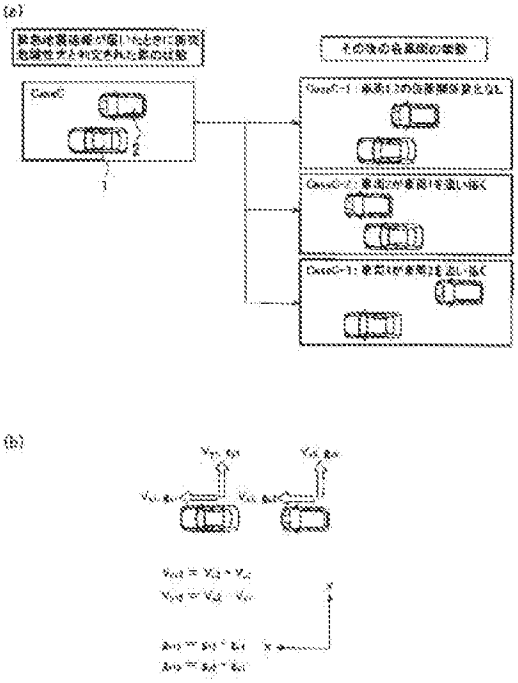
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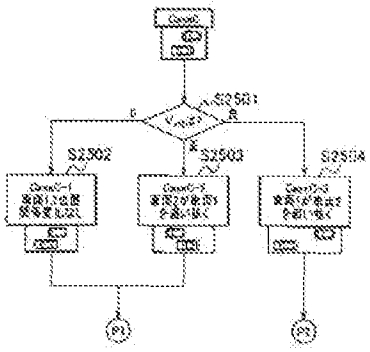
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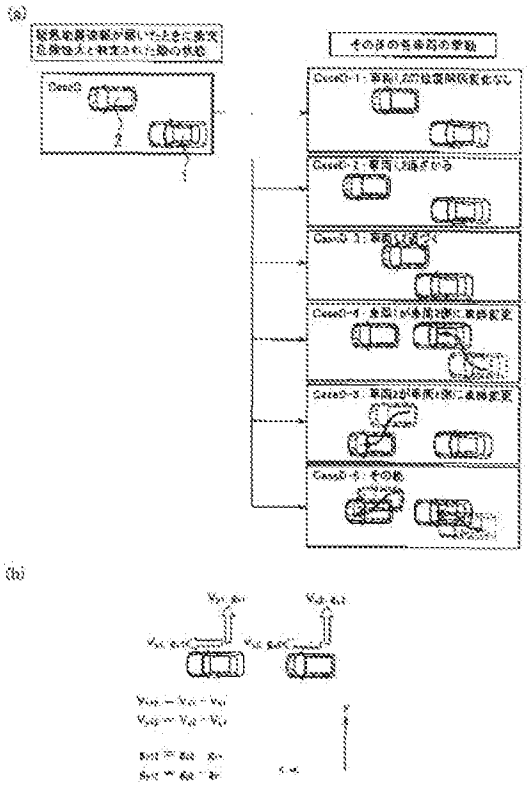
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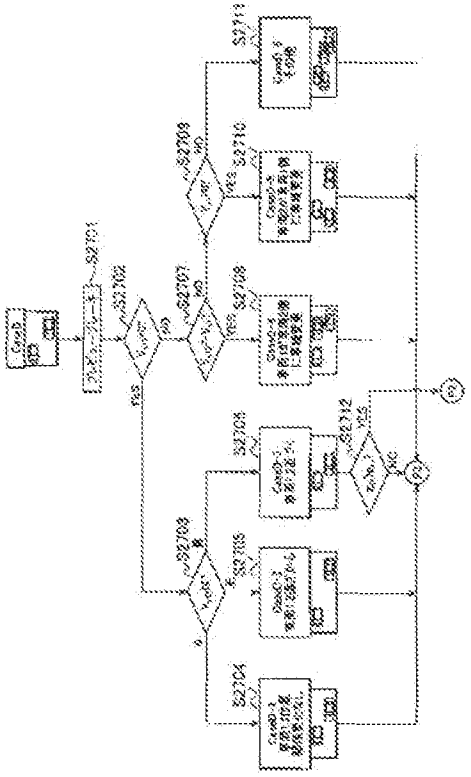
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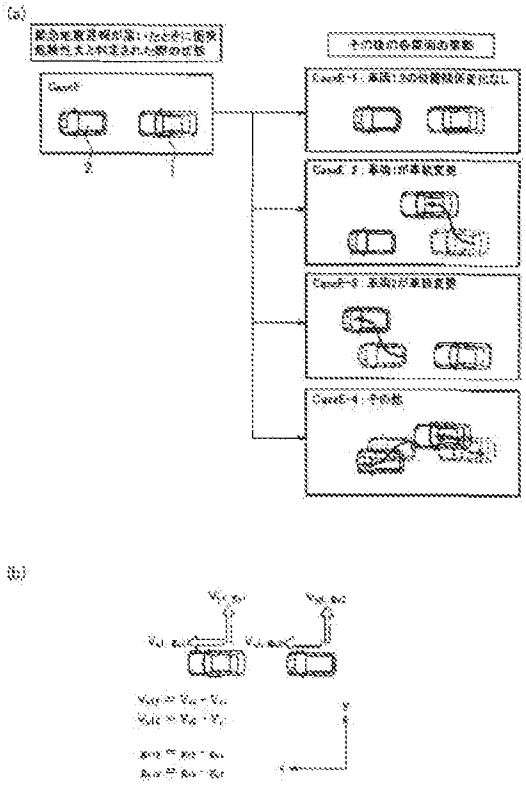
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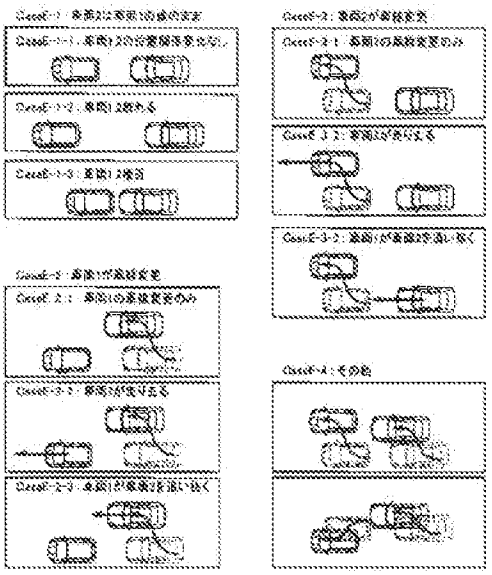
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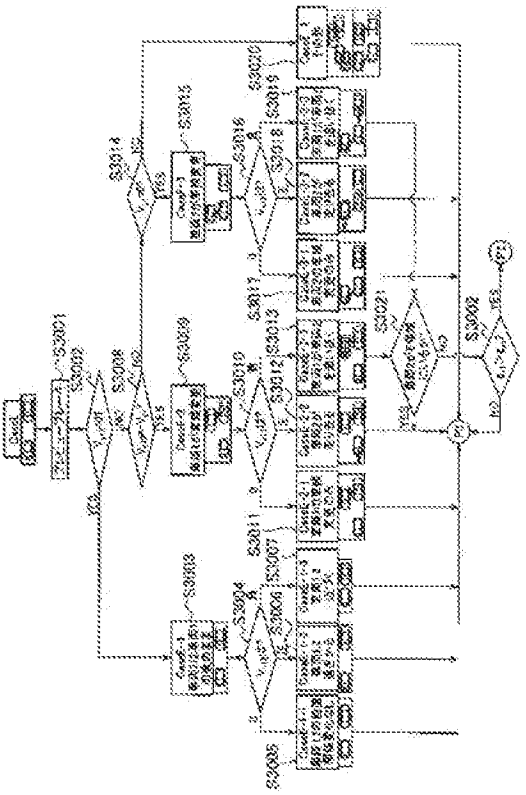
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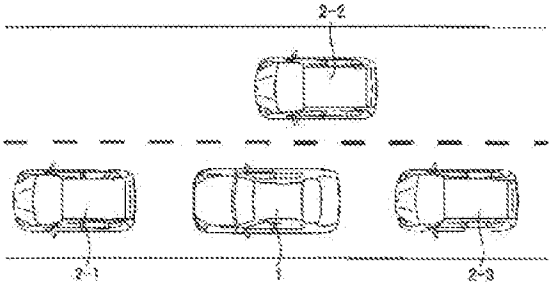
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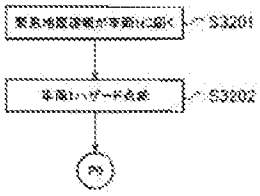
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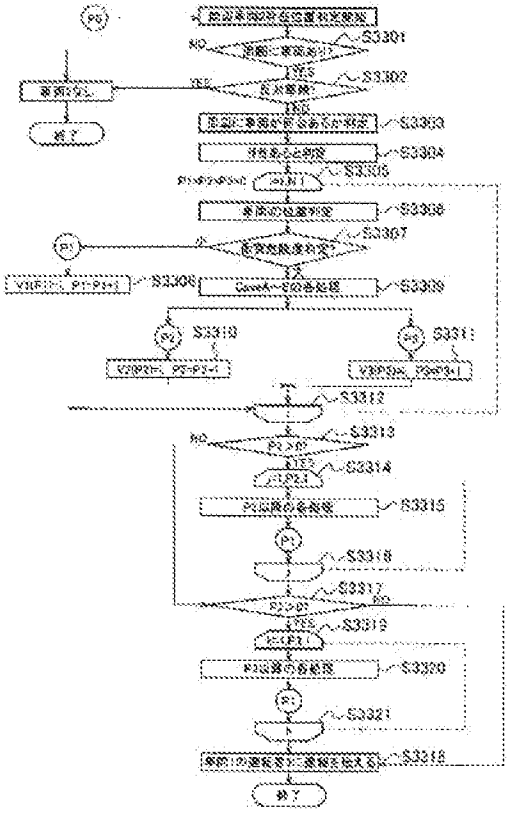
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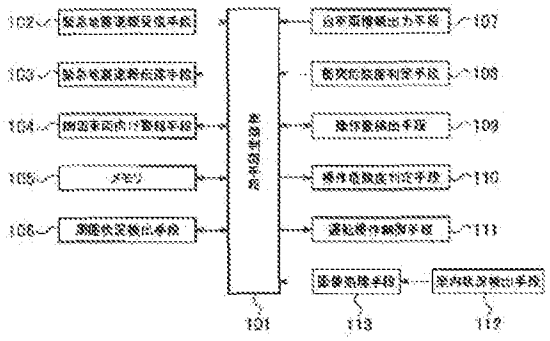
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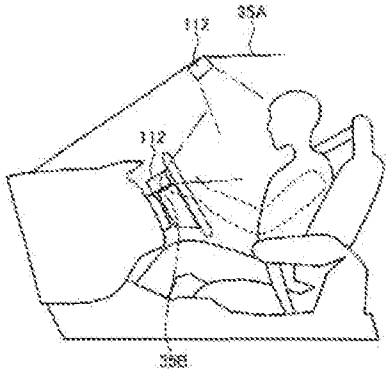
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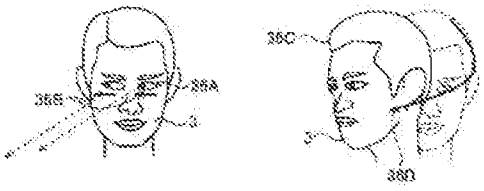
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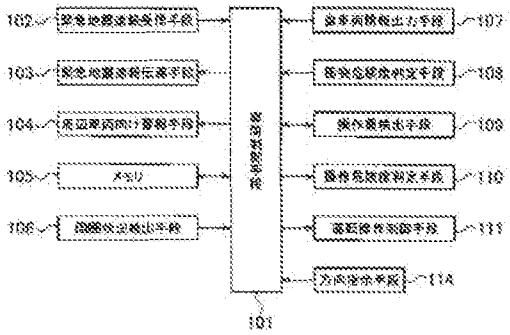


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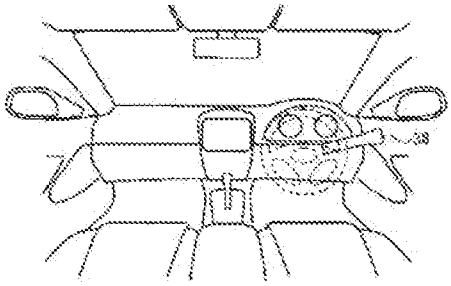


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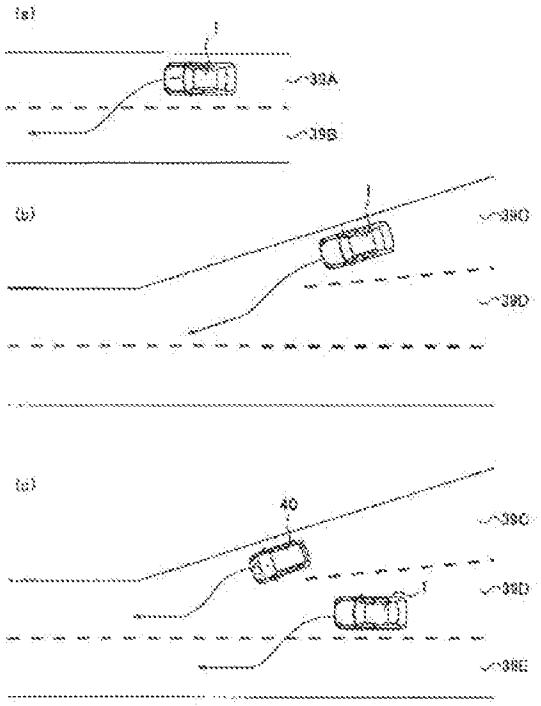
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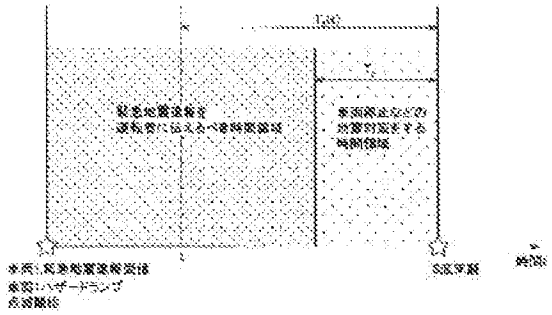
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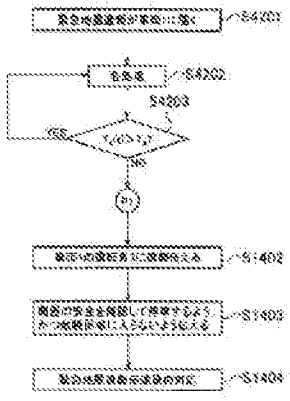
【図４０】



【図４１】



【図４２】



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CLAIMS JP2010152648A

1.

13 A vehicle control device having an emergency earthquake early warning receiving means for receiving an emergency earthquake early warning, an outside vehicle cabin notification means for notifying the outside of the vehicle cabin that the emergency earthquake early warning has been received by the emergency earthquake early warning receiving means, and an inside vehicle cabin notification means for notifying the inside of the vehicle cabin that the emergency earthquake early warning has been received by the emergency earthquake early warning receiving means, characterized in that the vehicle control device notifies the outside of the vehicle cabin that the emergency earthquake early warning has been received by the emergency earthquake early warning receiving means by the outside vehicle cabin notification means, and then notifies the inside of the vehicle cabin by the inside vehicle cabin notification means.

2.

27 The vehicle control device according to claim 1, further comprising a contact risk determination means for determining a contact risk between the vehicle and a surrounding vehicle, and after notifying the outside of the vehicle cabin of the receipt of the emergency earthquake warning by the outside vehicle cabin notification means, if the contact risk determination means determines that the contact risk is equal to or lower than a preset threshold, notifying the inside of the vehicle cabin by the inside vehicle cabin notification means.

3.

37 The vehicle control device according to claim 1, further comprising: a vehicle steering and

braking operation by a driver being suppressed after the vehicle interior notification means notifies an interior of the vehicle that the emergency earthquake warning has been received by the emergency earthquake warning receiving means.

4.

The vehicle control device according to claim 3, further comprising a panic determination means for determining whether or not a driver of the host vehicle has panicked, and after the vehicle interior notification means notifies an interior of the vehicle, if the panic determination means determines that the driver has not panicked, the vehicle control device releases the restriction on the driver's steering and braking operations.

5.

The vehicle control device according to claim 1, wherein the vehicle exterior notification means is constituted by an exterior lamp device arranged outside the vehicle, and the vehicle interior notification means is constituted by an interior lamp device arranged inside the vehicle.

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DESCRIPTION JP2010152648A

Vehicle control device

[0001]

The present invention relates to a vehicle control device that, when an earthquake occurs, receives an earthquake early warning and notifies a driver and passenger of the occurrence of the earthquake.

[0002]

Conventionally, as this type of technology, for example, the technology described in the document shown below is known (see Patent Document 1). This document describes an invention in which, when an earthquake is detected, various message transmission means are used to immediately notify the occupants that an earthquake has occurred, and to quickly inform the occupants that an earthquake and an emergency situation have occurred. 特開２００７－１７９０９６

[0003]

In the above-mentioned conventional example, when an earthquake is detected, a warning is immediately given to the occupants, which may lead to the driver panicking and causing sudden braking, steering, or acceleration, which may cause the vehicle to become unstable and result in contact with surrounding vehicles.

[0004]

Therefore, the present invention has been made in consideration of the above, and its object is to provide a vehicle control device that improves the way in which an emergency earthquake

warning is received, thereby improving the safety of vehicle driving.

[0005]

49 In order to achieve the above-mentioned object, the means for solving the problem of the present invention is characterized in that the emergency earthquake warning receiving means notifies the outside of the vehicle cabin that an emergency earthquake warning has been received by an outside vehicle cabin notification means, and then notifies the inside of the vehicle cabin by an inside vehicle cabin notification means.

[0006]

52 According to the present invention, when a vehicle receives an emergency earthquake warning, first the vehicle outside the passenger compartment is notified that an emergency earthquake warning has been received, and then the driver inside the passenger compartment is notified. Therefore, even if the driver panics and takes dangerous actions such as sudden braking, sudden steering, or sudden acceleration, causing the vehicle's behavior to become unstable, contact with surrounding vehicles can be prevented.

[0007]

61 Hereinafter, the best embodiment for carrying out the present invention will be described with reference to the drawings.

[0008]

66 FIG. 1 is a diagram showing the configuration of a vehicle control device according to a first embodiment of the present invention. The vehicle control device of Example 1 shown in Figure 1 is a device that controls a vehicle when it receives an emergency earthquake warning, and is configured with a vehicle control means 101, an emergency earthquake warning receiving means 102, an emergency earthquake warning transmission means 103, an alarm means for surrounding vehicles 104, a memory 105, a surrounding condition detection means 106, a vehicle information output means 107, a collision risk determination means 108, an operation amount detection means 109, an operation risk determination means 110, and a driving operation control means 111.

[0009]

78 The emergency earthquake warning receiving means 102 is composed of an in-vehicle radio, a car navigation system, a terminal dedicated to receiving emergency earthquake warnings, and the like.

[0010]

88 The emergency earthquake warning transmission means 103 is composed of audio output means such as an in-vehicle radio or car navigation system, lamps installed on the instrument panel or in the passenger compartment, and means for displaying a hat mark or the like on the instrument panel screen or windshield.

[0011]

92 The surrounding vehicle warning means 104 is composed of hazard lights, brake lights, headlights, and the like.

[0012]

97 The memory 105 is configured as a storage device that stores information required to realize the processing operations according to the present invention, such as programs for controlling the execution of processing routines of flowcharts to be described later, and various parameters.

[0013]

104 The surrounding conditions detection means 106 is a means for detecting obstacles ahead of the vehicle, the presence or absence of surrounding vehicles, their positions, their relative speeds with respect to surrounding vehicles, their relative accelerations, and the distance between the vehicles, and is composed of at least one of a camera 7, a radio wave sensor 8, an ultrasonic sensor 9, etc., which are installed at the front, side, and rear of the vehicle.

[0014]

112 The vehicle information output means 107 is a means for outputting the speed and acceleration of the vehicle.

[0015]

117 The collision risk determination means 108 is a means for determining the risk of collision with a nearby vehicle based on the position of the nearby vehicle detected by the surrounding condition detection means 106 by comparing a collision prediction time calculated from the relative speed, relative acceleration, vehicle distance, deceleration when the host vehicle is assumed to brake suddenly, which are stored in advance in memory 105, and acceleration when the host vehicle is assumed to accelerate suddenly, with a collision prediction time threshold value stored in advance in memory 105, or by comparing the speed of the host vehicle with that speed threshold value.

[0016]

128 The operation amount detection means 109 detects the depression speed and depression force of the brake pedal and accelerator pedal operated by the driver, and the rotation shaft speed of the steering wheel.

[0017]

134 The operation risk determination means 110 is a means for comparing the driver's operation amounts of the brake, steering wheel, and accelerator, detected by the operation amount detection means 109, with threshold values for each operation amount pre-stored in the memory 105, and determining the risk of the operation.

[0018]

141 The driving operation control means 111 is a means for controlling the braking force, steering angle, and driving force so as to prevent sudden braking, sudden steering, and sudden acceleration, and is also a means for controlling preview braking, automatic braking, and automatic driving.

[0019]

148 The vehicle control means 101 functions as a control center for controlling this device, controls the operation of each of the above-mentioned means, and is realized by, for example, a microcomputer equipped with resources such as a CPU, memory device, input/output device, etc., necessary for a computer that controls various operational processing based on a program.

153 The vehicle control means 101 inputs and outputs information necessary for control between each of the above-mentioned means, sends commands to each of the above-mentioned means based on the control logic (program) stored in memory 105, and generally manages and controls the operations necessary for controlling the vehicle when an emergency earthquake warning is received, as described below.

[0020]

161 FIG. 2 shows the situation when an emergency earthquake warning is received by a vehicle.

162 In FIG. 2, when an emergency earthquake warning 5 arrives from an emergency earthquake warning transmitting station 4 to an emergency earthquake warning receiving means 102, such as a radio, a car navigation system, or a dedicated terminal for receiving emergency earthquake warnings, of a vehicle (own vehicle) 1, the surrounding warning means 104 causes, for example, the hazard lights 6 of the vehicle 1 to flash in order to inform

surrounding vehicles 2 that the driver 3 of the vehicle 1 may be taking dangerous action in the future and that an earthquake is coming in the near future.

172 At this time, in order to prevent the driver 3 from panicking upon noticing the hazard lamps 6 flashed by the surrounding warning means 104, the interior hazard lamps of the vehicle 1 are not made to flash and the flashing sound is also not made.

[0021]

180 FIG. 3 shows an example of the layout of the surrounding situation detection means 106 in the vehicle 1.

182 In Figure 3, in order to transmit an emergency earthquake warning 5 to the driver 3 of the vehicle 1, at least one or more of a camera 7, a radio wave sensor 8, and an ultrasonic sensor 9 that constitute a surrounding condition detection means 106 used to determine the risk of collision between the vehicle 1 and a surrounding vehicle 2 are installed around the vehicle 1 as shown in Figure 3.

[0022]

190 FIG. 4 shows the emergency earthquake warning transmission means 103 .

191 In FIG. 4, after it is determined that the risk of collision between vehicle 1 and surrounding vehicle 2 has decreased, emergency earthquake warning transmission means 103 transmits emergency earthquake warning 5 to driver 3 of vehicle 1 .

[0023]

197 There are several methods for informing the driver 3 by voice 10 from the emergency earthquake warning receiving means 102, which may be a radio, a car navigation system, or a dedicated terminal for receiving emergency earthquake warnings. As a method for preventing the driver 3 from panicking, for example, as shown in FIG. 4(a), an earthquake lamp 13 or an interior hazard lamp 14 may be flashed or turned on in the interior room lamp 11 or instrument panel 12, or a hat mark 17 may be displayed on the instrument panel, for example, on the screen 15 of the navigation system or on the front window 16, or as shown in FIG. 4(b), a warning message 18 may be displayed together with the voice 10 on the screen 15 of the instrument panel.

[0024]

209 FIG. 5 shows a region division in which a surrounding vehicle 2 may exist relative to a vehicle 1. In FIG.

211 When vehicle 1 flashes its hazard lights 6, it senses where nearby vehicles 2 are located within the divided areas A to E around vehicle 1 shown in Figure 5 using cameras 7, radio wave sensors 8, ultrasonic sensors 9, etc. installed at the front, sides, and rear of the vehicle

as shown in Figure 3.

217 This sensing may be performed before the emergency earthquake alert is received.

[0025]

222 FIG. 6 is a flow chart showing the location of the surrounding vehicles 2 around the vehicle 1 and the procedure of a method for determining the location, and FIG. 7 shows the location of the surrounding vehicles 2 in the area division shown in FIG.

225 6, first, in a determination step S601, it is determined whether or not there is a nearby vehicle 2 around the vehicle 1 by the cameras 7, the radio wave sensors 8, the ultrasonic sensors 9, etc. installed at the front, sides, and rear of the vehicle.

228 If not, it is determined that there is no nearby vehicle 2 (step S602).

229 On the other hand, if there is a nearby vehicle 2, then in decision step S603, it is decided whether or not the nearby vehicle 2 is a vehicle in the opposite lane.

231 If the vehicle is in the opposite lane, it is determined that the nearby vehicle 2 is not present around the vehicle 1 (step S602).

[0026]

236 On the other hand, if the surrounding vehicle 2 is not a vehicle in the opposite lane, it is determined in a determination step S604 whether or not the surrounding vehicle 2 is behind the rear end line 2A of the vehicle 1.

239 If the surrounding vehicle 2 is behind the vehicle 1, it is then determined in a determination step S605 whether or not the surrounding vehicle 2 is straddling the vehicle 1 side edge line 2B.

242 If the vehicle 2 straddles the boundary, it is determined that the nearby vehicle 2 is in area A, as shown in FIG. 7(a) (step S606).

[0027]

247 On the other hand, if the surrounding vehicle 2 does not straddle the vehicle width center line 2C of the vehicle 1, it is then determined in a determination step S607 whether the surrounding vehicle 2 straddles the vehicle width center line 2C of the vehicle 1.

250 If the vehicle 2 is straddling the boundary, it is determined that the nearby vehicle 2 is in area A. If the vehicle 2 is not straddling the boundary, it is determined that the nearby vehicle 2 is in area B as shown in FIG. 7(b) (step S608).

[0028]

256 If it is determined in the previous determination step S604 that the surrounding vehicle 2 is not behind the vehicle 1, it is then determined in a subsequent determination step S609 whether the surrounding vehicle 2 is straddling the rear end line 2A of the vehicle 1.

259 If the vehicle 2 is straddling the boundary, it is determined that the nearby vehicle 2 is in area C, as shown in FIG. 7(c1) (step S610).

259 On the other hand, if the vehicle 1 is not straddling the lane, it is then determined in a determination step S611 whether the nearby vehicle 2 is behind the front end line 2D of the vehicle 1 or not.

264 If it is behind, it is determined that the surrounding vehicle 2 is in area C, as shown in FIG.

265 On the other hand, if the surrounding vehicle 2 is not behind the vehicle 1, it is then determined in a determination step S612 whether or not the surrounding vehicle 2 is straddling the front end line 2D of the vehicle 1.

268 If the vehicle 2 is straddling the boundary, it is determined that the nearby vehicle 2 is in area C, as shown in FIG. 7(c3) (step S610).

[0029]

273 On the other hand, if the surrounding vehicle 2 is not straddling the side edge line 2B of the vehicle 1, it is then determined in a determination step S613 whether the surrounding vehicle 2 is straddling the side edge line 2B of the vehicle 1.

276 If so, it is determined that the nearby vehicle 2 is in area E as shown in FIG. 7(e) (step S614).

277 On the other hand, if the surrounding vehicle 2 does not straddle the vehicle width center line 2C of the vehicle 1, it is then determined in a determination step S615 whether the surrounding vehicle 2 straddles the vehicle width center line 2C of the vehicle 1. If the surrounding vehicle 2 is not straddling the threshold, it is determined that the surrounding vehicle 2 is in area D as shown in FIG. 7(d) (step S616). On the other hand, if the vehicle 2 straddles the boundary, it is determined that the nearby vehicle 2 is in area E as shown in FIG. 7(e) (step S614).

[0030]

287 FIG. 8 is a diagram for explaining a method of calculating the rear collision prediction time tR and a method of determining the risk of a rear collision.

289 The rear collision prediction time tR is a parameter for determining the collision risk in area A, where there is a risk of collision with a surrounding vehicle 2 due to sudden braking of vehicle 1, and in area B, where there is a risk of collision with a surrounding vehicle 2 due to sudden steering or sudden braking + sudden steering of vehicle 1.

[0031]

296 Here, as shown in FIG. 8(b), the vehicle travel direction is the x direction, the vehicle width direction is the y direction, and it is assumed that when vehicle 1 traveling at an x-direction speed Vx1 suddenly brakes at a preset x-direction deceleration gd, it collides with a nearby vehicle 2 traveling at an x-direction speed Vx2 and an x-direction acceleration gx2.

[0032]

304 FIG. 8A is a flowchart showing the procedure of a collision risk determination method when a nearby vehicle 2 is in area A or area B.

306 First, the deceleration gd of the vehicle 1 during sudden braking and the collision prediction time threshold tcR for determining the collision risk are set (step S801).

308 Here, the collision prediction time threshold tcR depends on the speed Vx1 of the vehicle 1 as shown in FIG. 8(d), and is set to a value that increases as the speed Vx1 of the vehicle 1 increases.

[0033]

314 Next, in the case of a hypothetical collision as shown in FIG. 8(b), the camera 7, radio wave sensor 8, and ultrasonic sensor 9 installed at the rear of the vehicle 1 detect the x-direction relative velocity Vx12 and x-direction relative acceleration gx12 of the surrounding vehicle 2 relative to the vehicle 1, and the x-direction distance dR between the rear end of the vehicle 1 and the front end of the surrounding vehicle 2 (step S802).

318 Further, the acceleration gx1 of the vehicle 1 in the x direction is measured from an accelerometer mounted on the vehicle 1, data from an in-vehicle LAN such as a CAN, etc. (step S803). Thereafter, based on the values obtained above, the rear collision prediction time tR is calculated using the equations (8-1) to (8-5) shown in FIG. 8C (step S804).

[0034]

326 After the calculation, the calculated rear collision prediction time tR is compared with a previously set threshold value tcR of the rear collision prediction time (step S805).

328 If the rear collision prediction time tR is large, the collision risk is determined to be low (step S806), and if the rear collision prediction time tR is small, the collision risk is determined to be high (step S807).

[0035]

334 FIG. 9 is a diagram for explaining a method of calculating the predicted forward collision time tF and a method of determining the risk of a forward collision.

336 The forward collision prediction time tF is a parameter for determining the risk of collision in area D, where there is a risk of collision with a surrounding vehicle 2 due to sudden steering or sudden acceleration + sudden steering of vehicle 1, or in area E, where there is a risk of collision with a surrounding vehicle 2 due to sudden acceleration of vehicle 1.

[0036]

343 Here, as shown in FIG. 9(b), it is assumed that the vehicle travel direction is the x direction,

the vehicle width direction is the y direction, and when vehicle 1 traveling at an x-direction speed Vx1 suddenly accelerates at a preset x-direction acceleration ga, it collides with nearby vehicle 2 traveling at an x-direction speed Vx2 and an x-direction acceleration gx2.

[0037]

351 FIG. 9A is a flowchart showing the procedure of a collision risk determination method when a nearby vehicle 2 is in area D or area E.

353 First, the acceleration ga of the vehicle 1 when the accelerator is suddenly depressed and the collision prediction time threshold value tcF for determining the collision risk are set (step S901).

356 Here, the collision prediction time threshold value tcF depends on the speed Vx1 of the vehicle 1 as shown in FIG. 9D, and is set to a value that increases as the speed Vx1 of the vehicle 1 increases.

[0038]

362 Next, in the case of a hypothetical collision as shown in FIG. 9(b), the camera 7, radio wave sensor 8, and ultrasonic sensor 9 installed at the front of the vehicle 1 detect the x-direction relative velocity Vx12 and x-direction relative acceleration gx12 of the surrounding vehicle 2 relative to the vehicle 1, and the x-direction distance dF between the front end of the vehicle 1 and the rear end of the surrounding vehicle 2 (step S902).

367 Further, the acceleration gx1 of the vehicle 1 in the x direction is measured from an accelerometer mounted on the vehicle 1, data from an in-vehicle LAN such as a CAN, etc. (step S903). Thereafter, based on the values obtained above, the forward collision prediction time tF is calculated using the equations (9-1) to (9-5) shown in FIG. 9C (step S904).

[0039]

374 After the calculation, the calculated forward collision prediction time tF is compared with the previously set threshold value tcF of the forward collision prediction time (step S905).

376 If the forward collision prediction time tF is large, the collision risk is determined to be low (step S906), and if the forward collision prediction time tF is small, the collision risk is determined to be high (step S907).

[0040]

382 FIG. 10 is a flowchart showing a procedure for determining a collision situation between vehicle 1 and nearby vehicles 2 when the nearby vehicles 2 are present in each of areas A, B, C, D, and E.

385 In FIG. 10, first, when the nearby vehicle 2 is in area A or B as described above in FIG. 8, the rear collision prediction time tR is compared with a rear collision prediction time threshold

value tcR (steps S1001 and S1002). If tR>tcR is not satisfied and the collision risk is high, the case in area A is determined as Case A (step S1003), and if the nearby vehicle 2 is in area B, the case is determined as Case B (step S1004). Here, Case A is a case where there is a possibility of collision if the vehicle 1 suddenly brakes, and Case B is a case where there is a possibility of collision if the vehicle 1 suddenly steers and brakes. On the other hand, if tR>tcR and the collision risk is low, the preset process (the process steps connected by a connector P1 in the flowchart) is executed continuously.

[0041]

399 If the surrounding vehicle 2 is in area C, it is determined whether the x-direction speed Vx1 of the vehicle 1 is greater than a preset speed threshold value Vcx (step S1005), and if it is greater, it is determined to be Case C (step S1006), and if it is not greater, the preset processing (the processing step connected by connector P1 in the flowchart) is continued.

405 Here, Case C is a case where a sudden turn of the vehicle 1 may result in a collision.

[0042]

407 As described above in FIG. 9, when the surrounding vehicle 2 is in areas D and E, the forward collision prediction time tF is compared with a threshold value tcF of the forward collision prediction time (steps S1007 and S1008). If tF>tcF is not satisfied and the collision risk is high, the case of area D is judged as Case D (step S1009), and if the surrounding vehicle 2 is in area E, the case of area E is judged as Case E (step S1010).

412 Here, Case D is a case where a sudden turn and sudden acceleration of the vehicle 1 may result in a collision, and Case E is a case where a sudden acceleration of the vehicle 1 may result in a collision. On the other hand, if tF>tcF and the collision risk is low, the preset processing (the processing steps connected by a connector P1 in the flowchart) is executed continuously.

[0043]

420 Moreover, if there is no nearby vehicle 2, the preset processing (the processing steps connected by a connector P1 in the flowchart) is executed continuously.

[0044]

425 11 and 12 show the behavior of the vehicle 1 and the surrounding vehicle 2 immediately after it is determined to be Case A in the determination process shown in FIG.

427 The behavior of vehicle 1 and surrounding vehicle 2 immediately after Cass A is determined, as shown in Figure 11 (a), may be: Case A--1: no change in the positional relationship between vehicles 1 and 2; Case A--2: vehicle 1 changes lanes; Case A--3: surrounding vehicle 2 changes lanes; Case A--4: other cases.

[0045]

434 Furthermore, as shown in FIG. 12 , Case A-1 may include the following cases: Case A-1-1: no change in the relative positions of vehicles 1 and 2; Case A-1-2: vehicles 1 and 2 approach each other; Case A-1-3: vehicles 1 and 2 move away; Case A-2 may include the following cases: Case A-2-1: vehicle 1 changes lanes only; Case A-2-2: surrounding vehicle 2 overtakes vehicle 1; Case A-2-3: vehicle 1 drives away; Case A-3 may include the following cases: Case A-3-1: surrounding vehicle 2 changes lanes only; Case A-3-2: surrounding vehicle 2 overtakes vehicle 1; Case A-3-3: vehicle 1 drives away.

[0046]

444 FIG. 13 is a flowchart showing the procedure of the method of determining each of the above-mentioned Case A.

446 Here, as shown in FIG. 11(b), the vehicle travel direction is the x direction and the vehicle width direction is the y direction, the x- and y-direction speeds of vehicle 1 are Vx1, Vy1, the x- and y-direction speeds of surrounding vehicle 2 are Vx2, Vy2, and the relative speeds of surrounding vehicle 2 in the x and y directions with respect to vehicle 1 are Vx12, Vy12.

450 The accelerations of vehicle 1 in the x and y directions are gx1 and gy1, the accelerations of nearby vehicle 2 in the x and y directions are gx2 and gy2, and the relative accelerations of nearby vehicle 2 with respect to vehicle 1 in the x and y directions are gx12 and gy12.

[0047]

456 In FIG. 13, in decision step S1301, it is decided whether or not Vy12 is 0. If Vy12 is 0, it is decided that there is no relative movement in the y direction between the vehicle 1 and the surrounding vehicle 2, which is Case A-1 (step S1302).

458 Subsequently, in decision step S1303, it is determined whether Vx12 is 0, positive, or negative.

460 If the result of the judgment is 0, it is judged to be Case A-1-1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S1304); if the result is positive, it is judged to be Case A-1-2, in which vehicle 1 and surrounding vehicle 2 are approaching each other (step S1305); and if the result is negative, it is judged to be Case A-1-3, in which vehicle 1 and surrounding vehicle 2 are moving away from each other (step S1306).

[0048]

470 On the other hand, if the result in the previous judgment step S1301 is not 0, it is judged that there is relative movement between vehicle 1 and surrounding vehicle 2 in the vehicle width direction, and then in judgment step S1307 it is judged whether Vy12 and -Vy1 are equal,

i.e., whether vehicle 1 is attempting to change lanes.

476 If it is equally determined that the vehicle 1 is attempting to change lanes, it is determined to be Case A-2 in which the vehicle 1 is attempting to change lanes (step S1308). Subsequently, in decision step S1309, it is determined whether Vx12 is 0, positive, or negative.

[0049]

483 If the result of the judgment is 0, it is judged as Case A-2-1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S1310); if the result is positive, it is judged as Case A-2-2, in which vehicle 1 and surrounding vehicle 2 are approaching each other, i.e., surrounding vehicle 2 is about to overtake vehicle 1 (step S1311); if the result is negative, it is judged as Case A-2-3, in which vehicle 1 and surrounding vehicle 2 are moving away from each other, i.e., vehicle 1 is about to drive away (step S1312).

[0050]

493 On the other hand, if it is determined in the previous judgment step S1307 that the two are not equal and vehicle 1 is not attempting to change lanes, then in judgment step S1313 it is determined whether Vy1 is 0 or not, i.e., whether the surrounding vehicle 2 is attempting to change lanes or not.

497 If it is determined that the vehicle is attempting to change lanes, it is determined that this is Case A-3, in which the surrounding vehicle 2 is attempting to change lanes (step S1314), and then in determination step S1315 it is determined whether Vx12 is 0, positive, or negative.

[0051]

503 If the result of the judgment is 0, it is judged as Case A-3-1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S1316); if the result is positive, it is judged as Case A-3-2, in which vehicle 1 and surrounding vehicle 2 are approaching each other, i.e., surrounding vehicle 2 is about to overtake vehicle 1 (step S1317); if the result is negative, it is judged as Case A-3-3, in which vehicle 1 and surrounding vehicle 2 are moving away from each other, i.e., vehicle 1 is about to drive away (step S1318).

[0052]

513 On the other hand, if the result of the previous determination step S1313 is not 0, various movements in the vehicle width direction of the vehicle 1 and the surrounding vehicle 2 are possible, so that the case is determined as Other Case A-4 (step S1319).

[0053]

518 In the above cases of Case A-1-1, Case A-1-2, Case A-1-3, Case A-2-1, Case A-2-3, Case A-3-1, Case A-3-3, and Case A-4, it is determined that there is a high possibility that the surrounding vehicle 2 is in areas A and B, and the processing described below (processing steps connected by connector P2 in the flowchart) is continued.

[0054]

528 On the other hand, in the case of Case A-2-2 or Case A-3-2, it is then determined in a determination step S1320 whether or not the surrounding vehicle 2 is in the A area by executing the process flow shown in FIG.

529 If it is determined that the surrounding vehicle 2 is in area A, the process described below (the process steps connected by a connector P1 in the flowchart) is then executed.

[0055]

534 On the other hand, if it is determined that the surrounding vehicle 2 is not in area A, it is then determined in a determination step S1321 whether or not the surrounding vehicle 2 is in area C by executing the process flow shown in FIG.

537 If the result of the determination is that the user is in area C, the process (processing steps connected by connector P3 in the flowchart) described below is executed next.

[0056]

542 On the other hand, if the vehicle is not in area C, then in judgment step S1322, it is determined whether the acceleration gx2 of the surrounding vehicle 2 calculated from the acceleration gx1 of vehicle 1 and the relative acceleration gx12 between vehicle 1 and the surrounding vehicle 2 is greater than a predetermined acceleration threshold value gcx.

546 If it is not larger, it is determined that there is a high possibility that the surrounding vehicle 2 is in area B, and the process described below (the process steps connected by connector P2 in the flowchart) is continued.

549 On the other hand, if it is greater, it is determined that the surrounding vehicle 2 is in or is likely to move to one of areas C, D, or E, and the processing described below (the processing steps connected by connector P3 in the flowchart) is continued.

[0057]

555 In the processing flow shown in FIG. 13, by executing judgment step S1320, when the surrounding vehicle 2 is in area A, it is possible to more accurately determine that the surrounding vehicle 2 is not attempting to overtake vehicle 1.

558 In addition, by executing the determination step S1321, when the surrounding vehicle 2 is in the C area, it is possible to more accurately determine that the surrounding vehicle 2 is

attempting to overtake the vehicle 1.

562 Furthermore, by executing judgment step S1322, it can be more accurately determined that if gx2>gcx, the surrounding vehicle 2 is not in areas A or C, i.e., is in area B and is attempting to overtake vehicle 1, and that if gx2>gcx is not true, the surrounding vehicle 2 is in area B and is not attempting to overtake vehicle 1.

[0058]

570 FIG. 14 is a flow chart showing the processes connected at connectors P1 and P2 in the flow chart shown in FIG.

572 In FIG. 14, when executing the process connected by connector P2, since there is a high possibility that the surrounding vehicle 2 is in area A or B, in judgment step S1401, it is judged whether the rear collision prediction time tR is greater than the threshold value tcR of the rear collision prediction time, i.e., whether the collision risk is small.

576 If it is large (if the risk is low), the processes connected by the connector P1 are executed continuously, and the emergency earthquake warning 5 is transmitted to the driver 3 of the vehicle 1 via the emergency earthquake warning transmission means 103 (step S1402), and the driver is instructed to check the safety of the surroundings and stop the vehicle, or not to enter dangerous areas such as tunnels and bridges that are likely to be dangerous in the event of an earthquake (step S1403).

582 Thereafter, the process after transmitting the emergency earthquake warning to the driver 3, which will be described later, is executed (step S1404).

[0059]

587 On the other hand, if it is determined in the previous determination step S1401 that the difference is not greater, then in determination step S1402 it is determined whether a preset predetermined time Δt has elapsed, and if not, the determination step S1401 is executed again.

591 That is, the vehicle 1 continues to warn the surrounding vehicles 2 by flashing the hazard lamps 6 until the time Δt has elapsed. If tR>tcR occurs before the time Δt has elapsed, the process proceeds to step S1402 and subsequent steps.

[0060]

597 On the other hand, if tR>tcR does not hold even after the time Δt has elapsed, the flashing speed and brightness of the hazard lamps 6 are increased (step S1405), and the process flow shown in FIG. 6, which is connected via the connector P0, is executed.

600 By waiting for a predetermined time Δt in judgment step S1402, the surrounding vehicle 2 that notices the flashing hazard lights 6 of vehicle 1 is more likely to sense danger and move behind vehicle 1 to increase the distance between them.

[0061]

607 As a result, as shown in Figure 15, it is possible to increase the rear collision prediction time tR, and when the rear collision prediction time tR becomes smaller than the rear collision prediction time threshold value tcR, an emergency earthquake warning 5 can be transmitted to the driver 3 of the vehicle 1.

611 This allows preparations for an earthquake to be made before the main shock (S waves) arrives, for example by checking the safety of the surrounding area and stopping the vehicle. Furthermore, if the collision risk does not decrease even after the time Δt has elapsed, the flashing speed and brightness of the hazard lights 6 of the vehicle 1 can be increased to further emphasize the warning to the surrounding vehicles 2.

[0062]

618 Next, returning to FIG. 14, when the processing connected by connector P3 is executed, it is highly likely that the surrounding vehicle 2 is in or will reach areas C, D, or E, so even if the surrounding vehicle 2 sees that the hazard lights 6 of vehicle 1 are flashing, it is unlikely that the surrounding vehicle 2 will behave in such a way as to move behind vehicle 1 to increase the distance between itself and vehicle 1, which will increase the rear collision prediction time tR and reduce the risk of collision.

[0063]

628 Therefore, the collision risk determination parameter is changed from the rear collision prediction time tR to the front collision prediction time tF.

630 In this case, as shown in FIG. 16, the vehicle 1 applies automatic braking gradually so as not to cause the driver 3 to panic (step S1407).

632 By applying the automatic brakes, it is possible to move the surrounding vehicle 2 into area D, which is ahead of the vehicle 1, relatively faster than in the case where the automatic brakes are not applied. As a result, the forward collision prediction time tF can be increased earlier.

[0064]

638 After the automatic brake is applied, it is determined in a determination step S1407 whether or not the forward collision prediction time tF is greater than the threshold value tcF of the forward collision prediction time, that is, whether or not the collision risk is low.

641 If it is greater, the process proceeds to step S1402 and subsequent steps. On the other hand, if it is not larger, the process proceeds to step S1405 and subsequent steps.

[0065]

646 By activating the automatic brake as described above, it is possible to reduce the collision risk

more quickly when the surrounding vehicle 2 is about to overtake the vehicle 1, as shown in FIG.

648 As a result, it is possible to transmit the emergency earthquake warning 5 to the driver 3 of the vehicle 1 more quickly, allowing more time for the main shock (S-waves) to arrive, and enabling preparation for an earthquake, such as checking the safety of the surrounding area and stopping the vehicle, to be taken.

[0066]

657 FIG. 18 is a flow chart showing the process flow after the collision risk between the vehicle 1 and the surrounding vehicle 2 becomes small and an emergency earthquake alert is transmitted to the driver 3 of the vehicle 1, as shown in process step S1404 in FIG.

[0067]

663 It is desirable for the driver 3 of the vehicle 1 to, after hearing the emergency earthquake warning 5, check the safety of the surroundings and then stop the vehicle.

665 However, it is possible that hearing an Earthquake Early Warning Level 5 may cause people to panic and take dangerous actions such as sudden braking, sudden steering, or sudden acceleration.

[0068]

671 Therefore, taking such a situation into consideration, after transmitting the emergency earthquake warning 5 to the driver 3, first in judgment step S1801, it is judged whether or not there is an obstacle to be avoided, such as a pedestrian or a vehicle, ahead of the vehicle 1 using the camera 7, radio wave sensor 8, and ultrasonic sensor 9 shown in Figure 3.

675 If there is no obstacle to be avoided, there is a possibility that the driver 3 will panic and suddenly brake, steer or accelerate. Therefore, as shown in Figures 10(a) to (c), in order to prevent sudden braking, sudden steering or sudden acceleration, the braking force, steering angle and driving force which are the outputs for each driving operation of the driver 3 are controlled so as not to become large (step S1802).

680 By carrying out such output control, it is possible to prevent the vehicle 1 from getting into a dangerous state even if the driver 3 panics and performs sudden braking, steering, or acceleration operations.

[0069]

686 Next, in a judgment step S1803, the operation risk judgment means 110 judges whether or not the driver 3 performed a sudden braking operation, a sudden steering operation, or a sudden acceleration operation as described below after hearing the emergency earthquake warning 5.

690 That is, if the brake pedal depression speed (or brake pedal depression force) is equal to or greater than a predetermined threshold value, it is determined that a sudden braking operation has been performed (step S1804). If the rotation speed of the steering shaft (STRG shaft) is equal to or greater than a predetermined threshold value, it is determined that a sudden steering operation has been performed (step S1805). Furthermore, if the accelerator pedal depression speed (or accelerator pedal depression force) is equal to or greater than a predetermined threshold value, it is determined that a sudden accelerator operation has been performed (step S1806).

[0070]

701 If at least one of the above operations is performed, it is determined that the driver 3 has panicked (step S1807).

703 Thereafter, the vehicle 1 informs the driver 3 by voice via the emergency earthquake warning transmission means 103 such as a radio or a car navigation system that the driving mode will be changed to automatic driving, and then the driving mode is changed to automatic driving (step S1808). After checking the surrounding conditions using the camera 7, radio wave sensor 8, ultrasonic sensor 9, etc. shown in FIG. 6, the vehicle 1 is stopped at the side of the road before the main vibrations (S waves) arrive (step S1809). In the above processing step S1808, by informing the driver 3 that the vehicle 1 is in autonomous driving mode, it is possible to prevent the driver 3 from becoming panicked.

[0071]

714 On the other hand, if no operation was performed in the previous processing step S1803, it is determined that the driver 3 is not panicking (step S1810), and after releasing the brake, steering, and accelerator control applied in the previous processing step S1802 (step S1811), the driver checks the safety of the surroundings again by voice using the emergency earthquake warning transmission means 103 such as a radio or car navigation system, and notifies the driver that he or she will stop the vehicle 1 (step S1812).

720 By releasing the brake, steering wheel, and accelerator control in the above processing step S1811, the driver 3 can check the safety of the surroundings and stop the vehicle 1 in a safe place, such as the side of the road, before the main vibrations (S waves) arrive.

[0072]

726 On the other hand, if it is determined in the previous determination step S1801 that there is an obstacle ahead, a separately set processing flow for when there is an obstacle is executed (step S1813).

[0073]

732 In this way, in the above-mentioned first embodiment, when the vehicle 1 receives an emergency earthquake warning, it first notifies the outside of the vehicle cabin to nearby vehicles outside the vehicle cabin, such as following vehicles, that an emergency earthquake warning has been received and calls for their attention, and then the driver 3 inside the vehicle cabin is notified. Therefore, even if the driver 3 panics and takes dangerous actions such as sudden braking, sudden steering, or sudden acceleration, causing the behavior of the vehicle 1 to become unstable, contact with nearby vehicles 2 can be suppressed and avoided.

[0074]

742 In addition, when the risk of contact between vehicle 1 and surrounding vehicle 2 falls below a threshold, the driver 3 in the vehicle cabin is notified that an emergency earthquake warning has been received, thereby further preventing and avoiding contact with surrounding vehicles 2.

[0075]

749 Furthermore, by restricting the driver's steering and braking operations after notifying the vehicle interior that an emergency earthquake warning has been received, it is possible to prevent the driver 3 in the vehicle interior from panicking and taking dangerous actions such as sudden braking, sudden steering, or sudden acceleration, which could cause the vehicle's behavior to become unstable.

[0076]

757 If it is determined that the driver 3 is not panicking, the restriction on the driver 3's vehicle steering and vehicle braking operations is lifted, allowing the driver 3 who is not panicking to select a safer vehicle behavior.

[0077]

763 FIG. 20 is a flowchart showing a process flow according to the second embodiment of the present invention.

769 This second embodiment is a specific example of the process flow of step S1813 in the flowchart shown in FIG. 18, and other details are the same as those of the first embodiment, so that the description thereof will be omitted.

[0078]

771 In FIG. 20, after an emergency earthquake warning is transmitted to the driver 3, in decision step S2001 it is decided whether or not there is an obstacle to be avoided ahead of the vehicle 1. If there is an obstacle, as shown in FIG. 21, a preview brake is applied (step S2002)

to eliminate brake play and to apply braking force simultaneously with depression of the brake pedal, which is used as a means for preventing rear-end collisions.

777 In this way, applying preview braking makes it possible to avoid obstacles more quickly and safely.

[0079]

784 Thereafter, the accelerator control as shown in FIG. 19C is performed (step S2003).

785 By implementing the accelerator control, it becomes possible to prevent the vehicle 1 from suddenly accelerating when the driver 3 panics upon hearing the emergency earthquake warning 5 and suddenly steps on the accelerator despite the presence of an obstacle to be avoided ahead of the vehicle 1.

[0080]

792 Next, in judgment step S2004, the operation risk judgment means 110 judges whether or not the driver 3 performed an operation at an accelerator pedal depression speed (or accelerator pedal depression force) equal to or greater than a predetermined threshold value after hearing the emergency earthquake warning 5.

796 If the difference is equal to or greater than the threshold, it is determined that the driver 3 has panicked and has not performed any operation to avoid the obstacle (step S2005).

798 Thereafter, the vehicle 1 informs the driver 3 by voice on the emergency earthquake warning transmission means 103 such as a radio or a car navigation system that the driving mode will be switched to automatic driving, and then the driving mode is switched to automatic driving (step S2006). After confirming the surrounding conditions using the camera 7, the radio wave sensor 8, the ultrasonic sensor 9, etc. shown in FIG. 6, the vehicle 1 avoids obstacles by automatic driving (step S2007), and stops the vehicle 1 at the side of the road before the main vibrations (S waves) arrive (step S2008).

[0081]

808 On the other hand, if it is determined in the previous determination step S2004 that the threshold value is not exceeded, it is determined in the subsequent determination step S2009 whether or not the driver 3 has operated the brakes and steering wheel to avoid the obstacle.

811 If no operation has been performed, the driver 3 will panic upon hearing the emergency earthquake warning 5 even though there is an obstacle ahead of the vehicle 1 that needs to be avoided, and it will be determined that no avoidance operation has been performed (step S2005), and the processing from the previous processing step S2006 onwards will be executed.

[0082]

819 On the other hand, if an operation has been performed, it is determined that the driver 3 is not panicking (step S2010), and after releasing the accelerator control applied in the previous processing step S2003 (step S2011), the driver is informed by voice via the emergency earthquake warning transmission means 103 such as a radio or car navigation system that he or she will check the safety of the surrounding area again and stop the vehicle 1 (step S2012).

[0083]

828 In this way, in the above-described second embodiment, in addition to being able to obtain the same effects as the previous first embodiment, it is also possible to appropriately control the vehicle even when there is an obstacle in front of the vehicle 1.

[0084]

834 FIG. 22 is a diagram showing the behavior of the vehicle 1 and the surrounding vehicle 2 according to the third embodiment of the present invention.

836 This Example 3 is an example relating to the behavior of vehicle 1 and surrounding vehicles 2 immediately after Case B is determined in processing step S1004 of Figure 10, as well as the method of determining that behavior.The rest is similar to the previous Examples 1 and 2, so the description thereof will be omitted.

[0085]

843 In Figure 22 (a), the behavior of vehicle 1 and surrounding vehicle 2 immediately after Case B is determined may be as follows: Case B-1: no change in the positional relationship between vehicle 1 and surrounding vehicle 2; Case B-2: vehicles 1 and 2 approach each other; Case B-3: vehicles 1 and 2 move away from each other; Case B-4: vehicle 1 changes lanes toward surrounding vehicle 2; Case B-5: surrounding vehicle 2 changes lanes toward vehicle 1; Case B-6: other cases.

[0086]

852 FIG. 23 is a flow chart showing the procedure of the method of determining each of the above-mentioned Case B.

854 Here, as shown in FIG. 22(b), the vehicle travel direction is the x direction and the vehicle width direction is the y direction, the x- and y-direction speeds of vehicle 1 are Vx1, Vy1, the x- and y-direction speeds of surrounding vehicle 2 are Vx2, Vy2, and the relative speeds of surrounding vehicle 2 in the x and y directions with respect to vehicle 1 are Vx12, Vy12.

858 The accelerations of vehicle 1 in the x and y directions are gx1 and gy1, the accelerations of nearby vehicle 2 in the x and y directions are gx2 and gy2, and the relative accelerations of nearby vehicle 2 with respect to vehicle 1 in the x and y directions are gx12 and gy12.

[0087]

868 In FIG. 23, first in judgment step S2301, it is determined whether Vy12 is 0 or not. If it is 0, it is determined that there is no relative movement in the y direction between vehicle 1 and surrounding vehicle 2. Next, in judgment step S2302, it is determined whether Vx12 is 0, positive, or negative.

868 If the result of the judgment is 0, it is judged to be Case B-1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S2303); if the result is positive, it is judged to be Case B-2, in which vehicle 1 and surrounding vehicle 2 are approaching each other (step S2304); and if the result is negative, it is judged to be Case B-3, in which vehicle 1 and surrounding vehicle 2 are moving away from each other (step S2305).

[0088]

877 On the other hand, if the result in the previous judgment step S2301 is not 0, it is judged that there is relative movement between vehicle 1 and surrounding vehicle 2 in the vehicle width direction, and then in judgment step S2306 it is judged whether Vy12 and -Vy1 are equal, i.e., whether vehicle 1 is attempting to change lanes.

881 If the two are equal, it is determined that the case is Case B-4, in which the vehicle 1 is about to change lanes (step S2307).

[0089]

886 On the other hand, if they are not equal, it is then determined in decision step S2308 whether Vy1 is 0 or not, that is, whether the nearby vehicle 2 is about to change lanes or not.

888 If the result of the judgment is 0, it is judged to be Case B-5, in which the surrounding vehicle 2 is attempting to change lanes (step S2309); if the result is not 0, it is judged to be Case B-6, in which there are various possible movements in the vehicle width direction of vehicle 1 and surrounding vehicle 2 (step S2310).

[0090]

895 In the above cases of Case B-1, Case B-3, Case B-4, Case B-5, and Case B-6, it is determined that there is a high possibility that the surrounding vehicle 2 is in areas A and B, and the processing steps connected by the connector P2 described above are executed in sequence.

[0091]

901 On the other hand, if it is determined to be Case B-2, it is then determined in determination step S2311 whether or not the nearby vehicle 2 is in area C by executing the process flow

shown in FIG.

905 If it is determined that the surrounding vehicle 2 is in the C area, the processing steps connected at the connector P3 described above are executed in sequence.

[0092]

911 On the other hand, if the vehicle is not in area C, then in judgment step S2312, it is determined whether the acceleration gx2 of the surrounding vehicle 2 calculated from the acceleration gx1 of vehicle 1 in the x direction and the relative acceleration gx12 between vehicles 1 and 2 is greater than a predetermined acceleration threshold value gcx.

915 If it is greater, it is determined that the surrounding vehicle 2 is likely to be in or move to one of areas C, D, or E, and the processing steps connected by connector P3 described above are executed in sequence.

918 On the other hand, if it is not larger, it is determined that there is a high possibility that the surrounding vehicle 2 is in areas A and B, and the processing steps connected by the connector P2 described above are executed in sequence.

[0093]

924 In such a judgment procedure, by executing the judgment processing step S2311, when vehicle 1 and surrounding vehicle 2 in Case B--2 are approaching each other, it is possible to judge whether or not surrounding vehicle 2 is in area C, and if it is in area C, it is possible to more accurately determine that surrounding vehicle 2 is moving from area B to area C, i.e., that surrounding vehicle 2 is attempting to overtake vehicle 1.

929 In addition, by executing processing step S2312, it is possible to more accurately determine that if the difference is large, the surrounding vehicle 2 is in area B and is attempting to overtake vehicle 1, and that if the difference is not large, the surrounding vehicle 2 is in area B and is not attempting to overtake vehicle 1.

[0094]

938 Thus, in the third embodiment, in addition to the effects obtained in the first and second embodiments, it is possible to accurately determine Case B, and to provide an appropriate measure for dealing with Case B.

[0095]

942 FIG. 24 is a diagram showing the behavior of the vehicle 1 and the surrounding vehicle 2 according to the fourth embodiment of the present invention.

944 This Example 4 is an example relating to the behavior of vehicle 1 and surrounding vehicles 2 immediately after it has been determined to be Case C in processing step S1006 of Figure 10, as well as the method for determining that behavior.The rest is similar to the previous

Examples 1 and 2, so a description thereof will be omitted.

[0096]

954 In Figure 24 (a), the behavior of vehicle 1 and surrounding vehicle 2 immediately after Case C is determined may be as follows: Case C–1: no change in the positional relationship between vehicle 1 and surrounding vehicle 2; Case C–2: surrounding vehicle 2 overtakes vehicle 1; Case B–3: vehicle 1 overtakes surrounding vehicle 2.

[0097]

961 FIG. 25 is a flow chart showing the procedure of the method of determining each of the above-mentioned Case C.

963 Here, as shown in FIG. 24(b), the vehicle travel direction is the x direction and the vehicle width direction is the y direction, the x- and y-direction speeds of vehicle 1 are Vx1, Vy1, the x- and y-direction speeds of surrounding vehicle 2 are Vx2, Vy2, and the relative speeds of surrounding vehicle 2 in the x and y directions with respect to vehicle 1 are Vx12, Vy12.

967 The accelerations of vehicle 1 in the x and y directions are gx1 and gy1, the accelerations of nearby vehicle 2 in the x and y directions are gx2 and gy2, and the relative accelerations of nearby vehicle 2 with respect to vehicle 1 in the x and y directions are gx12 and gy12.

[0098]

973 In FIG. 23, first, in decision step S2501, it is decided whether Vx12 is 0, positive or negative.

974 If the result of the judgment is 0, it is judged to be Case C–1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S2502); if the result is positive, it is judged to be Case C–2, in which surrounding vehicle 2 overtakes vehicle 1 (step S2503); and if the result is negative, it is judged to be Case C–3, in which vehicle 1 overtakes surrounding vehicle 2 (step S2504).

[0099]

982 As described above, in the case of Case C–3, it is determined that there is a high possibility that the surrounding vehicle 2 is in areas A and B, and the processing steps connected by the connector P2 described above are executed in sequence.

985 On the other hand, in the case of Case C–1 and Case C–2, it is determined that the surrounding vehicle 2 is in the C, D, or E area or is likely to move there, and the processing steps connected by the connector P3 described above are executed in sequence.

[0100]

991 Thus, in the fourth embodiment, in addition to the effects obtained in the first and second

embodiments, it is possible to accurately determine Case C, and to provide an appropriate measure for dealing with Case C.

[0101]

990 FIG. 26 is a diagram showing the behavior of the vehicle 1 and the surrounding vehicle 2 according to the fifth embodiment of the present invention.

1000 This embodiment 5 is an embodiment relating to the behavior of vehicle 1 and surrounding vehicles 2 immediately after the determination of Case D in processing step S1009 of Figure 10, as well as the method of determining that behavior.The rest is similar to the previous embodiments 1 and 2, so the description thereof will be omitted.

[0102]

1007 In Figure 26 (a), the behavior of vehicle 1 and surrounding vehicle 2 immediately after Case D is determined may be as follows: Case D-1: no change in the positional relationship between vehicle 1 and surrounding vehicle 2; Case D-2: vehicles 1 and 2 move away; Case D-3: vehicles 1 and 2 move closer to each other; Case D-4: vehicle 1 changes lane to the side of surrounding vehicle 2; Case D-5: surrounding vehicle 2 changes lane to the side of vehicle 1; Case D-6: other cases.

[0103]

1016 FIG. 27 is a flowchart showing the procedure of the method of determining each of the above-mentioned Case D.

1018 Here, as shown in FIG. 26(b), the vehicle travel direction is the x direction and the vehicle width direction is the y direction, the x- and y-direction speeds of vehicle 1 are Vx1, Vy1, the x- and y-direction speeds of surrounding vehicle 2 are Vx2, Vy2, and the relative speeds of surrounding vehicle 2 in the x and y directions with respect to vehicle 1 are Vx12, Vy12.

1022 The accelerations of vehicle 1 in the x and y directions are gx1 and gy1, the accelerations of nearby vehicle 2 in the x and y directions are gx2 and gy2, and the relative accelerations of nearby vehicle 2 with respect to vehicle 1 in the x and y directions are gx12 and gy12.

[0104]

1028 In FIG. 27, first, after the preview brake that was touched earlier is applied (step S2701), it is determined whether or not Vy12 is 0 in determination step S2702.

1030 If it is 0, it is determined that there is no relative movement in the y direction between the vehicle 1 and the surrounding vehicle 2, and then in decision step S2703 it is determined whether Vx12 is 0, positive, or negative.

1033 If the value is 0, it is determined to be Case D-1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S2704); if the value is

positive, it is determined to be Case D-2, in which vehicle 1 and surrounding vehicle 2 are approaching each other (step S2705); and if the value is negative, it is determined to be Case D-3, in which vehicle 1 and surrounding vehicle 2 are moving away from each other (step S2706).

[0105]

1044 On the other hand, if the result in the previous judgment step S2702 is not 0, it is judged that there is relative movement between vehicle 1 and surrounding vehicle 2 in the vehicle width direction, and then in judgment step S2707 it is judged whether Vy12 and -Vy1 are equal, i.e., whether vehicle 1 is attempting to change lanes.

1048 If the two are equal, it is determined that the case is Case D-4, in which the vehicle 1 is about to change lanes (step S2708).

[0106]

1053 On the other hand, if they are not equal, it is then determined in decision step S2709 whether Vy1 is 0, that is, whether the nearby vehicle 2 is about to change lanes.

1055 If the result is 0, it is determined to be Case D-5, in which the surrounding vehicle 2 is attempting to change lanes (step S2710); if the result is not 0, it is determined to be Other Case D-6, since there are various possible movements of vehicle 1 and surrounding vehicle 2 in the vehicle width direction (step S2711).

[0107]

1062 In the above cases of Case D-1, Case D-2, Case D-4, Case D-5, and Case D-6, it is determined that there is a high possibility that the surrounding vehicle 2 is in areas C, D, and E, and the processing steps for connecting to connector P3 described above are sequentially executed.

[0108]

1068 On the other hand, in the case of Case D-3, it is subsequently determined in a determination step S2712 whether or not the acceleration gx1 of the vehicle 1 is greater than a preset acceleration threshold value gcx.

1071 If it is larger, it is determined that the surrounding vehicle 2 is in the A or B area or is highly likely to move there, and the processing steps for connecting to the connector P2 described above are sequentially executed.

1074 On the other hand, if it is not larger, it is determined that there is a high possibility that the surrounding vehicle 2 is in areas C, D, and E, and the processing steps for connecting to the connector P3 described above are executed in sequence.

1077 By executing the above-mentioned determination step S2712, it is possible to determine with greater accuracy whether the vehicle 1 is about to overtake the nearby vehicle 2.

[0109]

1082 Thus, in the fifth embodiment, in addition to the effects obtained in the first and second embodiments, it is possible to accurately determine Case D, and to provide an appropriate measure for dealing with Case D.

[0110]

1088 28 and 29 are diagrams showing the behavior of the vehicle 1 and the surrounding vehicle 2 according to the sixth embodiment of the present invention.

1090 This Example 6 is an example relating to the behavior of vehicle 1 and surrounding vehicles 2 immediately after Case E is determined in processing step S1010 of Figure 10, as well as the method of determining that behavior.The rest is similar to the previous Examples 1 and 2, so the description thereof will be omitted.

[0111]

1097 In Figure 28 (a), the behavior of vehicle 1 and surrounding vehicle 2 immediately after Case E is determined to be as follows: Case E-1: surrounding vehicle 2 remains behind vehicle 1; Case E-2: vehicle 1 changes lanes; Case E-3: surrounding vehicle 2 changes lanes; Case E-4: other cases.

[0112]

1104 Furthermore, as shown in FIG. 29 , Case E-1 can be classified as follows: Case E-1-1: no change in the positional relationship between vehicle 1 and surrounding vehicle 2; Case E-1-2: vehicles 1 and 2 move away; Case E-1-3: vehicles 1 and 2 approach each other; Case E-2 can be classified as: Case E-2-1: vehicle 1 changes lanes only; Case E-2-2: surrounding vehicle 2 drives away; Case E-2-3: vehicle 1 overtakes surrounding vehicle 2; Case E-3 can be classified as: Case E-3-1: surrounding vehicle 2 changes lanes only; Case E-3-2: surrounding vehicle 2 drives away; Case E-3-3: vehicle 1 overtakes surrounding vehicle 2.

[0113]

1114 FIG. 30 is a flowchart showing the procedure of the method of determining each of the above-mentioned Case E.

1116 Here, as shown in FIG. 28(b), the vehicle travel direction is the x direction and the vehicle width direction is the y direction, the x- and y-direction speeds of vehicle 1 are Vx1, Vy1, the x- and y-direction speeds of surrounding vehicle 2 are Vx2, Vy2, and the relative speeds of surrounding vehicle 2 in the x and y directions with respect to vehicle 1 are Vx12, Vy12.

1120 The accelerations of vehicle 1 in the x and y directions are gx1 and gy1, the accelerations of

nearby vehicle 2 in the x and y directions are gx2 and gy2, and the relative accelerations of nearby vehicle 2 with respect to vehicle 1 in the x and y directions are gx12 and gy12.

[0114]

1127 In FIG. 30, first, after the preview brake that was touched earlier is applied (step S3001), in judgment step S3002, it is judged whether Vy12 is 0 or not, and if it is 0, it is judged to be Case E-1, in which there is no relative movement in the y direction between vehicle 1 and surrounding vehicle 2 (step S3003).

1131 Next, in judgment step S3004, it is determined whether Vx12 is 0, positive, or negative. If it is 0, it is determined to be Case E-1-1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S3005). If it is positive, it is determined to be Case E-1-2, in which vehicle 1 and surrounding vehicle 2 are moving away from each other (step S3006). If it is negative, it is determined to be Case E-1-3, in which vehicle 1 and surrounding vehicle 2 are moving closer to each other (step S3007).

[0115]

1140 On the other hand, if the result in judgment step S3002 is not 0, it is judged that there is relative movement between vehicle 1 and surrounding vehicle 2 in the vehicle width direction, and then in judgment step S3008 it is judged whether Vy12 and -Vy1 are equal, i.e., whether vehicle 1 is attempting to change lanes.

1144 If the result of the determination is that the two are equal, it is determined to be Case E-2, in which the vehicle 1 is about to change lanes (step S3009).

[0116]

1149 Next, in judgment step S3010, it is determined whether Vx12 is 0, positive, or negative. If it is 0, it is determined to be Case E-2-1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S3011). If it is positive, it is determined to be Case E-2-2, in which vehicle 1 and surrounding vehicle 2 are moving away, i.e., surrounding vehicle 2 is about to drive away (step S3012). If it is negative, it is determined to be Case E-2-3, in which vehicle 1 and surrounding vehicle 2 are getting closer, i.e., vehicle 1 is about to overtake surrounding vehicle 2 (step S3013).

[0117]

1159 On the other hand, if they are not equal in the previous determination step S3008, it is next determined in determination step S3014 whether Vy1 is 0 or not, that is, whether the nearby vehicle 2 is about to change lanes or not.

1168 If the result is 0, it is determined that the case is Case E-3, in which the surrounding vehicle 2 is about to change lanes (step S3015).

1164 Next, in judgment step S3016, it is determined whether Vx12 is 0, positive, or negative. If it is 0, it is determined to be Case E-3-1, in which there is no relative movement in the x direction between vehicle 1 and surrounding vehicle 2 (step S3017). If it is positive, it is determined to be Case E-3-2, in which vehicle 1 and surrounding vehicle 2 are moving away, i.e., surrounding vehicle 2 is about to drive away (step S3018). If it is negative, it is determined to be Case E-3-3, in which vehicle 1 and surrounding vehicle 2 are getting closer, i.e., vehicle 1 is about to overtake surrounding vehicle 2 (step S3019).

1164 On the other hand, if the result of the previous determination step S3014 is not 0, various movements in the vehicle width direction of the vehicle 1 and the surrounding vehicle 2 are possible, so the case is determined to be Case E-4 (step S3020).

[0118]

1177 In the above cases of Case E-1-1, Case E-1-2, Case E-1-3, Case E-2-1, Case E-2-2, Case E-3-1, Case E-3-2, and Case E-4, it is determined that the surrounding vehicle 2 is highly likely to be in areas C, D, or E, and the processing steps for connecting to connector P3 described above are sequentially executed.

[0119]

1184 On the other hand, in the case of Case E-2-3 or Case E-3-3, it is then determined in a determination step S3021 whether or not the nearby vehicle 2 is in the E area.

1186 If it is in area E, the processing steps connected to connector P3 are executed in sequence.

[0120]

1190 On the other hand, if the vehicle 2 is not in area E, the process proceeds to judgment step S3022, where it is determined whether the acceleration gx1 of the vehicle 1 is greater than a preset acceleration threshold value gcx.If the acceleration gx1 is not greater than the predetermined acceleration threshold value gcx, it is determined that the surrounding vehicle 2 is likely to be in areas C or D, and the processing steps for connecting to connector P3 are sequentially executed.

1196 On the other hand, if it is larger, it is determined that the surrounding vehicle 2 is in area A or B, or is highly likely to move, and the processing steps for connecting to connector P2 described above are sequentially executed.

[0121]

1202 Here, by executing the determination step S3021, if the surrounding vehicle 2 is in the E area, it is possible to more accurately determine that the vehicle 1 is not attempting to overtake the surrounding vehicle 2.

1205 In addition, by executing the judgment step S3022, it is possible to more accurately

determine that vehicle 1 is attempting to overtake nearby vehicle 2 if the acceleration is greater than the threshold value, and that vehicle 1 is not attempting to overtake nearby vehicle 2 if the acceleration is not greater than the threshold value.

[0122]

1213 Thus, in the sixth embodiment, in addition to the effects obtained in the first and second embodiments, it becomes possible to accurately determine Case E, and to provide an appropriate measure for dealing with Case E.

[0123]

1219 Next, a seventh embodiment of the present invention will be described.

1220 The seventh embodiment is characterized in that, in the process flow of FIG. 10, if it is determined in judgment steps S1001, S1002, S1005, S1007, and S1008 that the ratio is greater than the vehicle speed, or if there are no surrounding vehicles, the process steps connected by connector P1 in the flowchart are executed in sequence; the rest is the same as in the first to sixth embodiments, and therefore a description thereof will be omitted.

[0124]

1228 In such a case, as shown in the flowchart of FIG. 14, first the emergency earthquake warning transmission means 103 transmits an emergency earthquake warning 5 to the driver 3 of the vehicle 1 (step S1402), and instructs the driver 3 to check the safety of the surroundings before stopping the vehicle, or not to enter dangerous areas such as tunnels or bridges that are likely to be dangerous in the event of an earthquake (step S1403).

1239 Thereafter, the process after transmitting the emergency earthquake warning to the driver 3, which will be described later, is executed (step S1404).

[0125]

1238 In this way, in the seventh embodiment, the same effects as those obtained in the first and second embodiments can be obtained.

[0126]

1245 Figures 31 to 33 are figures used to explain the technology adopted in Example 8 of the present invention, where Figure 31 is a figure showing the positional relationship when there are multiple surrounding vehicles around vehicle 1, and Figures 32 and 33 are flowcharts showing the processing procedure in that case.

1247 In addition, in Example 8, the overall system configuration, the method for determining the location of surrounding vehicles 2, the method for determining the collision risk between

vehicle 1 and surrounding vehicles 2, and the processing flow after transmitting the emergency earthquake warning 5 to the driver (Figures 18 and 20) are the same as those in Examples 1 to 7, so a description thereof will be omitted here.

[0127]

1267 In a situation where there are multiple surrounding vehicles 2-i (i = 1, 2, 3 ..., N; in Figure 31, it is assumed that there are three surrounding vehicles with N = 3) around vehicle 1, as shown in Figure 31, first, as shown in the flowchart of Figure 32, an emergency earthquake warning 5 is received by vehicle 1 (step S3201), and then vehicle 1 warns those around it using hazard lights 6 or the like (step S3202), and sequentially executes the processing steps shown in the flowchart of Figure 33, which are connected by connector P0 in the flowchart.

[0128]

1267 In Figure 33, first in judgment step S3301, it is determined that there are surrounding vehicles around vehicle 1, and then in judgment step S3302, it is determined that surrounding vehicle 2 is in a lane that is not the opposite lane.After that, the number of surrounding vehicles 2 is determined by means of a camera 7, a radio wave sensor 8, an ultrasonic sensor 9, etc. installed on the front, side, and rear of vehicle 1 (step S3303), and it is determined that N surrounding vehicles 2-i (i = 1, 2, 3 ..., N) are present (step S3304).

[0129]

1276 Then, loop processing S3305 is executed, and the location of the surrounding vehicle 2-i (i = 1, 2, 3 ..., N) is determined for each surrounding vehicle 2-i (i = 1, 2, 3 ..., N) in each processing step S3306 after processing step S604 shown in Figure 6.

1279 Next, in a determination step S3307, the collision risk between the vehicle 1 and the surrounding vehicles 2-i (i=1, 2, 3 . . . , N) in each area is determined by executing the process flow shown in FIG.

[0130]

1285 If it is determined that the collision risk is low, the processing steps for a state in which the collision risk is low that are connected to connector P1 are executed sequentially, and the number of vehicles in the state in which the processing flow that is connected to connector P1 is being executed with V1(P1) = i, P1 = P1 + 1 is counted (step S3308).

[0131]

1292 On the other hand, if it is determined that the collision risk is high and the case is

determined to be one of Cases A to E shown in Figure 10, the processing of each Case shown in Figure 13, Figure 23, Figure 25, Figure 27 or Figure 30 is executed according to the case (step S2209), and then, if the surrounding vehicle 2 is in area A or B, the processing steps connected to connector P2 are executed sequentially, and the number of vehicles in the state of executing the processing flow connected to connector P2 with V2(P2) = i, P2 = P2 + 1 is counted (step S3310).

1294 If the surrounding vehicle 2 is in areas C, D, or E, the processing steps connecting to connector P3 are executed sequentially, and the number of vehicles in the state where the processing flow connecting to connector P3 is being executed with V3(P3) = i, P3 = P3 + 1 is counted (step S3311).

[0132]

1307 In this way, after performing the same processing on all N surrounding vehicles 2–i (i = 1, 2, 3 ..., N) (step S3312), it is determined which of the processing flows connected by connectors P1, P2, P3 is being executed by each of the N surrounding vehicles 2–i (i = 1, 2, 3 ..., N).

[0133]

1314 Next, in judgment step S3313, it is determined whether there is a nearby vehicle 2–i (i = 1, 2, 3 ..., P2) that is executing a processing flow to be connected to connector P2, and if not, judgment step S3317 described below is executed.

[0134]

1330 On the other hand, if there is one, loop processing S3314, S3316 is started, and for the surrounding vehicle 2–j (j = 1, 2, ..., P2) that is determined to be in a state of executing the processing flow connected to connector P2, a series of processes from the processing flow connected to connector P2 in Figure 14 to the processing flow connected to connector P1 are executed (step S3315).

[0135]

1338 After executing the processing flow connected at connector P1 in which all of the surrounding vehicles 2–j (j = 1, 2, ..., P2) that have been determined to be in a state of executing the processing flow connected at connector P2 through such loop processing are in a state of low collision risk (step S3316), the judgment step S3317 is executed.

[0136]

1335 Next, in judgment step S3317, it is determined whether there is a nearby vehicle 2–k (k = 1,

2, 3 ..., P3) that is executing the processing flow connected by connector P3. If there is not, it is determined that the risk of collision with all N nearby vehicles 2-i (i = 1, 2, 3 ..., N) has decreased, and an emergency earthquake warning 5 is transmitted to the driver 3 of vehicle 1 (step S3318).

[0137]

1344 On the other hand, if there is one, loop processing S3319, S3321 is started, and for the surrounding vehicle 2-k (k = 1, 2, ..., P3) that is determined to be in a state of executing the processing flow connected to connector P3, a series of processes from the processing flow connected to connector P3 in Figure 14 to the processing flow connected to connector P1 are executed (step S3320).

[0138]

1352 When the processing flow connected to connector P1 is executed for all of the surrounding vehicles 2-k (k = 1, 2, ..., P3) that have been determined to be in a state of executing the processing flow connected to connector P3 through such loop processing and that have a low collision risk, it is determined that the collision risk between vehicle 1 and all of the N surrounding vehicles 2-i (i = 1, 2, 3 .... N) has decreased, and an emergency earthquake warning 5 is transmitted to the driver 3 of vehicle 1 (step S3318).

[0139]

1361 In the above processing flow, first, all surrounding vehicles 2-j (j = 1, 2, ... P2) that are executing the processing flow connected to connector P2 transition to a state where they are executing the processing flow connected to connector P1, i.e., a state where the risk of collision has been reduced, and then all surrounding vehicles 2(k) (k = 1, 2, ..., P3) that are executing the processing flow connected to connector P3 transition to a state where they are executing the processing flow connected to connector P1, i.e., a state where the risk of collision has been reduced.

[0140]

1371 In this way, in order to reduce the risk of collision with surrounding vehicles 2-k (k = 1, 2, ... P3) that are executing a processing flow connected to connector P3, vehicle 1 actively moves away from surrounding vehicles 2-k (k = 1, 2, ..., P3) that are executing a processing flow connected to connector P3 by using the automatic braking in processing step S1406 shown in Figure 14 to move vehicle 1 rearward.

[0141]

1370 When there are also nearby vehicles 2-j (j = 1, 2, ... P2) that are executing the processing flow connected to the connector P2 at the same time, if vehicle 1 activates the automatic brakes in a state where there is a high risk of collision between vehicle 1 and nearby vehicles 2-j (j = 1, 2, ... P2) that are executing the processing flow connected to the connector P2, there is a high possibility of collision with nearby vehicles 2-j (j = 1, 2, ... P2) that are executing the processing flow connected to the connector P2.

1370 However, such a problem can be prevented by first putting all surrounding vehicles 2-j (j = 1, 2, ... P2) that are executing the processing flow connected to connector P2 into a state where they are executing the processing flow connected to connector P1, i.e., a state where the risk of collision is reduced.

[0142]

1382 In this way, in the eighth embodiment, even when there are a plurality of surrounding vehicles, it is possible to obtain the same effects as those obtained in the first and second embodiments.

[0143]

1388 FIG. 34 is a diagram showing the configuration of a vehicle control device according to a ninth embodiment of the present invention.

1400 The vehicle control device of Example 9 shown in Figure 34 is configured with an interior situation detection means 112 and an image processing means 113 in addition to the configuration of the vehicle control device shown in Figure 1 above, and since everything other than the interior situation detection means 112 and the image processing means 113 is the same as Example 1, a description thereof will be omitted here.

1405 In addition, in this embodiment 9, the method of determining the location of the surrounding vehicle 2, the method of determining the collision risk between vehicle 1 and the surrounding vehicle 2, and the processing after transmitting the emergency earthquake warning 5 to the driver are the same as those in the previous embodiments 1 to 8, so they will not be explained here.

[0144]

1413 As shown in FIG. 35, the interior situation detection means 112 is composed of a camera or the like installed on a ceiling 35A or above a steering wheel 35B in the vehicle interior in order to detect the behavior of the occupants.

[0145]

1418 The image processing means 113 is a means for inputting and processing the image information obtained by the indoor situation detection means 112, and is composed of, for

example, a DSP (digital signal processor) or a microcomputer.

[0146]

1427 In such a configuration, in the processing flows shown in Figs. 13, 23, 27, and 30, whether or not the vehicle 1 in Case A–2, Case B–4, Case D–4, or Case E–2 is about to change lanes is determined by determining whether Vy12 is equal to –Vy1 in processing steps S1307, S2306, S2707, and S3008, respectively. In this embodiment 9, in addition to this determination, movement 36B of the eyes 36A of the driver 3 of the vehicle 1 as shown in Fig. 36(a) and movement 36D of the head 36C as shown in Fig. 36(b) are detected by image processing means 113 through images captured by a camera or the like of indoor situation detection means 112 installed in the vehicle, and a lane change is determined taking into account the detection results.

[0147]

1438 It is determined whether parameters such as the frequency and time that the eyes 36A of the driver 3 turn toward the side mirror, etc., the frequency and time that the head 36C turns toward the side mirror, etc., and the rotation angle of the head 36C are equal to or greater than a preset threshold value.

1443 If it is equal to or greater than the threshold, it is determined that the driver 3 of the vehicle 1 is about to change lanes, and this is added to the determination of whether Vy12 and –Vy1 are equal.

[0148]

1449 As a result, in this ninth embodiment, in addition to being able to obtain the same effects as those of the first and second embodiments, it is possible to more accurately determine whether the vehicle 1 is about to change lanes.

[0149]

1455 FIG. 37 is a diagram showing the configuration of a vehicle control device according to a tenth embodiment of the present invention.

1457 The vehicle control device of the tenth embodiment shown in FIG. 37 is configured with a direction indication means 114 in addition to the configuration of the vehicle control device shown in FIG. 1 above, and since the rest of the vehicle control device is the same as that of the first embodiment except for this direction indication means 114, a description thereof will be omitted here.

1462 In addition, in this embodiment 10, the method of determining the location of the surrounding vehicle 2, the method of determining the collision risk between vehicle 1 and the surrounding vehicle 2, and the processing after transmitting the emergency earthquake

warning 5 to the driver are the same as those in the previous embodiments 1 to 8, so they will not be explained here.

[0150]

1475 The direction indication means 114 is a means by which the vehicle 1 informs surrounding vehicles that it is about to make a right turn, a left turn, change lanes, etc., and functions by activating a turn signal lamp attached to the vehicle 1 by operating a turn signal lever 38 installed inside the vehicle 1 as shown in Figure 38.

[0151]

1480 In such a configuration, in the processing flows shown in Figures 13, 23, 27, and 30, whether or not vehicle 1 in Case A-2, Case B-4, Case D-4, or Case E-2 is attempting to change lanes is determined by determining whether Vy12 is equal to -Vy1 in processing steps S1307, S2306, S2707, and S3008, respectively.

1484 In contrast to this, in the tenth embodiment, a determination as to whether or not the driver 3 of the vehicle 1 is operating the winker lever 38 is added to the determination as to whether or not Vy12 is equal to -Vy1.

1487 This makes it possible to more accurately determine whether the vehicle 1 is about to change lanes.

[0152]

1492 As a result, in this embodiment 10, in addition to being able to obtain the same effects as the previous embodiments 1 and 2, it is possible to more accurately determine whether the vehicle 1 is about to change lanes.

[0153]

1498 Next, an eleventh embodiment of the present invention will be described.

1499 The configuration of this embodiment 11, as well as the method of determining the location of the surrounding vehicle 2 and the method of determining the risk of collision between vehicle 1 and the surrounding vehicle 2, are the same as those of embodiment 1 shown in Figure 1 above, and the processing after transmitting the emergency earthquake warning 5 to the driver 3 is the same as those of embodiments 1 to 8 above, so a description thereof will be omitted here.

[0154]

1508 In the processing flows shown in Figures 13, 23, 27, and 30, whether or not vehicle 1 in Case A-2, Case B-4, Case D-4, and Case E-2 is attempting to change lanes is determined by

determining whether Vy12 is equal to −Vy1 in processing steps S1307, S2306, S2707, and S3008, respectively.

[0155]

1517 In contrast to this, in this embodiment 11, the rotation angle of the steering shaft of the driver 3 of the vehicle 1 is detected by the operation amount detection means 109 shown in FIG. 1, and it is determined whether or not this rotation angle is equal to or greater than a preset threshold value.

1521 If it is equal to or greater than the threshold, it is determined that the driver 3 of the vehicle 1 is attempting to change lanes, and this is added to the determination of whether Vy12 and −Vy1 are equal.

1524 This makes it possible to more accurately determine whether the vehicle 1 is about to change lanes.

[0156]

1529 As a result, in this embodiment 11, in addition to being able to obtain the same effects as the previous embodiments 1 and 2, it is possible to more accurately determine whether the vehicle 1 is about to change lanes.

[0157]

1535 Next, a twelfth embodiment of the present invention will be described.

1536 In this embodiment 12, the configuration of the device, the method for determining the location of surrounding vehicles 2, the method for determining the risk of collision between vehicle 1 and surrounding vehicles 2, the processing after transmitting the emergency earthquake warning 5 to the driver, and the method for determining lane changes are the same as those in the previous embodiments 1 to 11, and therefore will not be described here.

[0158]

1545 Figure 39 shows examples of situations in which vehicle 1 is attempting to change lanes. For example, as shown in Figure 39(a), while traveling in driving lane 39A, vehicle 1 attempts to change lanes to adjacent lane 39B as indicated by the arrow; as shown in Figure 39(b), vehicle 1 attempts to change lanes from merging lane 39C to driving lane 39D at a merging point on a highway or the like as indicated by the arrow; and vehicle 1 traveling in driving lane 39D on a highway or the like attempts to change lanes to driving lane 39E adjacent to the driving lane as indicated by the arrow in order to avoid vehicle 40 that is attempting to change lanes from merging lane 39C to driving lane 39D as indicated by the arrow.

[0159]

1557 In such a lane change situation, if there is a high risk of collision between vehicle 1 and surrounding vehicle 2, the situation is similar to Case A-2, Case B-4, Case D-4, and Case E-2 in the processing flows shown in Figures 13, 23, 27, and 30, so the explanation will be omitted.

[0160]

1564 On the other hand, in this twelfth embodiment, when the risk of collision between the vehicle 1 and the surrounding vehicle 2 is low, the vehicle 1 is attempting to change lanes as shown in FIG. 39 above.

[0161]

1570 Methods for determining whether the vehicle 1 is about to change lanes, i.e., whether it is at the start of a lane change or in the middle of a lane change, include a method of outputting Vy1 in the y direction (vehicle width direction speed) of the vehicle 1 from the host vehicle information output means 107 and determining whether this value is not 0, a determination method based on the behavior of the driver 3 employed in the previous Examples 10 to 12, a determination method based on whether the turn signal is flashing or not, and a determination based on the amount of rotation of the steering shaft.

[0162]

1580 Figure 40 is a flowchart showing the procedure for communicating the emergency earthquake warning 5 to the driver 3 when the vehicle 1 receives the emergency earthquake warning 5, the risk of collision with a surrounding vehicle 2 is determined to be low, and the vehicle 1 is attempting to change lanes.

[0163]

1587 In FIG. 40, first, the emergency earthquake warning 5 arrives at the vehicle 1 (step S4001), and the vehicle 1 blinks the hazard lamps 6 (step S4002), but does not blink the interior hazard lamps 14.

[0164]

1593 Thereafter, if it is determined that the risk of collision between vehicle 1 and the surrounding vehicle 2 is low (step S4003), and if it is determined by the above-mentioned determination method that vehicle 1 is at the start of or in the middle of changing lanes, the emergency earthquake warning 5 is not immediately notified to the driver 3 of vehicle 1.

1597 A predetermined time after the emergency earthquake warning arrives at the vehicle 1, the y direction (vehicle width direction speed) Vy1 of the vehicle 1 becomes 0, the blinker stops blinking, and the amount of steering wheel rotation becomes 0, so that it is determined that the lane change of the vehicle 1 is completed, and then the emergency earthquake warning 5 is transmitted to the driver 3.

[0165]

1605 As a result, in this embodiment 12, in addition to being able to obtain the same effects as the previous embodiments 1 and 2, it is also possible to prevent the driver 3 from panicking and being unable to make an appropriate lane change due to hearing the emergency earthquake warning 5 when starting to change lanes or while changing lanes.

[0166]

1612 Next, a thirteenth embodiment of the present invention will be described.

1613 In this embodiment 13, the configuration of the device, the method for determining the location of surrounding vehicles 2, the method for determining the risk of collision between vehicle 1 and surrounding vehicles 2, and the processing after transmitting the emergency earthquake warning 5 to the driver are the same as those in the previous embodiments 1 to 12, so they will not be described here.

[0167]

1621 By the vehicle 1 receiving the emergency earthquake warning 5, the emergency earthquake warning receiving means 102 can grasp the expected arrival time Ts(t) of the main wave (S wave), which changes with the elapsed time t after reception.

1624 In other words, as shown in FIG. 41, if the time required for earthquake countermeasures such as stopping vehicle 1 in preparation for an earthquake is Tc, then the emergency earthquake warning 5 needs to be transmitted to the driver 3 of vehicle 1 while the predicted S-wave arrival time Ts is longer than Tc.

[0168]

1631 Therefore, in this embodiment 13, as shown in the flowchart of Figure 42, after the emergency earthquake warning arrives at vehicle 1 (step S4201), each processing step S4202 adopted in the previous embodiments 1 to 12 is executed until the emergency earthquake warning 5 is transmitted to the driver 3 of vehicle 1, and during this execution, a judgment step S3203 is performed to judge whether Ts(t) is greater than Tc.

1636 If it is greater, each process continues; if it is not greater, the process steps connected to connector P1 are immediately executed in sequence; that is, as shown in FIG. 14, an Earthquake Early Warning 5 is transmitted to driver 3 of vehicle 1 by emergency

earthquake warning transmission means 103 (step S1402), and the driver is instructed to check the safety of the surroundings before stopping the vehicle, or to avoid entering dangerous areas such as tunnels and bridges that are likely to be dangerous in the event of an earthquake (step S1403), and then the process after transmitting the Earthquake Early Warning to driver 3 is executed (step S1404).

[0169]

1650 In this way, in this embodiment 13, by comparing Ts(t) and Tc, it is possible to reliably transmit the Emergency Earthquake Warning 5 to the driver 3 before the earthquake strikes. Even if the driver 3 panics upon hearing the Emergency Earthquake Warning 5 and suddenly brakes, steers, or accelerates, by carrying out the processing shown in Figure 14 after transmitting the Emergency Earthquake Warning 5 to the driver 3, it is possible to take earthquake countermeasures such as stopping the vehicle 1 before the earthquake strikes.

[0170]

1660 In the above-described first to thirteenth embodiments, the vehicle control device of the present invention has the following characteristics, and the following effects can be obtained by these characteristics.

[0171]

1666 (1) The collision risk determination means 108 is characterized in that it is a determination means for determining the collision risk with the surrounding vehicle 2 using the surrounding situation detection means 106 installed in the vehicle 1.

[0172]

1672 With the above-mentioned features, the risk of collision with surrounding vehicles is judged, and an emergency earthquake alert is sent to the driver 3 only after the risk of collision becomes small, thereby reducing the possibility of an accident occurring due to the driver 3 panicking and taking dangerous actions.

[0173]

1679 (2) The surrounding conditions detection means 106 is composed of external surrounding detection sensors such as cameras, radio wave sensors, and ultrasonic sensors installed at the front, sides, and rear of the vehicle 1, and is characterized as a detection means that detects the relative speed, relative acceleration, and relative distance between the vehicle 1 and surrounding vehicles 2.

[0174]

1687 Due to the above features, by using external surrounding detection sensors such as cameras, radio wave sensors, and ultrasonic sensors, it is possible to detect the relative speed, relative acceleration, relative distance, etc. between vehicle 1 and surrounding vehicles 2 with greater accuracy.

[0175]

1694 (3) The surrounding condition detection means 106 is composed of cameras, radio wave sensors, and ultrasonic sensors installed at the front, sides, and rear of the vehicle 1, and is characterized in that it functions as a surrounding vehicle presence position determination means that determines the presence position of the surrounding vehicle 2 relative to the vehicle 1.

[0176]

1702 With the above-mentioned features, the position of the surrounding vehicle 2 can be determined, and the collision risk can be appropriately determined.

[0177]

1707 (4) The surrounding vehicle presence position determination means is characterized in that it determines whether the surrounding vehicle 2 is straddling, in front of, or behind the front end line, side end line, rear end line, and vehicle width center line of the vehicle 1, and determines the presence position of the surrounding vehicle 2 relative to the vehicle 1.

[0178]

1714 Due to the above-mentioned features, the location of the surrounding vehicle 2 is determined based on the positional relationship between the front end line, side end line, rear end line, and vehicle width center line of the vehicle itself and the surrounding vehicles, so that the location of the surrounding vehicle 2 can be appropriately determined.

[0179]

1721 (5) The collision risk determined by the collision risk determination means 108 is characterized in that, for a rear nearby vehicle 2, the collision risk is a predicted collision time between vehicle 1 and the surrounding vehicle 2, which is calculated from the relative speed, relative acceleration, and relative distance between the surrounding vehicle 2 and vehicle 1, the speed and acceleration of vehicle 1, and a predetermined deceleration at the

time of sudden braking of vehicle 1.

[0180]

1735 The above features make it possible to calculate parameters for determining the risk of collision with a nearby vehicle 2 present behind the vehicle 1.

[0181]

1740 (6) The collision risk determined by the collision risk determination means 108 is characterized in that, for a surrounding vehicle 2 in front, the collision risk is a predicted collision time between vehicle 1 and the surrounding vehicle 2 calculated from the relative speed, relative acceleration, and relative distance between the surrounding vehicle 2 and vehicle 1, the speed and acceleration of vehicle 1, and a preset acceleration during rapid acceleration of vehicle 1.

[0182]

1749 The above features make it possible to calculate parameters for determining the risk of collision with a nearby vehicle 2 in front of the vehicle 1.

[0183]

1754 (7) The collision risk determined by the collision risk determination means 108 is characterized by being the speed of the vehicle 1 with respect to the nearby vehicle 2 on the side.

[0184]

1760 The above features make it possible to calculate parameters for determining the risk of collision with a nearby vehicle 2 present to the side of the vehicle 1.

[0185]

1765 (8) The collision risk determination means 108 is characterized in that it determines the collision risk by comparing the collision prediction time, the speed of the vehicle 1, a preset collision prediction time threshold, and a threshold for the speed of the vehicle 1.

[0186]

1771 Due to the above features, the collision risk between the vehicle 1 and the surrounding vehicle 2 can be appropriately determined.

[0187]

1776 (9) The vehicle control means 101 is characterized by including a lane change determination means for determining whether the vehicle 1 and the surrounding vehicles 2 are changing lanes.

[0188]

1782 Due to the above-mentioned features, when judging the collision risk, it is possible to judge the relative positional change in the vehicle width direction between the vehicle 1 and the surrounding vehicle 2, which changes from moment to moment.

[0189]

1788 (10) The vehicle control means is characterized in that it determines whether the vehicle 1 and the surrounding vehicle 2 are approaching or moving away from each other relatively in the forward/rearward direction.

[0190]

1794 Due to the above-mentioned features, when judging the collision risk, it is possible to judge the change in the relative position in the longitudinal direction between the vehicle 1 and the surrounding vehicle 2, which changes from moment to moment.

[0191]

1800 (11) The lane change determination means is characterized in that it determines whether vehicle 1 or surrounding vehicle 2 has started to change lanes or is in the middle of changing lanes by comparing the relative speed in the vehicle width direction between vehicle 1 and surrounding vehicle 2 with the speed in the vehicle width direction of vehicle 1.

[0192]

1808 Due to the above features, by comparing the vehicle width speed of the vehicle 1 with the relative vehicle width speed between the vehicle 1 and the surrounding vehicles 2, it is possible to appropriately determine whether the vehicle 1 and the surrounding vehicles 2 are changing lanes.

[0193]

(12) The lane change determination means is characterized in that it determines whether the vehicle 1 is about to start changing lanes or is currently changing lanes based on the speed of the vehicle 1 in the vehicle width direction.

[0194]

Due to the above-mentioned features, it is possible to appropriately determine whether the vehicle 1 is changing lanes based on the speed of the vehicle 1 in the vehicle width direction.

[0195]

(13) The lane change determination means is characterized in that it determines whether the vehicle 1 is at the start of a lane change or is in the middle of changing lanes based on the amount, frequency, and time of movement of the eyes or head of the driver 3 of the vehicle 1 when looking in the direction of a side mirror, etc., using a camera installed inside the vehicle 1.

[0196]

Due to the above-mentioned features, a camera installed inside the vehicle 1 can be used to detect the amount, frequency, and duration of movement of the eyes and head of the driver 3 of the vehicle 1 when looking in the direction of the side mirror, etc., thereby making it possible to more appropriately determine whether the vehicle 1 is changing lanes.

[0197]

(14) The lane change determination means is characterized in that it determines whether the vehicle 1 is about to start changing lanes or is currently changing lanes based on whether or not an interior turn signal lever of the vehicle 1 is operated.

[0198]

With the above-mentioned features, by detecting whether or not the turn signal lever of the vehicle 1 is operated, it is possible to more appropriately determine whether the vehicle 1 is changing lanes.

[0199]

(15) The lane change determination means is characterized in that it determines whether the vehicle 1 is about to start changing lanes or is currently changing lanes based on the amount of operation of the steering wheel of the vehicle 1.

[0200]

1850 With the above-mentioned features, by detecting the steering wheel operation amount of the vehicle 1, it is possible to more appropriately determine whether the vehicle 1 is changing lanes.

[0201]

1860 (16) The vehicle control means 101 is characterized in that it determines a change in the relative position between the vehicle 1 and the nearby vehicles 2 in the longitudinal direction based on the magnitude of the relative speed between the vehicle 1 and the nearby vehicles 2 in the longitudinal direction.

[0202]

1870 Due to the above-mentioned features, the change in the relative position between vehicle 1 and nearby vehicles 2 in the longitudinal direction can be appropriately determined based on the magnitude of the relative speed between vehicle 1 and nearby vehicles 2 in the longitudinal direction.

[0203]

1880 (17) The vehicle control means 101 is characterized in that it determines a change in the relative position between the vehicle 1 and the surrounding vehicle 2 in the longitudinal direction based on the acceleration of the vehicle 1 in the longitudinal direction.

[0204]

1890 Due to the above-mentioned features, the change in the relative position between vehicle 1 and nearby vehicle 2 in the longitudinal direction can be appropriately determined based on the magnitude of the acceleration in the longitudinal direction between vehicle 1 and nearby vehicle 2 .

[0205]

1895 (18) The vehicle control means 101 is characterized in that it determines the change in the relative position between vehicle 1 and surrounding vehicle 2 in the longitudinal direction from the longitudinal acceleration of vehicle 1 and the longitudinal acceleration of surrounding vehicle 2 calculated from the longitudinal acceleration of vehicle 1 and the relative longitudinal acceleration between vehicle 1 and surrounding vehicle 2.

[0206]

1902 Due to the above-mentioned features, the change in the relative position between the vehicle 1 and the surrounding vehicle 2 in the longitudinal direction can be appropriately determined based on the magnitude of the acceleration of the vehicle 1 in the longitudinal direction.

[0207]

1909 (19) The emergency earthquake warning transmission means 103 is characterized by being composed of voice output from a radio, a car navigation system, etc., earthquake lamps installed on an instrument panel or a room lamp, a hat mark displayed on an instrument panel screen or a front window, etc., a warning message displayed on the instrument panel screen, an interior hazard lamp, etc.

1914 Due to the above features, the emergency earthquake warning can be appropriately conveyed to the driver 3 of the vehicle 1.

[0208]

1919 (20) The vehicle control means 101 is equipped with an occupant status determination means, which is characterized in that when the surrounding condition detection means 106, such as a camera, a radio wave sensor, or an ultrasonic sensor installed at the front, side, or rear of the vehicle 1, determines that there is no obstacle to be avoided in front of the vehicle 1, the occupant status determination means determines whether the driver 3 has panicked based on whether at least one of the driver 3's operation amounts of the brake, steering wheel, or accelerator is greater than a predetermined operation amount threshold.

[0209]

1929 Due to the above-mentioned features, when there is no obstacle to be avoided ahead of the vehicle 1, it is possible to determine whether the driver 3 has suddenly braked, steered the wheel, or accelerated, thereby making it possible to appropriately determine whether the driver has panicked upon hearing the Earthquake Early Warning.

[0210]

1936 (21) The occupant status determination means is characterized in that when it determines that there is an obstacle to be avoided in front of the vehicle 1 by the surrounding condition detection means 106 such as a camera, a radio wave sensor, an ultrasonic sensor, etc. installed at the front, side, or rear of the vehicle 1, it determines whether the driver has panicked or not based on whether the amount of accelerator operation by the driver is greater than a predetermined threshold value for the amount of operation.

[0211]

1945 Due to the above-mentioned features, when there is an obstacle ahead of the vehicle 1 that needs to be avoided, it is possible to determine whether the driver 3 has suddenly accelerated, thereby making it possible to appropriately determine whether the driver has panicked upon hearing the emergency earthquake warning.

[0212]

1952 (22) The occupant status determination means is characterized in that, when it determines that there is no obstacle to be avoided in front of the vehicle 1 by the surrounding condition detection means 106 such as a camera, a radio wave sensor, an ultrasonic sensor, etc. installed at the front, side, and rear of the vehicle 1, it determines whether the driver 3 has panicked or not based on whether the driver 3 has applied the brakes or steering to avoid the obstacle.

[0213]

1961 With the above-mentioned features, when there is no obstacle to be avoided ahead of the vehicle 1, it is possible to appropriately determine whether the driver panicked upon hearing the Emergency Earthquake Warning, based on whether the driver applied the brakes or steered to avoid the obstacle.

[0214]

1968 (23) The vehicle control means 101 is equipped with an operation output control means, which is characterized in that when the surrounding condition detection means 106, such as a camera, a radio wave sensor, an ultrasonic sensor, etc. installed at the front, side, and rear of the vehicle 1, determines that there is no obstacle to be avoided in front of the vehicle 1, it controls the braking force, steering amount, and driving force output in response to the driver's sudden braking, sudden steering, and sudden acceleration operations.

[0215]

1978 With the above-mentioned features, when there is no obstacle ahead of the vehicle 1 that needs to be avoided, the brakes, steering, and accelerator can be controlled to prevent the driver from panicking upon hearing an emergency earthquake warning and taking dangerous actions such as sudden braking, sudden steering, or sudden acceleration, causing the vehicle 1 to fall into a dangerous situation.

[0216]

1987 (24) The operation output control means is characterized in that when the surrounding condition detection means 106, such as a camera, a radio wave sensor, an ultrasonic sensor, etc. installed at the front, side, and rear of the vehicle 1, determines that there is an obstacle to be avoided in front of the vehicle 1, the operation output control means controls the driving force output in response to a sudden accelerator operation by the driver.

[0217]

1995 With the above-mentioned features, when there is an obstacle ahead of the vehicle 1 that needs to be avoided, the accelerator is controlled to prevent the driver from panicking upon hearing the emergency earthquake alert and taking dangerous actions such as sudden braking, sudden steering, or sudden acceleration, which would put the vehicle 1 into a dangerous situation.

[0218]

2003 (25) The operation output control means is characterized in that when the surrounding vehicle presence position determination means determines that the surrounding vehicle 2 is in front of the vehicle 1 and the collision risk determination means 108 determines that there is a high risk of collision between the vehicle 1 and the surrounding vehicle 2, the operation output control means applies automatic braking.

[0219]

2011 Due to the above-mentioned features, when a collision risk assessment is made and it is determined that the surrounding vehicle 2 is in the forward direction and the collision risk is high, the vehicle 1 can apply automatic braking to actively move the surrounding vehicle 2 in front relatively further forward of the vehicle 1, thereby quickly reducing the collision risk.

[0220]

2019 (26) The operation output control means is characterized in that when the surrounding condition detection means 106, such as a camera, a radio wave sensor, or an ultrasonic sensor installed at the front, side, or rear of the vehicle 1, determines that there is an obstacle to be avoided in front of the vehicle 1, the operation output control means applies preview braking, such as eliminating brake play.

[0221]

2027 Due to the above-mentioned features, when there is an obstacle to be avoided ahead of the vehicle 1, the obstacle can be quickly avoided by applying preview braking, such as by eliminating brake play.

[0222]

2033 (27) The operation output control means is characterized in that when the surrounding vehicle presence position determination means determines that the surrounding vehicle 2 is in front of the vehicle 1 and the collision risk determination means 108 determines that there is a high risk of collision between the vehicle 1 and the surrounding vehicle 2, the operation output control means applies preview braking, such as eliminating brake play.

[0223]

2041 Due to the above-mentioned features, when judging the risk of collision, if it is judged that a nearby vehicle 2 is in front of vehicle 1, preview braking, such as by eliminating brake play, can be applied, allowing for a more rapid response even if the vehicle in front suddenly brakes after hearing the emergency earthquake warning.

[0224]

2048 (28) The operation output control means is characterized in that, when the occupant state determination means determines that the driver 3 did not panic upon hearing the emergency earthquake warning, the operation output control means releases the control of the brakes, steering wheel, and accelerator that were previously controlled.

[0225]

2055 Due to the above-mentioned features, if the driver does not panic when hearing the emergency earthquake warning, by releasing the control of the brakes, steering wheel, and accelerator, the driver can take appropriate earthquake countermeasures, such as stopping the vehicle 1 while checking the safety of the surroundings before the earthquake strikes.

[0226]

2062 (29) The operation output control means is characterized in that, when the occupant state determination means determines that the driver has panicked upon hearing the emergency earthquake warning, the operation output control means performs automatic driving.

[0227]

2068 Due to the above-mentioned features, if the driver panics upon hearing an emergency

earthquake warning, vehicle 1 will switch to automatic driving, and if there is no obstacle in front of vehicle 1 that needs to be avoided, vehicle 1 will be able to stop vehicle 1 in automatic driving mode before the earthquake arrives, while checking for safety of the surroundings using surrounding condition detection means 106 such as cameras, radio wave sensors, ultrasonic sensors, etc. installed on the front, sides, and rear of vehicle 1.

2070 Furthermore, if an obstacle to be avoided is in front of vehicle 1, the vehicle can avoid the obstacle while checking for safety of the surroundings using surrounding condition detection means 106 such as cameras, radio wave sensors, and ultrasonic sensors installed at the front, sides, and rear of vehicle 1, and can also stop vehicle 1 by automatic driving before the earthquake arrives.

[0228]

2083 1 is a diagram showing a configuration of a vehicle control device according to a first embodiment of the present invention;

2085 FIG. 1 is a diagram showing a state in which an emergency earthquake alert is received.

2086 1A to 1C are diagrams showing examples of the arrangement of cameras, radio wave sensors, ultrasonic sensors, etc., installed at the front, sides, and rear of a vehicle.

2088 FIG. 1 is a diagram showing how an emergency earthquake warning is transmitted.

2089 FIG. 2 is a diagram showing an area in which surrounding vehicles exist;

2090 5 is a flowchart showing a procedure for determining the location of nearby vehicles.

2091 FIG. 2 is a diagram showing surrounding vehicles present in each area.

2092 FIG. 11 is a diagram relating to processing when a nearby vehicle is present in areas A and B.

2093 FIG. 11 is a diagram relating to processing when a nearby vehicle is present in areas D and E.

2094 11 is a flowchart showing a procedure for determining each case.

2095 11 is a diagram showing a change in the relative position between the vehicle 1 and the surrounding vehicle 2 when it is determined to be Case A in the first embodiment. FIG.

2097 11 is a diagram showing a change in the relative position between the vehicle 1 and the surrounding vehicle 2 when it is determined to be Case A in the first embodiment. FIG.

2099 11 is a flowchart showing a processing procedure related to Case A according to the first embodiment;

2101 10 is a flowchart showing a processing procedure from a result of a collision risk determination to a notification of an emergency earthquake alert to a driver.

2103 FIG. 13 is a diagram showing an image in which the risk of collision with a rear vehicle is reduced.

2105 FIG. 4 is a diagram showing the characteristics of an automatic brake.

2106 FIG. 13 is a diagram showing an image in which the risk of collision with a forward vehicle is reduced more quickly.

2108 11 is a flowchart showing a processing procedure after an emergency earthquake alert is notified to a driver when there is no obstacle ahead.

2110 FIG. 4 is a diagram showing changes in output with respect to each driving operation amount.

2112 11 is a flowchart showing a processing procedure after an emergency earthquake alert is notified to a driver when an obstacle is present ahead.

2112 FIG. 13 is a diagram showing the characteristics of a preview brake.

2113 13 is a diagram showing a change in the relative position between the vehicle 1 and the surrounding vehicle 2 when it is determined to be Case B in the third embodiment. FIG.

2117 13 is a flowchart showing a processing procedure related to Case B according to the third embodiment.

2119 13 is a diagram showing a change in the relative position between the vehicle 1 and the surrounding vehicle 2 when it is determined to be Case C according to the fourth embodiment. FIG.

2122 13 is a flowchart showing a processing procedure related to Case C according to the fourth embodiment;

2124 13 is a diagram showing a change in the relative position between the vehicle 1 and the surrounding vehicle 2 when it is determined to be Case D in the fifth embodiment. FIG.

2126 13 is a flowchart illustrating a processing procedure related to Case D according to the fifth embodiment.

2128 13 is a diagram showing a change in the relative position between the vehicle 1 and the surrounding vehicle 2 when it is determined to be Case E in the sixth embodiment. FIG.

2130 13 is a diagram showing a change in the relative position between the vehicle 1 and the surrounding vehicle 2 when it is determined to be Case E in the sixth embodiment. FIG.

2132 13 is a flowchart showing a processing procedure related to Case E according to the sixth embodiment.

2134 FIG. 23 is a diagram showing the positions of nearby vehicles according to an eighth embodiment;

2136 FIG. 23 is a diagram showing a processing procedure after receiving an emergency earthquake warning in accordance with an eighth embodiment.

2138 13 is a flowchart showing a processing procedure according to an eighth embodiment.

2139 FIG. 13 is a diagram showing a configuration of a vehicle control device according to a ninth embodiment of the present invention.

2141 FIG. 2 is a diagram showing an example of the arrangement of cameras installed in a vehicle interior;

2143 This is a diagram that visualizes the driver's eye and head movements.

2144 FIG. 16 is a diagram showing a configuration of a vehicle control device according to a tenth embodiment of the present invention.

2146 FIG. 4 is a diagram showing the arrangement of a turn signal lever.

2147 FIG. 23 is a diagram showing an example in which a vehicle 1 according to a twelfth embodiment of the present invention changes lanes.

2149 23 is a flowchart showing a processing procedure according to a twelfth embodiment.

2150 FIG. 11 is a diagram showing the time when an emergency earthquake alert should be notified to a driver.

2152 0)

2153 23 is a flowchart showing a processing procedure according to a thirteenth embodiment.

2154 Explanation of symbols

[0229]

2158 REFERENCE SIGNS LIST 101: Vehicle control means 102: Emergency earthquake warning receiving means 103: Emergency earthquake warning transmission means 104: Alarm means 105: Memory 106: Surrounding condition detection means 107: Vehicle information output means 108: Collision risk determination means 109: Operation amount detection means 110: Operation risk determination means 111: Driving operation control means 112: Interior condition detection means 113: Image processing means 114: Direction indication means

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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	**07/22/2024 04:27:07 PM Z ET**	**012644_00013_PRV_UTL**

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	Jennalee Phillips
PATENT CENTER #	66443099	FILING DATE	08/12/2020
CUSTOMER #	28827	FIRST NAMED INVENTOR	DAVID M. TUCKER
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	David Woodral

Documents

TOTAL DOCUMENTS: 6

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
IDS Statement 4889-9145-6466 v.2.pdf	1	Letter specifying the conditions for filing under 37 CFR 1.97	89 KB
2024-07-19_RCE.pdf	3	Request for Continued Examination (RCE)	1292 KB
WO2012-071054.pdf	33	Foreign Reference	1442 KB
JP2014-500550.pdf	26	Foreign Reference	19792 KB
JP2010152648.pdf	93	Foreign Reference	14649 KB
IDS 2024-07-19.pdf	5	Information Disclosure Statement (IDS) Form (SB08)	983 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
IDS Statement 4889-9145-6466 v.2.pdf	B0AF8AC9C58B8FE5ADD04E99DA21BA15E9B337F9CB1A2BD7E3916983709E2FF064E8498E9419EA2C0DE5816EA02F101556FAB7E5D9501E9738D135148F9B6065
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CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	DAVID M. TUCKER

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 2001	E20247LG27565807	Jennalee Phillips

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2820	REQUEST FOR CONTINUED EXAMINATION (RCE)- 2ND AND SUBSEQUENT REQUEST (SEE 37 CFR 1.114)	800.00	1	800.00
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10124757		2018-11-13	Kerr et al	
	2	7404372		2008-07-29	Aasgaard	
	3	8099113	B2	2012-01-17	Morrison	
	4	8126479	B2	2012-02-28	Morrison	
	5	8126480	B2	2012-02-28	Morrison	
	6	8301112	B2	2012-10-30	Morrison	
	7	8306503	B2	2012-11-06	Morrison	
	8	8306555	B2	2012-11-06	Morrison	

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	9	8423048	B2	2013-04-16	Morrison	
	10	8594707	B2	2013-11-26	Morrison	
	11	9333913	B1	2016-05-10	Elders et al	
	12	9679487	B1	2017-06-13	Hayward	
	13	9778349	B2	2017-10-03	Probert, et al.	
	14	9986401		2018-05-29	El Dinary	
	15	US10171980	B2	2019-01-01	Friesen	
	16	US4238778		1980-12-09	Ohsumi	
	17	US5572201		1996-11-05	Graham, et al.	
	18	US6590507	B2	2003-07-08	Burns	
	19	US6895332	B2	2005-05-17	King, et al.	

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	20	US7113107	B2	2006-09-26	Taylor	
	21	US7679505	B1	2010-03-16	Vallaire	
	22	US8032273	B2	2011-10-04	Yang, et al.	
	23	US8223037	B2	2012-07-17	Grotendorst et al.	
	24	US8275347	B2		Sennett, et al.	
	25	US8483651	B1	2013-07-09	Zamora et al.	
	26	US8738025	B2	2014-05-27	Hampel, et al.	
	27	US9111447	B2	2015-08-18	Holland	
	28	US9224294		2015-12-29	St. John	
	29	US9398619	B1	2016-07-19	Sennett, et al.	
	30	US9980108	B2	2018-05-22	Hepworth, et al.	

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	1	20050072350		2005-04-07	Aasgaard	
	2	20140227991		2014-08-14	Breton, et al.	
	3	20140301101		2014-10-09	Russ	
	4	20160039339		2016-02-11	Engel et al	
	5	20160210858	A1	2016-07-21	Foster, et al.	
	6	20160355123		2016-12-08	Oooka	
	7	20170259734		2017-09-14	Imaishi et al	
	8	20180304886		2018-10-25	Tannenbaum	
	9	20190080598	A1	2019-03-14	Walsh, et al.	

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	10	20210056842	A1	2021-02-25	Walsh, et al.	
	11	20220051340		2022-02-17	Rose et al	
	12	20230298465	A1	2023-09-21	Walsh, et al.	
	13	US200301419	A1	2003-07-31	Coon	
	14	20060273126		2006-12-07	Pedrini	
	15	US201001598	A1	2010-06-24	Tester	
	16	US201002501	A1	2010-09-30	Gutierrez, et al.	
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	18	US201201762	A1	2012-07-12	Imanaga, et al.	
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	20	US201400851	A1	2014-03-27	Gutierrez	

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	1	1702CHE2005			2007-09-14	Deepa, et al.		☐
	2	2005170311	JP	A	2005-06-30	Kazuhiko et al		☒
	3	2016222171	JP	A	2016-12-28	Oooka et al		☐
	4	2018536569	JP	A	2015-12-21	Janesick		☐
	5	H00439939	JP	U	1992-04-06	Jitsugan		☐
	6	WO2002011100		A1	2001-07-28	Kussmann		☒

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	AL-SULTAN, ET AL., "A comprehensive survey on vehicular Ad Hoc network", Journal of Network and Computer Applications, 06/20/2012, Page(s) 380-392, Volume 37, Publisher: Elsevier Ltd.	☐

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	2	BISWAS, ET AL., "Vehicle-to-Vehicle Wireless Communication Protocols for Enhancing Highway Traffic Safety", IEEE Communications Magazine, 01/00/2006, Page(s) 74-82	☐
	3	BOUKERCHE, ET AL., "Vehicular Ad Hoc Networks: A New Challenge for Ad Hoc Networks: A New Challenge for", Science Direct, 01/07/2008, Page(s) 2838-2849, Volume 31, Publisher: Elsevier B.V.	☐
	4	BRAUN, "Intelligent transportation systems: mirage or reality?", Microwave Journal, 08/00/1997, Volume 40.8, Number 22(9), Publisher: Horizon House Publications, Inc.	☐
	5	BUCHENSCHEIT, ET AL., "A VANET-based Emergency Vehicle Warning System", 00/00/2009, Page(s) 28-4-1-1-28-4-1-8	☐
	6	CABALLERO-GIL, ET AL., "Design and Implementation of an Application for Deploying Vehicular Networks with Smartphones", International Journal of Distributed Sensor Networks, 05/11/2013, Page(s) 10, Volume 2013, Publisher: Hindawi Publishing Corporation	☐
	7	CALNAN, "Jacksonville, Fla., Man's Device Would Warn Drivers about Emergency Vehicles", 12/05/2003, Publisher: Tribune Content Agency LLC	☐
	8	CHEN, ET AL., "A Mobicast Routing Protocol in Vehicular Ad-Hoc Networks", 00/00/2009, Publisher: IEEE GLOBECOM	☐
	9	CHEUNG, ET AL., "R5_Vehicle to Infrastructure Technology Applications in Queensland", National Asset Centre of Excellence, 05/00/2014, Page(s) 1-88	☐
	10	DJAHEL, ET AL., "Adaptive Traffic Management for Secure and Efficient Emergency Services in Smart Cities",	☐
	11	ELLERY, "1,000 gadget that lets speeders spot police cars half a mile away: Device blasted by police as a possport to villainy", 12/13/2014, Publisher: Daily Mail.com	☐
	12	HARDING, ET AL., "Vehicle-to-Vehicle Communications:Readiness of V2V Technology for Application", Report No. DOT HS 812 014, 08/00/2014, Page(s) 1-327, Publisher: Washington, DC: National Highway Traffic Safety Administration	☐

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	13	MILLER, "Alert system is one cool tool", The Intelligencer, 10/01/2011, Publisher: Postmedia Network Inc.	☐
	14	KAKKASAGERI, ET AL., "Information Managment In Vehicular Ad Hoc Networks: A Review", Journal ofNetwork and Computer Applications, 00/00/2014, Page(s) 334-350, Volume 39, Publisher: Elsevier Ltd	☐
	15	LEE, ET AL., "Impact of Vehicular Networks on Emergency Medical Services in Urban Areas", International Journal of Environmental Research and Public Health, 11/00/2014, Page(s) 11348-70, Volume 11, Number 11	☐
	16	MARTINEZ, ET AL., "Emergency Services in Future Intellegent Transportation Systems Based on Vehicular Communication Networks", IEEE Intelligent Transportation Systems Magazine, 02/00/2010, Page(s) 6-20	☐
	17	NZOUONTA, "ROAD-BASED ROUTING IN VEHICULAR AD HOC NETWORKS", New Jersey Institute of Technology - Department of Computer Sciences, 05/00/2009, Page(s) 1-164	☐
	18	, "Volvo Car Corporation Improves Safety with Communicating Cars", 10/22/2012, Publisher: Targeted News Service	☐
	19	UMEDU, ET AL., "An Intervehicular-Communication Protocol for", IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, 02/00/2010, Page(s) 627-637, Volume 59, Number 2	☐
	20	WANG, ET AL., "A Multi-Agent Based Vehicles Re-routing System for Unexpected Traffic Congestion Avoidance", 10/08/2014, Page(s) 2541-2548	☐
	21	WANG, ET AL., "Design and Implementation of an Emergency Vehicle Signal Preemption System Based on Cooperative Vehicle-Infrastructure Technology", Advances in Mechanical Engineering, 08/19/2013, Page(s) 10, Volume 2013, Number 834976, Publisher: Hindawi Publishing Corporation	☐
	22	WEINSTEIN, "Device would take alarm out of sirens Two York men are working on a system that would alert drivers to ambulances", York Daily Record, 12/02/1996, Publisher: Gannett Media Corp	☐
	23	WHITE, ET AL., "Wreck Watch: Automatic Traffic Accident Detection and Notification with Smartphones", Mobile Netw Appl, , Page(s) 285-303, Number 16	☐

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	24	, IEEE COMMUNICATIONS SURVEYS & TUTORIALS, 00/00/2009, Page(s) 1-20, Volume 11, Number 2	☐
	25	YANG, ET AL., "A Vehicle-to-Vehicle Communication Protocol for Cooperative Collision Warning", IEEE Computer Society, 00/00/2004, Page(s) 1-10	☐
	26	XIAOSI ZENG, "POTENTIAL CONNECTED VEHICLE APPLICATIONS TO ENHANCE MOBILITY, SAFETY, AND ENVIRONMENTAL SECURITY", 02/00/2012, Page(s) 1-71, Publisher: Southwest Region University Transportation Center	☐

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EXAMINER SIGNATURE

Examiner Signature	/MACEEH ANWARI/	Date Considered	05/31/2024

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2024-04-17
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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EXAMINER	
ANWARI, MACEEH	
ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 06/11/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

TITLE OF INVENTION: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	09/11/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

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HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

TITLE OF INVENTION: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	09/11/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
ANWARI, MACEEH	3663	701-117000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via the USPTO patent electronic filing system ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

28827 7590 06/11/2024

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

EXAMINER	
ANWARI, MACEEH	
ART UNIT	**PAPER NUMBER**
3663	

DATE MAILED: 06/11/2024

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).
https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 16/991,595	Applicant(s) TUCKER et al.	
	Examiner MACEEH ANWARI	Art Unit 3663	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 3/22/2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 26-28,30-33 and 35 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/MACEEH ANWARI/
Primary Examiner, Art Unit 3663

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MACEEH ANWARI	3663

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
((G08G1/162 OR B60K35/00 OR B60Q1/30 OR B60Q1/46 OR B60Q9/008 OR B60W30/0956 OR B60W30/16 OR B60W50/14 OR G01S19/42 OR G08G1/22 OR H04B1/3822 OR B60K2370/1529 OR B60K2370/178 OR B60W2050/146 OR B60W2420/42 OR B60W2556/65 OR B60K2370/1868 OR B60K2370/193 OR B60K2370/21 OR B60K2370/5915 OR B60W2556/45 OR B60W2556/50 OR B60K37/00 OR G08G1/0962 OR G08G1/096791 OR B60Q1/525).cpc.)	08/15/2022	TS

US Classification - Searched*			
Class	Subclass	Date	Examiner
701	117	02/21/2023	MA

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

	/MACEEH ANWARI/ Primary Examiner, Art Unit 3663

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MACEEH ANWARI	3663

Search Notes		
Search Notes	**Date**	**Examiner**
Performed Inventor and Assignee Search	08/15/2022	
Performed CPC search	08/15/2022	
Performed Text search	08/15/2022	
Combined CPC and text search	08/16/2022	
Refined Text search	08/16/2022	
Refined Text search	08/17/2022	
(Update search)	02/21/2023	MA
(Update search)	05/31/2024	MA

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
	Text search of: USPAT, USPGPUB.	05/31/2024	MA

	/MACEEH ANWARI/ Primary Examiner, Art Unit 3663

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MACEEH ANWARI	3663

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/12/2020	02/21/2023	05/31/2024						
-	1	✓	✓	-						
-	2	✓	✓	-						
-	3	✓	✓	-						
-	4	✓	-	-						
-	5	✓	✓	-						
-	6	✓	✓	-						
-	7	✓	✓	-						
-	8	✓	✓	-						
-	9	✓	✓	-						
-	10	✓	✓	-						
-	11	✓	✓	-						
-	12	✓	✓	-						
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-	25	✓	-	-						
1	26	✓	✓	=						
2	27	✓	✓	=						
3	28	✓	✓	=						
-	29	✓	-	-						
4	30	✓	✓	=						
5	31	✓	✓	=						
6	32	✓	✓	=						
7	33	✓	✓	=						
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-	37	✓	-	-						
-	38	✓	-	-						
-	39	✓	-	-						
-	40	✓	-	-						
-	41		✓	-						

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	**Art Unit**
	MACEEH ANWARI	3663

CPC						
Symbol					**Type**	**Version**
B60Q	/	1	/	525	F	2013-01-01
G08G	/	1	/	162	I	2013-01-01
B60K	/	35	/	00	I	2013-01-01
G01S	/	19	/	42	I	2013-01-01
B60Q	/	9	/	008	I	2013-01-01
B60W	/	30	/	16	I	2013-01-01
B60W	/	50	/	14	I	2013-01-01
B60Q	/	1	/	46	I	2013-01-01
B60W	/	30	/	0956	I	2013-01-01
H04B	/	1	/	3822	I	2013-01-01
G08G	/	1	/	22	I	2013-01-01
B60W	/	2050	/	146	A	2013-01-01
B60W	/	2556	/	65	A	2020-02-01
B60W	/	2420	/	403	A	2013-01-01
B60K	/	35	/	23	A	2024-01-01
B60K	/	35	/	28	A	2024-01-01
B60K	/	2360	/	178	A	2024-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	8	
/MACEEH ANWARI/ Primary Examiner, Art Unit 3663	31 May 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	**Art Unit**
	MACEEH ANWARI	3663

INTERNATIONAL CLASSIFICATION				
CLAIMED				
B60Q1/50	/	1	/	50
G08G1/16	/	1	/	16
B60K35/00	/	35	/	00
G01S19/42	/	19	/	42
B60Q9/00	/	9	/	00
B60W30/16	/	30	/	16
B60W50/14	/	50	/	14
B60Q1/46	/	1	/	46
B60W30/095	/	30	/	095
H04B1/3822	/	1	/	3822
G08G1/00	/	1	/	00
B60K35/23	/	35	/	23
B60K35/28	/	35	/	28

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
701	117

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 8	
/MACEEH ANWARI/ Primary Examiner, Art Unit 3663 (Primary Examiner) 31 May 2024 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office Part of Paper No.: 20240531

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	**Art Unit**
	MACEEH ANWARI	3663

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
-	1	-	10	-	19	3	28	-	37						
-	2	-	11	-	20	-	29	-	38						
-	3	-	12	-	21	4	30	-	39						
-	4	-	13	-	22	5	31	-	40						
-	5	-	14	-	23	6	32	-	41						
-	6	-	15	-	24	7	33								
-	7	-	16	-	25	-	34								
-	8	-	17	1	26	8	35								
-	9	-	18	2	27	-	36								

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 8	
/MACEEH ANWARI/ Primary Examiner, Art Unit 3663 (Primary Examiner)	31 May 2024 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office Part of Paper No.: 20240531

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10217357		2019-02-26	Elsheemy	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20180281782		2018-10-04	Salter et al	

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	1							

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.A/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	1		

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/MACEEH ANWARI/	Date Considered	05/31/2024

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.A/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-03-22
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.A/

Privacy Act Statement

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Application Number	16991595
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First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10124757		2018-11-13	Kerr et al	
	2	7404372		2008-07-29	Aasgaard	
	3	8099113	B2	2012-01-17	Morrison	
	4	8126479	B2	2012-02-28	Morrison	
	5	8126480	B2	2012-02-28	Morrison	
	6	8301112	B2	2012-10-30	Morrison	
	7	8306503	B2	2012-11-06	Morrison	
	8	8306555	B2	2012-11-06	Morrison	

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	1	20050072350		2005-04-07	Aasgaard	
	2	20140227991		2014-08-14	Breton, et al.	
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	1	1702CHE2005			2007-09-14	Deepa, et al.		☐
	2	2005170311	JP	A	2005-06-30	Kazuhiko et al		☒
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	1	AL-SULTAN, ET AL., "A comprehensive survey on vehicular Ad Hoc network", Journal of Network and Computer Applications, 06/20/2012, Page(s) 380-392, Volume 37, Publisher: Elsevier Ltd.	☐

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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Name/Print	Woodral, David G.	Registration Number	57277

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	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-07-28
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.A/

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10891858	B2	2021-01-12	Walsh, Michael	
	2	11135968		2021-10-05	Cobb et al	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20110196566		2011-08-11	Slater	

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	1	BG66564B1			2017-03-31	DIMILOR		
	2	WO2016118575		A1	2016-07-28	Foster, Ginny		

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	Application Number	16991595
	Filing Date	2020-08-12
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
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EXAMINER SIGNATURE

Examiner Signature	/MACEEH ANWARI/	Date Considered	05/31/2024

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Application Number	16991595
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Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-07-28
Name/Print	Woodral, David G.	Registration Number	57277

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L2	4979	701/117.ccls.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:22 PM
L3	4925	2 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:23 PM
L4	54	2 NOT 3	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:23 PM
L5	387129	(G08G1/162 or B60K35/00 or B60Q1/30 or B60Q1/46 or B60Q9/008 or B60W30/0956 or B60W30/16 or B60W50/14 or G01S19/42 or G08G1/22 or H04B1/3822 or B60K2370/1529 or B60K2370/178 or B60W2050/146 or B60W2420/42 or B60W2556/65 or B60K2370/1868 or B60K2370/193 or B60K2370/21 or B60K2370/5915 or B60W2556/45 or B60W2556/50 or B60K37/00 or G08G1/0962 or G08G1/096791 or B60Q1/525).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:23 PM
L6	309726	5 AND (@ad<"20190812"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2023/02/17 12:24 PM

		@rlad<"20190812")	AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L7	77403	5 NOT 6	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:24 PM
L8	29	(ESS$-HELP$-INC$).AS.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:25 PM
L9	11	8 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:25 PM
L10	18	8 NOT 9	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:25 PM
L11	173	((TUCKER$-DAVID$-M$)(POWERS$-STEPHEN$-T$)(INCORVAIA$-MIKE$)(TUCKER$-AUSTIN$)).IN.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:26 PM
L12	114	11 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:26 PM
L13	59	11 NOT 12	(US-PGPUB; USPAT;	OR	ON	ON	2023/02/17

			USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				12:27 PM
L14	138	("20140306826" OR "20140375810" OR "20150061895" OR "20150314723" OR "20170246987" OR "20190210515" OR "20190279447" OR "20190283693" OR "20200189446" OR "20200189453" OR "8405498" OR "9481331" OR "9616810" OR "20120043888" OR "20170072835" OR "10173674" OR "10351050" OR "10598332" OR "20060043433" OR "20090045754" OR "20110205521" OR "20130054087" OR "20150151671" OR "20160039336" OR "20160152176" OR "20160257243" OR "20160339837" OR "20170080850" OR "20170243450" OR "20170274816" OR "20170352274" OR "20180056857" OR "20180061225" OR "20180094777" OR "20190234601" OR "20190361453" OR "20200094734" OR "20200236745" OR "7046160" OR "9494940" OR "9643533" OR "20120268262" OR "20120313792" OR "20130141251" OR "20130229289" OR "20170124876" OR "10055985" OR "20020036908" OR "20020078879" OR "20020105432" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/02/17 12:27 PM

		"20030001728" OR "20030132852" OR "20040100373" OR "20040257214" OR "20050099286" OR "20050134448" OR "20060022520" OR "20060125616" OR "20060209547" OR "20070142977" OR "20070159319" OR "20070194905" OR "20080100432" OR "20090219150" OR "20090322508" OR "20100109859" OR "20100134271" OR "20100225465" OR "20100253499" OR "20120185130" OR "20130093582" OR "20130190985" OR "20140055619" OR "20140146552" OR "20140149025" OR "20140300462" OR "20140361686" OR "20140368324" OR "20150061492" OR "20150088397" OR "20150116133" OR "20150127212" OR "20160144778" OR "20170274819" OR "20170305349" OR "20170364070" OR "3553644" OR "4176340" OR "4227174" OR "4357594" OR "4550305" OR "4981363" OR "5043699" OR "5264826" OR "5374920" OR "5434758" OR "5481243" OR "5510763" OR "5515026" OR "5519389" OR "5646385" OR "5736925" OR "5775712" OR "5850177" OR "6023221" OR "6025775" OR "6028512" OR "6078145" OR					

		"6081188" OR "6181243" OR "6229438" OR "6323766" OR "6351211" OR "6397133" OR "6420799" OR "6445289" OR "6456206" OR "6515584" OR "6623151" OR "6674182" OR "6744359" OR "6842111" OR "6858986" OR "6879251" OR "6922137" OR "7119672" OR "7150554" OR "7199704" OR "7455139" OR "7852203" OR "7961086" OR "8049610" OR "8319662" OR "8393750" OR "8398284" OR "8415901" OR "8669853" OR "8903617").pn.					
L17	505	14 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:29 PM
L18	9	14 NOT 17	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:29 PM
L19	2	"20090219150".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:19 PM
L20	2	"20190248364".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP,	OR	ON	ON	2023/02/17 01:33 PM

			AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L21	810	((brok$3 stop$4) near6(vehicle) near8(ahead up$front) near10(warn$4 notif$8))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:49 PM
L22	39	((brok$3 stop$4) near6(vehicle) near8(ahead up$front) near10(warn$4 notif$8)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:49 PM
L23	33	22 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:49 PM
L24	1	"20130229289".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:55 PM
L25	1	14 AND ((brok$3 stop$4) near6(vehicle) near8(ahead up$front) near10(warn$4 notif$8))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:02 PM
L26	2236	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(approach$ incom4) near10(vehicle automobile))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:05 PM
L27	803	((brok$3 stop$4)	(US-PGPUB; USPAT;	OR	ON	ON	2023/02/17

		near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile))	USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				02:06 PM
L28	78	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:06 PM
L29	61	28 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:06 PM
L30	0	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile) near10(potential upcom4 imminent possible) near10(rear$end collision)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:08 PM
L31	4	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile) near10(potential upcom4 imminent possible) near10(rear$end collision))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:08 PM
L32	4	31 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2023/02/17 02:09 PM

			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L33	24	("10074274" OR "10127813" OR "10147247" OR "10147318" OR "10194484" OR "10204517" OR "10386195" OR "10424203" OR "10818167" OR "20050239436" OR "20070063824" OR "20070159354" OR "20090189754" OR "20130147955" OR "20190051156" OR "20210287543" OR "6160493" OR "8198991" OR "8350721" OR "8599039" OR "8842021" OR "8947219" OR "8952830" OR "9792817").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/02/21 12:25 PM
L34	13988	(two$way near8(communication connection warn$4 aler$4 alarm$4) near8(vehicle))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/21 12:31 PM
L36	0	34 AND 33	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/21 12:31 PM
L37	19	33 AND ((communication connection warn$4 aler$4 alarm$4) near8(((on$com$4)(approach$4)) near10 vehicle))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/21 12:33 PM
L38	2	"20210287543".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD,	OR	ON	ON	2023/03/22 10:08 AM

			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L39	9	"10217357".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:14 PM
L40	2	"20180281782".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:15 PM
L42	5262	701/117.ccls.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L43	4988	2 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L44	274	2 NOT 3	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L45	413893	(G08G1/162 or B60K35/00 or B60Q1/30 or B60Q1/46 or B60Q9/008 or B60W30/0956 or B60W30/16 or B60W50/14 or G01S19/42 or G08G1/22 or H04B1/3822 or B60K2370/1529 or	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM

		B60K2370/178 or B60W2050/146 or B60W2420/42 or B60W2556/65 or B60K2370/1868 or B60K2370/193 or B60K2370/21 or B60K2370/5915 or B60W2556/45 or B60W2556/50 or B60K37/00 or G08G1/0962 or G08G1/096791 or B60Q1/525).cpc.					
L46	306438	5 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L47	107455	5 NOT 6	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L48	35	(ESS$-HELP$-INC$).AS.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L49	15	8 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L50	20	8 NOT 9	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L51	191	((TUCKER$-DAVID$-M$)(POWERS$-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP,	OR	ON	ON	2024/05/31 06:32 PM

		STEPHEN$-T$)(INCORVAIA$-MIKE$)(TUCKER$-AUSTIN$)).IN.	AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L52	120	11 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L53	71	11 NOT 12	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L54	138	("20140306826" OR "20140375810" OR "20150061895" OR "20150314723" OR "20170246987" OR "20190210515" OR "20190279447" OR "20190283693" OR "20200189446" OR "20200189453" OR "8405498" OR "9481331" OR "9616810" OR "20120043888" OR "20170072835" OR "10173674" OR "10351050" OR "10598332" OR "20060043433" OR "20090045754" OR "20110205521" OR "20130054087" OR "20150151671" OR "20160039336" OR "20160152176" OR "20160257243" OR "20160339837" OR "20170080850" OR "20170243450" OR "20170274816" OR "20170352274" OR "20180056857" OR "20180061225" OR "20180094777" OR "20190234601" OR	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/31 06:32 PM

		"20190361453" OR "20200094734" OR "20200236745" OR "7046160" OR "9494940" OR "9643533" OR "20120268262" OR "20120313792" OR "20130141251" OR "20130229289" OR "20170124876" OR "10055985" OR "20020036908" OR "20020078879" OR "20020105432" OR "20030001728" OR "20030132852" OR "20040100373" OR "20040257214" OR "20050099286" OR "20050134448" OR "20060022520" OR "20060125616" OR "20060209547" OR "20070142977" OR "20070159319" OR "20070194905" OR "20080100432" OR "20090219150" OR "20090322508" OR "20100109859" OR "20100134271" OR "20100225465" OR "20100253499" OR "20120185130" OR "20130093582" OR "20130190985" OR "20140055619" OR "20140146552" OR "20140149025" OR "20140300462" OR "20140361686" OR "20140368324" OR "20150061492" OR "20150088397" OR "20150116133" OR "20150127212" OR "20160144778" OR "20170274819" OR "20170305349" OR "20170364070" OR "3553644" OR "4176340" OR "4227174" OR "4357594" OR "4550305" OR "4981363" OR "5043699" OR				

		"5264826" OR "5374920" OR "5434758" OR "5481243" OR "5510763" OR "5515026" OR "5519389" OR "5646385" OR "5736925" OR "5775712" OR "5850177" OR "6023221" OR "6025775" OR "6028512" OR "6078145" OR "6081188" OR "6181243" OR "6229438" OR "6323766" OR "6351211" OR "6397133" OR "6420799" OR "6445289" OR "6456206" OR "6515584" OR "6623151" OR "6674182" OR "6744359" OR "6842111" OR "6858986" OR "6879251" OR "6922137" OR "7119672" OR "7150554" OR "7199704" OR "7455139" OR "7852203" OR "7961086" OR "8049610" OR "8319662" OR "8393750" OR "8398284" OR "8415901" OR "8669853" OR "8903617").pn.					
L55	505	14 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L56	16	14 NOT 17	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2024/05/31 06:32 PM

			GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L57	2	"20090219150".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L58	2	"20190248364".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L59	906	((brok$3 stop$4) near6(vehicle) near8(ahead up$front) near10(warn$4 notif$8))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L60	39	((brok$3 stop$4) near6(vehicle) near8(ahead up$front) near10(warn$4 notif$8)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L61	34	22 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L62	1	"20130229289".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L63	1	14 AND ((brok$3 stop$4) near6(vehicle) near8(ahead up$front)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2024/05/31 06:32 PM

		near10(warn$4 notif$8))	DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L64	2423	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(approach$ incom4) near10(vehicle automobile))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L65	871	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L66	82	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L67	62	28 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L68	0	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile) near10(potential upcom4 imminent possible) near10(rear$end collision)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L69	4	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2024/05/31 06:32 PM

		near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile) near10(potential upcom4 imminent possible) near10(rear$end collision))	DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L70	4	31 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L71	24	("10074274" OR "10127813" OR "10147247" OR "10147318" OR "10194484" OR "10204517" OR "10386195" OR "10424203" OR "10818167" OR "20050239436" OR "20070063824" OR "20070159354" OR "20090189754" OR "20130147955" OR "20190051156" OR "20210287543" OR "6160493" OR "8198991" OR "8350721" OR "8599039" OR "8842021" OR "8947219" OR "8952830" OR "9792817").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/31 06:32 PM
L72	15213	(two$way near8(communication connection warn$4 aler$4 alarm$4) near8(vehicle))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L73	0	34 AND 33	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU,	OR	ON	ON	2024/05/31 06:32 PM

			SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L74	19	33 AND ((communication connection warn$4 aler$4 alarm$4) near8(((on$com$4)(approach$4)) near10 vehicle))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L75	2	"20210287543".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L76	9	"10217357".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM
L77	2	"20180281782".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/05/31 06:32 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	23	(((first initial one a) WITH (vehicle) WITH (communicat$6) WITH (server)) AND ((another different second other) WITH (vehicle) WITH (communicat$6) WITH (server)) AND ((predetermined threshold common "same") WITH (path road segment road$way section)) AND ((warn$4 alert$4 alarm$4 notifi$9) WITH (second another alternat$4	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/31 06:32 PM

		other) WITH (vehicle))).clm.					

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10124757		2018-11-13	Kerr et al	
	2	7404372		2008-07-29	Aasgaard	
	3	8099113	B2	2012-01-17	Morrison	
	4	8126479	B2	2012-02-28	Morrison	
	5	8126480	B2	2012-02-28	Morrison	
	6	8301112	B2	2012-10-30	Morrison	
	7	8306503	B2	2012-11-06	Morrison	
	8	8306555	B2	2012-11-06	Morrison	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	9	8423048	B2	2013-04-16	Morrison	
	10	8594707	B2	2013-11-26	Morrison	
	11	9333913	B1	2016-05-10	Elders et al	
	12	9679487	B1	2017-06-13	Hayward	
	13	9778349	B2	2017-10-03	Probert, et al.	
	14	9986401		2018-05-29	El Dinary	
	15	US10171980	B2	2019-01-01	Friesen	
	16	US4238778		1980-12-09	Ohsumi	
	17	US5572201		1996-11-05	Graham, et al.	
	18	US6590507	B2	2003-07-08	Burns	
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	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2024-04-17
Name/Print	Woodral, David G.	Registration Number	57277

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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	**04/17/2024 10:18:44 AM Z ET**	**012644_00013_PRV_UTL**

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	CAROLYN KIMBALL
PATENT CENTER #	65113450	FILING DATE	08/12/2020
CUSTOMER #	28827	FIRST NAMED INVENTOR	DAVID M. TUCKER
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	David Woodral

Documents

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JP2018536569.1.pdf	715A9DBAC94DC52116B8C323E404EC13D0952A5076A09A540 CA53EC1203304D4F162FFFD9938462C4A1FBED20B66359123 BEADBE225C3964169D21D6EC395B72

WO2002011100.pdf	9B10FF34DC5FB2D988011AAD43043F6CAD76C6D0DC9CBA5D47850FE05A453462974B7821325A31AE679ADDD905EA86834E7E25519ED1C2CEFD24BBD50AE11921
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IN200501702I4.2.pdf	CEB528F5FA7CFA7EEF1DF894A5E16C74671DD463A3D2D375AAFF3B3E86EAE01A1E131EB682BB7E9CFAA54FF19D1DF02D8EB61AF3E0AA70B8AC682DBE1EDECFC7
WO2002011100A1-Translation2.pdf	E6A0E6943F67B17D73AB891CC96631F2423D0613DC4E2FFF14697077D24016133E50FBD4B5F1AFA79BBA446A581C1F2565FF7F70B6141F441F134ACA79325229
Martinez-2010.2.pdf	B9EA6BED90245DD41FAC6DFA2A188300A0268D0218C0787FB2405B49E4FE8E65119F58682037274F117F2E7611D04D39B80B9D197E7BED5E5A4A3092E4364375
Harding81-160.pdf	84BEA721C7616C5A081CC0E7AA7D5258AC4A0BC4E524D6D5CF0115C1611B45183B977C1DD046E37243145BCBC50F4F6F7993F11BCC56511E88B3E23DF54E5F52
Harding241-327.pdf	338A0C83E8773170992888D40DA64B997F1078A04D992250EAAE8BA72EA66409B90578F8D71CC8C0CE4618A35CC3CEB403779701B34379EBFFE14F48B74AEB39
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Harding1-39.pdf	37493E9C426239B4E3756A59281395C1B23A7F6BEAFA9FA2CBE1FEDEC27C46D006A12036BE7895F41DB19B5F1FC1CC8CCF24023A669B8B501B605AE005200359
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2024-04-04_IDS.pdf

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85BFB167F0A32D45BD6DE884192FA59A868F1FBE9FA50292E
4D64EC5518E64C1E8D7A91A662E87C

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	04/17/2024 10:18:44 AM Z ET	012644_00013_PRV_UTL

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	CAROLYN KIMBALL
PATENT CENTER #	65113450	AUTHORIZED BY	David Woodral
CUSTOMER #	28827	FILING DATE	08/12/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	DAVID M. TUCKER

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 2001	E20244GA19205068	CAROLYN KIMBALL

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	104.00	1	104.00
			TOTAL AMOUNT:	$104.00

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New Applications Under 35 U.S.C. 111

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PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20110063129		2011-03-17	Stahlin	

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	102015215766	DE	A1	2017-02-23	Bosch GMBH		X

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	1	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-07-28
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	48367056
Application Number:	16991595
International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
Filer Authorized By:	David Gene Woodral
Attorney Docket Number:	012644_00013_PRV_UTL
Receipt Date:	28-JUL-2023
Filing Date:	12-AUG-2020
Time Stamp:	16:54:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	2023-07-28_IDS.pdf	1006682 aedcd1ece083dfe9dec285ab632f83a67fa97912	no	4

Warnings:

Information:					
2	Foreign Reference	BG66564B1.pdf	564248 afa76d80079e7d716583c6265994013 4f688305f	no	7
Warnings:					
Information:					
3	Foreign Reference	WO2016118575A1.pdf	2209595 3f6728b47cb58d2ce2b138c103e7e6ccd8905c90	no	45
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	2023-07-28_IDS2.pdf	1006589 535429b96e2645e2c03d7d534a7cbafb96b29a6d	no	4
Warnings:					
Information:					
5	Foreign Reference	DE102015215766trans.pdf	9427598 ca0219c60b32e989f9b3f9e70a9c8b6c9f7ee592	no	22
Warnings:					
Information:					
		Total Files Size (in bytes):	14214712		

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New Applications Under 35 U.S.C. 111

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New International Application Filed with the USPTO as a Receiving Office

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PTO/SB/08a (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10891858	B2	2021-01-12	Walsh, Michael	
	2	11135968		2021-10-05	Cobb et al	

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20110196566		2011-08-11	Slater	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	BG66564B1			2017-03-31	DIMILOR		
	2	WO2016118575		A1	2016-07-28	Foster, Ginny		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

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OR

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-07-28
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

28827 7590 03/27/2023

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

EXAMINER	
ANWARI, MACEEH	

ART UNIT	PAPER NUMBER
3663	

NOTIFICATION DATE	DELIVERY MODE
03/27/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

iplaw@gablelaw.com

Applicant-Initiated Interview Summary	**Application No.** 16/991,595	**Applicant(s)** TUCKER et al.		
	Examiner MACEEH ANWARI	**Art Unit** 3663	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
MACEEH ANWARI	Primary Examiner	Telephonic
DAVID WOODRAL	Attorney of Record	

Date of Interview: 22 March 2023

Issues Discussed:

35 U.S.C. 103

Applicant's representative tried to explain how the current claims differ from the prior arts of record, i.e., Karapantelakis and Varoglu et al.. Applicant's representative tried to explain how the current claims are a much more "streamlined" (i.e., efficient) means of relaying information between vehicles and a server to warn the drivers of the vehicle as to a possible/potential collision between the vehicle. Applicant's representative further suggested cancel independent claim set 1 and focus more on independent claim set 26. Examiner encouraged applicant's representative to formally file their response and to be as detailed as possible in their explanation in how the claims differ from the prior arts of record. The examiner further suggested contacting applicant's representative prior to issuing a subsequent office action in hopes of expediting prosecution. No agreements were reached.

/MACEEH ANWARI/ Primary Examiner, Art Unit 3663	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10217357		2019-02-26	Elsheemy	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20180281782		2018-10-04	Salter et al	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-03-22
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	16991595
Filing Date:	12-Aug-2020
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Filer:	David Gene Woodral/Michelle Kimball
Attorney Docket Number:	012644_00013_PRV_UTL

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE- 1ST REQUEST	2801	1	544	544
		Total in USD ($)		**544**

Electronic Acknowledgement Receipt

EFS ID:	47728720
Application Number:	16991595
International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
Filer Authorized By:	David Gene Woodral
Attorney Docket Number:	012644_00013_PRV_UTL
Receipt Date:	22-MAR-2023
Filing Date:	12-AUG-2020
Time Stamp:	20:17:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$544
RAM confirmation Number	E20233LK18187028
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	2023-03-22_RCE.pdf	1322844 a896139c9bf77cea711f210446b4950f9b39e5b8	no	3
Warnings:					
Information:					
2	Amendment Submitted/Entered with Filing of Continued Prosecution Application (CPA)/Request for Continued Examination(RCE)	2023-03-22_Amendment.pdf	119746 c1e23e43b58f898b8855f5f9dac8d2607b81fdea	no	7
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	2023-03-22_IDS.pdf	1006526 c306396650b7a50837c3e9aed4ad06dbc29b3390	no	4
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	38300 b3588a4ed0dee2a3e2d96a6df6a276c8a1f618e0	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2487416		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/30EFS (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	16991595	Filing Date	2020-08-12	Docket Number (if applicable)	012644_00013_PRV_UTL	Art Unit	3663
First Named Inventor	TUCKER			Examiner Name	Anwari, Maceeh		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.
☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 50-1971

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-03-22
Name	David G. WOODRAL	Registration Number	57277

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ESS-Help, Inc. Inventor(s): TUCKER, et al. Application No.: 16/991,595 Filed: 08/12/2020 Title: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS Attorney Docket No.: 012644_00013_PRV_UTL	Confirmation No.: 6990 Art Unit: 3663 Examiner: Anwari, Maceeh

Commissioner for Patents
Box 1450
Alexandria, VA 22313-1450

SUBMISSION UNDER 37 C.F.R. § 1.114 ACCOMPANYING
REQUEST FOR CONTINUED EXAMINATION

This submission is submitted in conjunction with Applicants' Request for Continued Examination under 37 C.F.R. § 1.114 and is responsive to the Examiner's Final Office Action mailed February 24, 2023. No fee is believed to be occasioned by the filing of this paper. However, if it is determined that any fee, including extension of time fees or additional claim fees, must accompany this filing, please consider this our authorization to charge the deposit account of the undersigned, Deposit Account 50-1971, therefor. Finally, and only if necessary, please consider the instant filing to be a Petition for Extension of Time to Respond. Please amend the application as follows:

Amendments to the claims begin on page **2**.

Remarks begin on page **4**.

In the claims:

This listing of claims will replace all prior versions and listings of claims in the application.

1-25. (Cancelled)

26. (Currently amended) A system for providing real time indication of a hazardous vehicle condition comprising:

a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a first communication sent from the first vehicle to the server indicating the first vehicle is in a hazardous condition and a location of the first vehicle;

wherein the server receives a second communication sent from a second vehicle to the server indicative of a location of the second vehicle; and

wherein the server provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another.

27. (Previously presented) The system of claim 26, wherein the second vehicle is equipped with a second microprocessor in communication with the server that provides an alert to an occupant of the second vehicle upon receipt of the third communication.

28. (Previously presented) The system of claim 26, wherein the first microprocessor is in communication with a global positioning system associated with the first vehicle to determine the location of the first vehicle.

29. (Cancelled)

30. (Previously presented) The system of claim 26, wherein the alert to the occupant of the second vehicle is a visual indication.

31. (Original) The system of claim 30 wherein the visual indication is provided on a heads-up display.

32. (Previously presented) The system of claim 26, wherein the alert to the occupant of the second vehicle is an audio alert.

33. (Previously presented) The system of claim 26, wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided.

34. (Cancelled)

35. (Previously presented) The system of claim 33, wherein the high conspicuity external visual indicator is activated to strobe the lights at the rear of the second vehicle.

36-41. (Cancelled)

REMARKS

In the present paper, claims 1-25, 29, 34, and 36-41 are cancelled without prejudice. Claim 26 is amended. Thus, claims 26-28, 30-33, and 35 remain for consideration.

Claim Rejections - 35 USC §103

Claims 1-3, 5-13, 26-28, 30-33, 35 and 41 were rejected as being unpatentable over U.S. Patent Publication No. 2021/0287543 by Karapantelakis ("Karapantelakis") in view of U.S. Patent No. 10/204,517 to Varoglu, et al. ("Varoglu").

Claims 1-3 and 5-13 are cancelled without prejudice in the present paper.

Respecting Karapantelakis, Applicant would note that the system disclosed therein is an alert service that is part of a wireless carrier that intercepts alerts bound for a Public Safety Answering point or a wireless vehicle service, such as OnStar. Par. **[0027]** describes a vehicle with a safety system that generates an emergency distress signal. Par. **[0036]** states, "According to embodiments of the disclosure, the alert service **20** is operative to intercept the wireless distress signal and, based on the contents of the distress signal, initiate the transmission of warning signals to wireless devices within the vicinity of the accident."

As the intercepted distress signal was not intended by the originating vehicle to go to Karapantelakis' system, it may not have contained sufficient information for the system, to determine the originating vehicle's actual location. Karapantelakis may simply provide warning signals to all other vehicles within the same wireless cell as described in par. **[0038]**, or in neighboring cells as stated in par. **[0039]**. Paragraphs **[0059]-[0061]** describes various ways that location and direction information can be obtained (apart from the original distress signal, if it was not included there) including triangulation and requirement for vehicles to additionally

report such information to the alert service **20**. Applicant would note again that the alert service **20** is not the service to which the origination message was directed, as the message obtained by the alert service **20** was bound for a Public Safety Answering point or separate wireless vehicle service and intercepted (**[0027]**).

Applicant's system, on the other hand, is one where a claimed server receives both an indication of a hazard condition and a location of the transmitting vehicle because the claimed server was the intended recipient and not a part of the wireless carrier network programmed to intercept messages or information that were bound for elsewhere.

Claim 26 is amended in the present paper to clarify this distinction as follows: "a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a first communication sent from the first vehicle to the server indicating the first vehicle is in a hazardous condition and a location of the first vehicle; wherein the server receives a second communication sent from a second vehicle to the server indicative of a location of the second vehicle." The claimed server can then alert other vehicles based on the alert and the vehicle locations as stated in the claim: "wherein the server provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another."

Par. **[0054]** of the instant published application describes how Applicant's server is the ultimate recipient of data from the originating vehicle **202**, and how this server determines which other vehicles should receive the alert. Par. **[0067]** also describes how a vehicle receives an alert from its own server or otherwise, and send alerts is receives, as well as its own additional generated alerts to the server. (Note that the foregoing is not necessary the only support for

claim 26, and that claim 26 does not represent the only embodiment disclosed in the original application).

Applicant would also note for the record that Varoglu does not appear to teach any of the elements discussed above that are absent from Karapantelakis. Thus, the combination of references does not teach every claim element of claim 26 and claim 26 is believed to be allowable. Claims 27-28, 30-33, and 35 depend from and further limit claim 26 and are therefore believed to be in condition for allowance as well.

Conclusion

This is intended to be a complete response to the Office Action mailed February 24, 2023. Reconsideration and allowance of all pending claims are respectfully requested. Should any issues remain unaddressed that would prevent the Examiner from allowing any claim, the Examiner is invited to contact attorney David G. Woodral (Reg. No. 57277) at (918) 595-4800 so that these issues may be resolved as expeditiously as possible.

Respectfully Submitted,

March 22, 2023
Date

By /david g. woodral/

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/991,595	Filing Date 08/12/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	03/22/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 8	Minus	** 40	= 0		x $40 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0		x $192 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RENEE M COLLINS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

28827 7590 02/24/2023

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EXAMINER	
ANWARI, MACEEH	

ART UNIT	PAPER NUMBER
3663	

NOTIFICATION DATE	DELIVERY MODE
02/24/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

iplaw@gablelaw.com

Office Action Summary	Application No. 16/991,595	Applicant(s) TUCKER et al.	
	Examiner MACEEH ANWARI	Art Unit 3663	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 12/7/2022.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-3,5-13,26-28,30-33,35 and 41 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-3,5-13,26-28,30-33,35 and 41 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 2/17/2023.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

2. This action is in response to communications filed on 12/07/2022. **Claims 1-2, 5-11, 26-28, 30 - 33 & 35** have been amended. **Claims 4, 14-25, 29, 34 & 36-40** have been canceled and **claim 41** has been newly added. No other claims have been amended, added, or canceled. Accordingly, **claims 1-3, 5-13, 26-28, 30-33, 35 & 41** are pending.

Response to Arguments

3. Applicant's arguments with respect to **claims 1-3, 5-13, 26-28, 30-33, 35 & 41** have been considered but are moot because the new ground of rejection does not rely on any reference applied in the prior rejection of record for any teaching or matter specifically challenged in the argument.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1-3, 5-13, 26-28, 30-33, 35 & 41** are rejected under 35 U.S.C. 103 as being unpatentable over Karapantelakis (US 2021/0287543 A1 hereinafter '543) in view of Varoglu et al. (US10204517 B2 hereinafter '517).

6. As per claim 1, **'543** discloses: a system for signaling a hazard condition on a first vehicle, comprising:

a microprocessor configured to receive an electronic signal from the first vehicle that is indicative that the first vehicle is in a hazard state **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 4-6 "processor circuitry, distress signal by vehicle involved in an accident/event")**;

a first radio transmitter in operative communication with the microprocessor **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 4-6 "transmission of warning signal to UEs")**; and

a radio receiver in operative communication with the microprocessor **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 4-6 "transmission of warning signal to UEs, mobile devices receiving the warning signal")**;

wherein, in response to receiving the signal indicative of a hazardous state, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the first vehicle is in the hazard state **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 4-6 "transmission of warning signal to Ues of accident/event")**;

wherein the microprocessor receives via the radio receiver an indication that a second vehicle is in a hazard condition and a location of second other vehicle **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 4-6 "alert service [20] and V2 & V1")**;

wherein the microprocessor provides an indication to an occupant of the vehicle that the second vehicle is in the hazardous condition when the microprocessor determines that the first vehicle is on an intercept course with the second vehicle **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 4-6 "alert service [20] and heading direction of V2 & V1 in reference to vehicle involved in accident (V3 & V4)")**.

However, '**543** does not appear to explicitly disclose wherein the microprocessor provides an indication to an occupant of the first vehicle that the second vehicle is in the hazardous condition

when the microprocessor determines that the first vehicle is on an intercept course with the second vehicle.

Nevertheless**, '517**--who is in the same field of endeavor--discloses wherein the microprocessor provides an indication to an occupant of the first vehicle that the second vehicle is in the hazardous condition when the microprocessor determines that the first vehicle is on an intercept course with the second vehicle **(see '517 at least fig. 1-2 & 8-10 "warning to first vehicle of a second/another vehicle as approaching it in an intercept course, alert car passing on right, ambulance approaching pull over")**.

One of ordinary skill in the art, prior to the effective filing date of the given invention would have been motivated to combine **'517's** enhanced situational awareness in a driving capacity with those of **'543's** notification of a vehicular accident system in order to form a more reliable and overall safer system (i.e., by warning the driver involved in an accident with more situational awareness of an approaching vehicle and allowing the driver to act accordingly).

Motivation for combining **'543** with **'517** not only comes from knowledge well known in the art, but also from **'517 (see at last ¶ 2- 6)**.

Both '543 & 517 disclose claim 2: further comprising a global positioning system unit that provides location data corresponding to the first vehicle to the microprocessor and the first wireless signal includes the location data **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 3: further comprising a second radio transmitter in operative communication with a personal electronic device, the personal electronic device providing location data to the microprocessor that is included in the first wireless signal **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 5: wherein the microprocessor further provides an electronic indication of the hazard condition of the second vehicle to another system within the first vehicle **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 6: wherein the microprocessor provides the indication to the occupant of the first vehicle visually

(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action").

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 7: further comprising a heads-up display showing the indication to the occupant of the first vehicle **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 8: wherein the microprocessor provides the indication to the occupant of the first vehicle audibly **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 9: wherein the microprocessor provides the indication to the occupant of the first vehicle via a personal electronic device associated with the occupant of the first vehicle **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 10: wherein the microprocessor is configured to detect an indication from a second vehicle that the second vehicle in in a hazard state, and transmits a second wireless signal via the first radio transmitter that indicates the second vehicle is in the hazard state **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 11: wherein the indication from the second vehicle is a line of sight communication

(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action").

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 12: wherein the indication from the other vehicle is an indication from a forward-looking sensor communicatively coupled to the microprocessor

(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action").

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 13: wherein the forward-looking sensor comprises a camera

(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action").

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 26: A system for providing real time indication of a hazardous vehicle condition comprising: a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a first communication from the first vehicle indicating [[a]] the first vehicle is in a hazardous condition and a location of the first vehicle; wherein the server receives a second communication from a second vehicle indicative of a location of the second vehicle; and wherein the server provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another **(see claim 1 above)**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 27: wherein the second vehicle is equipped with a second microprocessor in communication with the server that provides an alert to an occupant of the second vehicle upon receipt of the third communication **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 28: wherein the first microprocessor is in communication with a global positioning system associated with the first vehicle to determine the location of the first vehicle **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 30: wherein the alert to the occupant of the second vehicle is a visual indication **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least**

fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action").

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 31: wherein the visual indication is provided on a heads-up display **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 32: wherein the alert to the occupant of the second vehicle is an audio alert **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 33: wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location,**

speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action").

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 35: wherein the high conspicuity external visual indicator is activated to strobe the lights at the rear of the second vehicle **(see '543 at least fig. 1-5, in particular fig. 1 & 4-5 and ¶ 2-6 & 27-30 "Mobile electronic device, alert service [20], location, speed information of vehicle" and see '517 at least fig. 1-2 & 8-10 "Mobile electronic equipment, GPS and location information updated in order to take appropriate action")**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Both '543 & 517 disclose claim 41: A vehicle safety system comprising: a microprocessor in a first vehicle; a global positioning system affixed to the first vehicle and reporting a position of the first vehicle to the microprocessor; a radio receiver communicatively coupled to the microprocessor; and an alert device inside a passenger compartment of the first vehicle; wherein the microprocessor receives via the radio receiver an indication of a second vehicle being disabled, and a location of the second vehicle; wherein, when the microprocessor determines that the first vehicle is on an intercept course with the location of the second vehicle based at least on the position of the first and second vehicles, the alert device is used via the processor to indicate the presence of the second vehicle **(see claim 1 above)**.

Motivation for combing **'543** with **'517**, in the instant claim, is the same as that in claim 1 above.

Conclusion

7. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on 2/17/2023 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609.04(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MACEEH ANWARI whose telephone number is 571-272-7591. The examiner can normally be reached on Monday-Friday 7:30-5:00 PM ES.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on 571-272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MACEEH ANWARI/
Primary Examiner, Art Unit 3663

Notice of References Cited	Application/Control No. 16/991,595	Applicant(s)/Patent Under Reexamination TUCKER et al.	
	Examiner MACEEH ANWARI	Art Unit 3663	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20210287543-A1	09-2021	KARAPANTELAKIS; Athanasios	G08G1/205	1/1
*	B	US-10204517-B2	02-2019	Varoglu; Devrim	H04B17/318	1/1
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
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	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MACEEH ANWARI	3663

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/12/2020	02/21/2023							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	-							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
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	39	✓	-							
	40	✓	-							
	41		✓							

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MACEEH ANWARI	3663

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
((G08G1/162 OR B60K35/00 OR B60Q1/30 OR B60Q1/46 OR B60Q9/008 OR B60W30/0956 OR B60W30/16 OR B60W50/14 OR G01S19/42 OR G08G1/22 OR H04B1/3822 OR B60K2370/1529 OR B60K2370/178 OR B60W2050/146 OR B60W2420/42 OR B60W2556/65 OR B60K2370/1868 OR B60K2370/193 OR B60K2370/21 OR B60K2370/5915 OR B60W2556/45 OR B60W2556/50 OR B60K37/00 OR G08G1/0962 OR G08G1/096791 OR B60Q1/525).cpc.)	08/15/2022	TS

US Classification - Searched*			
Class	Subclass	Date	Examiner
701	117	02/21/2023	MA

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Performed Inventor and Assignee Search	08/15/2022	
Performed CPC search	08/15/2022	
Performed Text search	08/15/2022	
Combined CPC and text search	08/16/2022	
Refined Text search	08/16/2022	
Refined Text search	08/17/2022	
(Update search)	02/21/2023	MA

	/MACEEH ANWARI/ Primary Examiner, Art Unit 3663

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	MACEEH ANWARI	3663

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

	/MACEEH ANWARI/ Primary Examiner, Art Unit 3663

Bibliographic Data

Application No: 16/991,595

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /MACEEH ANWARI/ Examiner's Signature | Initials

Title: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
08/12/2020	701	3663	012644_00013_PRV_UTL
RULE			

APPLICANTS

ESS-HELP, INC., Houston, TX,

INVENTORS

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STEPHEN T. POWERS, Houston, TX, UNITED STATES

MIKE INCORVAIA, Hendersonville, TN, UNITED STATES

AUSTIN REECE TUCKER, Katy, TX, UNITED STATES

CONTINUING DATA

This application has PRO of 62885659 08/12/2019

FOREIGN APPLICATIONS

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10074274		2018-09-11	Becker et al	
	2	10127813		2018-11-13	Walsh et al	
	3	10147247		2018-12-04	Nishida	
	4	10147318		2018-12-04	Gebers	
	5	10194484		2019-01-29	Lucero et al	
	6	10204517		2019-02-12	Varoglu et al	
	7	10386195		2019-08-20	Grunberger et al	
	8	10424203		2019-09-24	Gunaratne	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.A/

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	Application Number	16991595
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	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	9	10818167		2020-10-27	Lu et al	
	10	6160493		2000-12-12	Smith	
	11	8198991		2012-06-12	Do	
	12	8350721		2013-01-08	Carr	
	13	8599039		2013-12-03	Otero et al	
	14	8842021		2014-09-23	Behm et al	
	15	8947219		2015-02-03	Popovic	
	16	8952830		2015-02-10	Sims et al	
	17	9792817		2017-10-17	Rider et al	

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	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	1	20050239436		2005-10-27	Bell et al	
	2	20070063824		2007-03-22	Gaddy et al	
	3	20070159354		2007-07-12	Rosenberg	
	4	20090189754		2009-07-30	Hochrein	
	5	20130147955		2013-06-13	Oosugi	
	6	20190051156		2019-02-14	Banvait et al	
	7	20210287543		2021-09-16	Karapantelakis	

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	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	DIAZ DE CERIO ET AL, "Provisioning Vehicular Services and Communications Based on a Bluetooth Sensor Network Deployment", ISSN 1424-8220, 05/29/2015, Page(s) 12765-12781, Volume 15, Publisher: Sensors 2015	
	2	DJAJADI ET AL, "Inter-cars Safety Communication System Based on Android Smartphone", 10/26/2014, Publisher: 2014 IEEE Conference on Open Systems (ICOS), Published in: Subang, Malaysia	

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Examiner Signature	/MACEEH ANWARI/	Date Considered	02/21/2023

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-02-17
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L2	4979	701/117.ccls.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:22 PM
L3	4925	2 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:23 PM
L4	54	2 NOT 3	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:23 PM
L5	387129	(G08G1/162 or B60K35/00 or B60Q1/30 or B60Q1/46 or B60Q9/008 or B60W30/0956 or B60W30/16 or B60W50/14 or G01S19/42 or G08G1/22 or H04B1/3822 or B60K2370/1529 or B60K2370/178 or B60W2050/146 or B60W2420/42 or B60W2556/65 or B60K2370/1868 or B60K2370/193 or B60K2370/21 or B60K2370/5915 or B60W2556/45 or B60W2556/50 or B60K37/00 or G08G1/0962 or G08G1/096791 or B60Q1/525).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:23 PM
L6	309726	5 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD,	OR	ON	ON	2023/02/17 12:24 PM

			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L7	77403	5 NOT 6	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:24 PM
L8	29	(ESS$-HELP$-INC$).AS.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:25 PM
L9	11	8 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:25 PM
L10	18	8 NOT 9	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:25 PM
L11	173	((TUCKER$-DAVID$-M$)(POWERS$-STEPHEN$-T$)(INCORVAIA$-MIKE$)(TUCKER$-AUSTIN$)).IN.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:26 PM
L12	114	11 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:26 PM
L13	59	11 NOT 12	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD,	OR	ON	ON	2023/02/17 12:27 PM

			DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L14	138	("20140306826" OR "20140375810" OR "20150061895" OR "20150314723" OR "20170246987" OR "20190210515" OR "20190279447" OR "20190283693" OR "20200189446" OR "20200189453" OR "8405498" OR "9481331" OR "9616810" OR "20120043888" OR "20170072835" OR "10173674" OR "10351050" OR "10598332" OR "20060043433" OR "20090045754" OR "20110205521" OR "20130054087" OR "20150151671" OR "20160039336" OR "20160152176" OR "20160257243" OR "20160339837" OR "20170080850" OR "20170243450" OR "20170274816" OR "20170352274" OR "20180056857" OR "20180061225" OR "20180094777" OR "20190234601" OR "20190361453" OR "20200094734" OR "20200236745" OR "7046160" OR "9494940" OR "9643533" OR "20120268262" OR "20120313792" OR "20130141251" OR "20130229289" OR "20170124876" OR "10055985" OR "20020036908" OR "20020078879" OR "20020105432" OR "20030001728" OR "20030132852" OR "20040100373" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/02/17 12:27 PM

		"20040257214" OR "20050099286" OR "20050134448" OR "20060022520" OR "20060125616" OR "20060209547" OR "20070142977" OR "20070159319" OR "20070194905" OR "20080100432" OR "20090219150" OR "20090322508" OR "20100109859" OR "20100134271" OR "20100225465" OR "20100253499" OR "20120185130" OR "20130093582" OR "20130190985" OR "20140055619" OR "20140146552" OR "20140149025" OR "20140300462" OR "20140361686" OR "20140368324" OR "20150061492" OR "20150088397" OR "20150116133" OR "20150127212" OR "20160144778" OR "20170274819" OR "20170305349" OR "20170364070" OR "3553644" OR "4176340" OR "4227174" OR "4357594" OR "4550305" OR "4981363" OR "5043699" OR "5264826" OR "5374920" OR "5434758" OR "5481243" OR "5510763" OR "5515026" OR "5519389" OR "5646385" OR "5736925" OR "5775712" OR "5850177" OR "6023221" OR "6025775" OR "6028512" OR "6078145" OR "6081188" OR "6181243" OR "6229438" OR				

		"6323766" OR "6351211" OR "6397133" OR "6420799" OR "6445289" OR "6456206" OR "6515584" OR "6623151" OR "6674182" OR "6744359" OR "6842111" OR "6858986" OR "6879251" OR "6922137" OR "7119672" OR "7150554" OR "7199704" OR "7455139" OR "7852203" OR "7961086" OR "8049610" OR "8319662" OR "8393750" OR "8398284" OR "8415901" OR "8669853" OR "8903617").pn.					
L17	505	14 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:29 PM
L18	9	14 NOT 17	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 12:29 PM
L19	2	"20090219150".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:19 PM
L20	2	"20190248364".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2023/02/17 01:33 PM

			JPO; DERWENT; IBM_TDB)				
L21	810	((brok$3 stop$4) near6(vehicle) near8(ahead up$front) near10(warn$4 notif$8))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:49 PM
L22	39	((brok$3 stop$4) near6(vehicle) near8(ahead up$front) near10(warn$4 notif$8)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:49 PM
L23	33	22 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:49 PM
L24	1	"20130229289".did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 01:55 PM
L25	1	14 AND ((brok$3 stop$4) near6(vehicle) near8(ahead up$front) near10(warn$4 notif$8))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:02 PM
L26	2236	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(approach$ incom4) near10(vehicle automobile))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:05 PM
L27	803	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO;	OR	ON	ON	2023/02/17 02:06 PM

		incom4) near10(vehicle automobile))	JPO; DERWENT; IBM_TDB)				
L28	78	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:06 PM
L29	61	28 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:06 PM
L30	0	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile) near10(potential upcom4 imminent possible) near10(rear$end collision)).ab.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:08 PM
L31	4	((brok$3 stop$4) near6(vehicle) near10(warn$4 notif$8) near10(user driver passenger) near10(approach$ incom4) near10(vehicle automobile) near10(potential upcom4 imminent possible) near10(rear$end collision))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:08 PM
L32	4	31 AND (@ad<"20190812" @rlad<"20190812")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/17 02:09 PM

L33	24	("10074274" OR "10127813" OR "10147247" OR "10147318" OR "10194484" OR "10204517" OR "10386195" OR "10424203" OR "10818167" OR "20050239436" OR "20070063824" OR "20070159354" OR "20090189754" OR "20130147955" OR "20190051156" OR "20210287543" OR "6160493" OR "8198991" OR "8350721" OR "8599039" OR "8842021" OR "8947219" OR "8952830" OR "9792817").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/02/21 12:25 PM
L34	13988	(two$way near8(communication connection warn$4 aler$4 alarm$4) near8(vehicle))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/21 12:31 PM
L36	0	34 AND 33	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/21 12:31 PM
L37	19	33 AND ((communication connection warn$4 aler$4 alarm$4) near8(((on$com$4)(approach$4)) near10 vehicle))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/02/21 12:33 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	3663
Examiner Name	Anwari, Maceeh
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10074274		2018-09-11	Becker et al	
	2	10127813		2018-11-13	Walsh et al	
	3	10147247		2018-12-04	Nishida	
	4	10147318		2018-12-04	Gebers	
	5	10194484		2019-01-29	Lucero et al	
	6	10204517		2019-02-12	Varoglu et al	
	7	10386195		2019-08-20	Grunberger et al	
	8	10424203		2019-09-24	Gunaratne	

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	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	9	10818167		2020-10-27	Lu et al	
	10	6160493		2000-12-12	Smith	
	11	8198991		2012-06-12	Do	
	12	8350721		2013-01-08	Carr	
	13	8599039		2013-12-03	Otero et al	
	14	8842021		2014-09-23	Behm et al	
	15	8947219		2015-02-03	Popovic	
	16	8952830		2015-02-10	Sims et al	
	17	9792817		2017-10-17	Rider et al	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear

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	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

	1	20050239436		2005-10-27	Bell et al	
	2	20070063824		2007-03-22	Gaddy et al	
	3	20070159354		2007-07-12	Rosenberg	
	4	20090189754		2009-07-30	Hochrein	
	5	20130147955		2013-06-13	Oosugi	
	6	20190051156		2019-02-14	Banvait et al	
	7	20210287543		2021-09-16	Karapantelakis	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	3663
	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	DIAZ DE CERIO ET AL, "Provisioning Vehicular Services and Communications Based on a Bluetooth Sensor Network Deployment", ISSN 1424-8220, 05/29/2015, Page(s) 12765-12781, Volume 15, Publisher: Sensors 2015	
	2	DJAJADI ET AL, "Inter-cars Safety Communication System Based on Android Smartphone", 10/26/2014, Publisher: 2014 IEEE Conference on Open Systems (ICOS), Published in: Subang, Malaysia	

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Examiner Name	Anwari, Maceeh
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2023-02-17
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	**02/17/2023 05:43:19 PM ET**	**012644_00013_PRV_UTL**

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	Michelle Kimball
PATENT CENTER #	61616684	FILING DATE	08/12/2020
CUSTOMER #	28827	FIRST NAMED INVENTOR	DAVID M. TUCKER
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	David Woodral

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
Djajadi-2014.pdf	6	Non Patent Literature	629 KB
Diaz de Cerio-2015.pdf	17	Non Patent Literature	3392 KB
2023-02-17_IDS_Search.pdf	6	Information Disclosure Statement (IDS) Form (SB08)	984 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
Djajadi-2014.pdf	AB92C0DEF7CC0601FC90655A319D878BE5651E41F3C60BB7E

	DE873EBD444211723DB6A08FF2A165E0D8615BC9FD019E5F99E8A8A018C5E9FB178F93B189F01C9
Diaz de Cerio-2015.pdf	E029D3F5CF3A07E824635C37F93C3561680EE931DE0FCAAB73B98613478BC218CC56028E2877A07DBF849C557A044BC3EF559EBC751AE964768A7B3DB938CFF5
2023-02-17_IDS_Search.pdf	99121BA6F58B3FD91BD964EA0E8AC1867AD1154AD8ED8AD9EABA98BAEAD46BE68D2538DAD5E750BB08A5616D71A83E74C533B25DEE8C11A2BE71965E626A9C61

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	02/17/2023 05:43:19 PM ET	012644_00013_PRV_UTL

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

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APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	Michelle Kimball
PATENT CENTER #	61616684	AUTHORIZED BY	David Woodral
CUSTOMER #	28827	FILING DATE	08/12/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	DAVID M. TUCKER

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 2001	E20232GH43398901	Michelle Kimball

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	104.00	1	104.00
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If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

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Electronic Acknowledgement Receipt

EFS ID:	47164693
Application Number:	16991595
International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
Filer Authorized By:	David Gene Woodral
Attorney Docket Number:	012644_00013_PRV_UTL
Receipt Date:	07-DEC-2022
Filing Date:	12-AUG-2020
Time Stamp:	17:52:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Request for Reconsideration-After Non-Final Rejection	2022-12-07_Amendment.pdf	165871 555348e3ae4369724dd7270ec46527711d50ceea	no	14

Warnings:

Information:	
Total Files Size (in bytes):	165871

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ESS-Help, Inc. Inventor(s): TUCKER, et al. Application No.: 16/991,595 Filed: 08/12/2020 Title: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS Attorney Docket No.: 012644_00013_PRV_UTL	Confirmation No.: 6990 Art Unit: 3663 Examiner: ORTIZ, ANGELA Y

Commissioner for Patents
Box 1450
Alexandria, VA 22313-1450

AMENDMENT

Dear Sir:

This paper is submitted in response to the Office Action mailed September 7, 2022. No fee is believed to be occasioned by the filing of this paper. However, if it is determined that any fee, including extension of time fees or additional claim fees, must accompany this filing, please consider this our authorization to charge the deposit account of the undersigned, Deposit Account 50-1971, therefor. Finally, and only if necessary, please consider the instant filing to be a Petition for Extension of Time to Respond. Please amend the application as follows:

A listing of claims begin on page **2.**

Remarks begin on page **8.**

In the claims:

This listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently Amended) A system for signaling a hazard condition on a first vehicle, comprising:

a microprocessor configured to receive an electronic signal from the first vehicle that is indicative ~~of a hazardous condition involving~~ that the first vehicle is in a hazard state; ~~and~~

a first radio transmitter in operative communication with the microprocessor; and

a radio receiver in operative communication with the microprocessor;

wherein, in response to receiving the signal indicative of a hazardous ~~event~~ state, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the first vehicle is ~~involved~~ in the hazard[[ous]] ~~condition~~state;

wherein the microprocessor receives via the radio receiver an indication that a second vehicle is in a hazard condition and a location of second other vehicle;

wherein the microprocessor provides an indication to an occupant of the first vehicle that the second vehicle is in the hazardous condition when the microprocessor determines that the first vehicle is on an intercept course with the second vehicle.

2. (Currently amended) The system of claim 1, further comprising a global positioning system unit that provides location data corresponding to the first vehicle to the microprocessor and the first wireless signal includes the location data.

3. (Original) The system of claim 1, further comprising a second radio transmitter in operative communication with a personal electronic device, the personal electronic device providing location data to the microprocessor that is included in the first wireless signal.

4. (Cancelled)

5. (Currently amended) The system of claim [[4]]1, wherein the microprocessor further provides [[the]]an electronic indication of the hazard condition of ~~another~~the second vehicle ~~electronically~~ to another system within the first vehicle.

6. (Currently amended) The system of claim [[4]]1, wherein the microprocessor provides the indication to the occupant of the first vehicle ~~of the hazard condition of another vehicle~~ visually ~~to an occupant of the vehicle~~.

7. (Currently amended) The system of claim 6, further comprising a heads-up display~~, and wherein the visual indication of the hazard condition of another vehicle is provided to an occupant of the vehicle using said heads-up display~~ showing the indication to the occupant of the first vehicle.

8. (Currently amended) The system of claim [[4]]1, wherein the microprocessor provides the indication to the occupant of the first vehicle ~~of the hazard condition of another vehicle~~ audibly ~~to an occupant of the vehicle~~.

9. (Currently amended) The system of claim [[4]]1, wherein the microprocessor provides the indication to the occupant of the first vehicle ~~of the hazard condition of another vehicle to~~via a personal electronic device associated with ~~an~~the occupant of the first vehicle.

10. (Currently amended) The system of claim 1, wherein the microprocessor is configured to detect an indication from ~~another~~ a second vehicle that the ~~other~~ second vehicle in in a hazard[[ous]] ~~condition~~ state, and transmits a second wireless signal via the first radio transmitter that indicates the ~~other~~ second vehicle is in the hazard[[ous]] ~~condition~~state.

11. (Currently amended) The system of claim 10, wherein the indication from the ~~other~~second vehicle is a line of sight communication.

12. (Original) The system of claim 11, wherein the indication from the other vehicle is an indication from a forward-looking sensor communicatively coupled to the microprocessor.

13. (Original) The system of claim 12, wherein the forward-looking sensor comprises a camera.

14-25. (Cancelled)

26. (Currently amended) A system for providing real time indication of a hazardous vehicle condition comprising:

a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a ~~signal~~ first communication from the first vehicle indicating [[a]] the first vehicle is in a hazardous condition and a location of the first vehicle;

wherein the server receives a second communication from a second vehicle indicative of a location of the second vehicle; and

wherein the server ~~receives the indication of the hazardous condition from the first microprocessor and provides the indication to a second vehicle~~ provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another.

27. (Currently amended) The system of claim 26, wherein the second vehicle is equipped with a second microprocessor in communication with the server that ~~receives the indication of the hazardous condition and~~ provides an alert to an occupant of the second vehicle upon receipt of the third communication.

28. (Currently amended) The system of claim 26, wherein the first microprocessor is in communication with a global positioning system associated with the first vehicle ~~and includes location data therefrom in the signal indicating a hazardous condition~~ to determine the location of the first vehicle.

29. (Cancelled)

30. (Currently amended) The system of claim [[29]]26, wherein the alert to the occupant of the second vehicle is a visual indication.

31. (Original) The system of claim 30 wherein the visual indication is provided on a heads-up display.

32. (Currently amended) The system of claim [[29]]26, wherein the alert to the occupant of the second vehicle is an audio alert.

33. (Currently amended) The system of claim [[29]]26, wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided.

34. (Cancelled)

35. (Currently amended) The system of claim [[29]]33, wherein the high conspicuity external visual indicator is activated to strobe the lights at the rear of the second vehicle.

36-40. (Cancelled)

41. (New) A vehicle safety system comprising:

a microprocessor in a first vehicle;

a global positioning system affixed to the first vehicle and reporting a position of the first vehicle to the microprocessor;

a radio receiver communicatively coupled to the microprocessor; and

an alert device inside a passenger compartment of the first vehicle;

wherein the microprocessor receives via the radio receiver an indication of a second vehicle being disabled, and a location of the second vehicle;

wherein, when the microprocessor determines that the first vehicle is on an intercept course with the location of the second vehicle based at least on the position of the first and second vehicles, the alert device is used via the processor to indicate the presence of the second vehicle.

REMARKS

In the present paper, claims 4, 14-25, 29, 34, and 36-40 are cancelled and claims 1-2, 5-11, 26-28, 30-33, and 35 are amended. New claim 41 is added. Thus, claims 1-3, 5-13, 26-28, 30-33, 35, and 41 remain for consideration. Amendments and cancellations are for purposes of advancing prosecution and made without prejudice and without acquiescence or agreement to any rejection or interpretation of the prior art.

Claim Rejections - 35 USC §112

Claim 34 was rejected as being indefinite for failing to point out and distinctly claim the subject matter which the inventor regards as the invention. Claim 34 has been cancelled.

Claim Rejections - 35 USC §103

Claims 1-2, 26-29 were rejected as being unpatentable over US Publication No. 2019/0248364 by Dastgir ("Dastgir"). The Examiner states:

> *Regarding claim 1, Dastgir teaches a system for signaling a hazard condition on a vehicle, comprising: a microprocessor configured to receive an electronic signal from the vehicle that is indicative of a hazardous condition involving the vehicle (see at least Dastgir para 35: "the sensing devices 40a-40n communicate sensor signals directly to the controller 34 and/or may communicate the signals to other controllers (not shown) which, in turn, communicate processed data from the signals to the controller 34 over a communication bus (not shown) or other communication means."); wherein, in response to receiving the signal indicative of a hazardous event, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition (see at least Dastgir para 39: "In various embodiments, the controller 34 communicates road hazard information including the identified road hazard and the location to the cloud computing system 140 via, for example the communication system 36 (FIG. 1)."). While Dastgir does not explicitly teach a first radio transmitter in operative communication with the microprocessor, Dastgir does teach in para 29: "As shown in more detail in FIG. 1, the autonomous vehicle 100 generally includes ... a sensor system 28, an actuator system 30, at least one data storage device 32, at least one controller 34, and a*

communication system 36." It is known in the art to use radio transceivers and other wireless communication devices in vehicle communication systems. It is well known in the art that communications systems may include radio transmitters as claimed, as such devices are known for communicating between vehicles for a heads-up on a wide range of potential threats (see at least Kelley Blue Book as cited by the applicant). It would have been obvious to someone skilled in the art before the effective filing date to use a radio transceiver because such devices are known for communicating potential threats on the 5.9 GHz spectrum (Kelley Blue Book).

Claim 1 is amended in the present paper to recite, "A system for signaling a hazard condition on a first vehicle, comprising:

a microprocessor configured to receive an electronic signal from the first vehicle that is indicative that the first vehicle is in a hazard state;

a first radio transmitter in operative communication with the microprocessor; and

a radio receiver in operative communication with the microprocessor;

wherein, in response to receiving the signal indicative of a hazardous state, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the first vehicle is in the hazard state;

wherein the microprocessor receives via the radio receiver an indication that a second vehicle is in a hazard condition and a location of second other vehicle;

wherein the microprocessor provides an indication to an occupant of the first vehicle that the second vehicle is in the hazardous condition when the microprocessor determines that the first vehicle is on an intercept course with the second vehicle."

Dastgir is a system directed to generation of road hazard alerts, and these would not appear to be generated based upon the condition of the vehicle itself. Additionally, these road hazards are delivered to a processor for use in controlling the receiving vehicle (e.g., Dastgir, Abstract). US Patent Application Publication US No. 2013/0229289 by Bensoussan et al.

("Bensoussan") might be cited for teaching generation of an alert based on the vehicle condition, and for providing that alert to a user rather than an auto-pilot system, for example. However, amended claim 1 also requires that, "the microprocessor provides an indication to an occupant of the first vehicle that the second vehicle is in the hazardous condition when the microprocessor determines that the first vehicle is on an intercept course with the second vehicle." Thus a system is claimed where a first vehicle receives notice of a second vehicle in a hazard state, and delivers that notice to an occupant of the vehicle, when it is determined by the microprocessor in the system of the first vehicle, that the first vehicle is on an intercept course with the second vehicle.

It is noted that certain embodiments of Dastgir would appear to provide some discrimination for when an alert is delivered. This is termed "selectively communicating." However, it is clear that Dastgir's system relies on the *transmitting* vehicle to determine whether to selectively communicate to the second vehicle (e.g., par. [0005]). This selection appears to be based on a lane location of the second vehicle (*Id.*) and not an intercept course as known and determined by the receiving vehicle.

In the presently claimed system, the receiving, first vehicle can determine whether to alert the driver because it will "know" not only the location of the vehicle generating the alert, but it will also "know" its own intended destination. In a practical example, an alert may be received for a vehicle in the road ahead, but that vehicle is not in the intended path of the receiving vehicle, so it may not generate an alert to the driver of the receiving vehicle.

For at least these reasons, claim 1, as amended, is believed to be allowable over the art of record. Claims 2-3 and 5-13 depend from and further limit claim 1, and should be allowable for at least this reason.

The Examiner further states:

> *Regarding claim 26, Dastgir teaches a system for providing real time indication of a hazardous vehicle condition comprising: a server in communication with a first microprocessor of a first vehicle (see at least Dastgir para 39: "In various embodiments, the road hazard vehicle control system 10 further includes a cloud computing system 140. The cloud computing system 140 can be remote from the vehicles 100, such as, but not limited to, a server system or other system as shown and/or may be incorporated into the vehicles 100. "), the first microprocessor operative to receive a signal from the first vehicle indicating a hazardous condition (see at least Dastgir para 35: "the sensing devices 40a-40n communicate sensor signals directly to the controller 34 and/or may communicate the signals to other controllers (not shown) which, in turn, communicate processed data from the signals to the controller 34 over a communication bus (not shown) or other communication means."); wherein the server receives the indication of the hazardous condition from the first microprocessor and provides the indication to a second vehicle (see at least Dastgir para 39: "In various embodiments, the controller 34 communicates road hazard information including the identified road hazard and the location to the cloud computing system 140 via, for example the communication system 36 (FIG. 1)."). It would have been obvious to combine the embodiments of Dastgir to include a microprocessor that receives an indication of a hazardous condition and forwarding that indication to a server based on the motivation to store hazard information and distribute it to relevant vehicles (see at least Dastgir para 39-40).*

Claim 26 is amended in the present paper to recite, "A system for providing real time indication of a hazardous vehicle condition comprising:

a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a first communication from the first vehicle indicating the first vehicle is in a hazardous condition and a location of the first vehicle;

wherein the server receives a second communication from a second vehicle indicative of a location of the second vehicle; and

wherein the server provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another.

It should be noted here again that Dastgir is concerned with road hazards rather than hazard states of the vehicle itself (e.g., a breakdown that may not be blocking a lane at present but still represents a heightened safety concern).

Regarding the communication system taught by Dastgir, as noted by the Examiner, Dastgir teaches a system where a data management module selectively communicates road hazard information to other vehicles (i.e., vehicles different from the vehicle generating the road hazard information) as discussed in par. [0040]. However, unlike the presently claimed system that "provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another," Dastgir is stated to deliver the road hazard information when there is an "immediate or near immediate threat, " or based on a "determined impact of the road hazard." Compared with Dastgir, the claimed system provides alerts based on *vehicle* hazards before they are necessarily road hazards, and before they have necessarily become an immediate or near immediate threat.

For at least the reasons discussed above, claim 26 is believed to be allowable over the art of record. Claims 27-28, 30-31, 32-33, and 35 depend from and further limit claim 26 and should be allowable for at least this reason.

New Claim

New claim 41 is added and recites, "A vehicle safety system comprising:

a microprocessor in a first vehicle;

a global positioning system affixed to the first vehicle and reporting a position of the first vehicle to the microprocessor;

a radio receiver communicatively coupled to the microprocessor; and

an alert device inside a passenger compartment of the first vehicle;

wherein the microprocessor receives via the radio receiver an indication of a second vehicle being disabled, and a location of the second vehicle;

wherein, when the microprocessor determines that the first vehicle is on an intercept course with the location of the second vehicle based at least on the position of the first and second vehicles, the alert device is used via the processor to indicate the presence of the second vehicle."

This claim distinguishes over the art of record, at least because the receiving microprocessor activates the alert device inside the receiving vehicle when it determines the vehicle is on an intercept course with the disabled vehicle. Dastgir and Bensoussan, alone or in combination, do not provide passenger compartment alerts of disabled vehicle based on the receiving vehicle determining that it is on an intercept course with the disabled vehicle's location.

Conclusion

This is intended to be a complete response to the Office Action mailed September 7, 2022. Reconsideration and allowance of all pending claims are respectfully requested. Should any issues remain unaddressed that would prevent the Examiner from allowing any claim, the Examiner is invited to contact attorney David G. Woodral (Reg. No. 57277) at (918) 595-4800 so that these issues may be resolved as expeditiously as possible.

Respectfully Submitted,

December 7, 2022
Date

By /david g. woodral/

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/991,595	Filing Date 08/12/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	12/07/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 40	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/TRACEY M YOUNG/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT7679117

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
DAVID M. TUCKER	10/11/2022
STEPHEN T. POWERS	10/11/2022
MIKE INCORVAIA	12/01/2022
AUSTIN REECE TUCKER	12/05/2022

RECEIVING PARTY DATA

Name:	ESS-HELP, INC.
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Internal Address:	1ST FLOOR
City:	HOUSTON
State/Country:	TEXAS
Postal Code:	77009

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16991595

CORRESPONDENCE DATA

Fax Number: (918)595-4990

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ATTORNEY DOCKET NUMBER:	012644_00013_PRV_UTL
NAME OF SUBMITTER:	DAVID G. WOODRAL
SIGNATURE:	/david g. woodral/
DATE SIGNED:	12/06/2022
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 2
source=Assignment 16991595 executed#page1.tif
source=Assignment 16991595 executed#page2.tif

ASSIGNMENT AND DECLARATION

WHEREAS, DAVID M. TUCKER, residing at 20110 Kingsland Blvd., Katy, TX 74450, and STEPHEN T. POWERS, residing at 6922 Blandford Lane, Houston, TX 77055, and MIKE INCORVAIA, residing at 103 Bayshore Court, Hendersonville, TN 37075, and AUSTIN REECE TUCKER, residing at 20110 Kingsland Blvd., Katy, TX 77450 (hereinafter referred to as "ASSIGNORS"), have invented a certain new and useful invention entitled "SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS" for which a utility patent application in the United States of America was filed on August 12, 2020, as Serial No. 16/991,595 and an International PCT Application as PCT/US2020/045930, filed on August 12, 2020 (collectively, "APPLICATION"), for which applications claim the benefit of or priority to prior filed U.S. Provisional Patent Application Serial No. 62/885,659, filed on August 12, 2019; and

WHEREAS, ESS-HELP, INC., a Texas corporation located at 313 Lilac Street, 1st Floor, Houston, TX 77009 (hereinafter referred to as "ASSIGNEE"), is desirous of acquiring the entire right, title and interest in and to the aforementioned invention and application, and in, to and under any and all Letters Patent of the United States and in any and all other countries;

NOW, THEREFORE, this Assignment witnesseth that for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, ASSIGNORS have sold, assigned, transferred and set over and do hereby sell, assign, transfer and set over to ASSIGNEE, the above-referenced invention and application and any and all divisions, continuations, continuations-in-part, requests for continued examination, or other applications subsequently filed claiming the benefit of said application, thereof, and any and all Letters Patent of the United States, its territorial possessions, and any and all foreign countries which may be granted therefor, and any and all extensions, reissues or certificates of reexamination of such Letters Patent, including all rights of priority and the subject matter of any and all claims which may be obtained in every such patent, the same to be held and enjoyed by ASSIGNEE for its own use and benefit, and for the use and benefit of its successors, assigns or other legal representatives, to the end of the term or terms for which such Letters Patent are or may be granted, extended, reissued or reexamined as fully and entirely as the same would have been held and enjoyed by ASSIGNORS if this assignment had not been made.

AND, ASSIGNORS hereby authorize and request the Commissioner of Patents to issue any and all Letters Patent of the United States on the invention, or resulting from an application which claims the benefit of the present application, and from any and all divisions and continuations, extensions, requests for continued examination, reissues or reexaminations of any such application to ASSIGNEE, and ASSIGNORS hereby covenant that ASSIGNORS have full right to convey the entire interest herein assigned, and that ASSIGNORS have not executed and will not execute any agreement in conflict herewith.

AND, ASSIGNORS further hereby covenant and agree that ASSIGNORS will, at any time, upon request and at the expense of ASSIGNEE, execute and deliver any and all papers that may be necessary or desirable to perfect the title to the invention and application and any Letters Patent as may be granted therefor in ASSIGNEE, its successors, assigns, or other legal representatives, and that if ASSIGNEE, its successors, assigns, or other legal representatives shall desire to file any division or continuation application, or to secure an extension, reissue or reexamination of such Letters Patent, or to file a disclaimer relating thereto, will, upon request, sign all papers, make all rightful oaths, and do all requisite

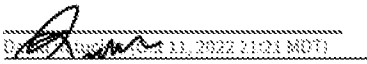
acts for the filing of such division, continuing, or reissue application, request for continued examination, request for reexamination or disclaimer, without further compensation.

AND, ASSIGNORS further agree to communicate to ASSIGNEE, its successors, assigns, or other legal representatives, such facts relating to the invention disclosed in the present APPLICATION or Letters Patent issuing therefrom as may be known, and to testify as to such when requested to do so.

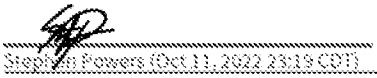
Each of the ASSIGNORS also hereby declares and affirms that:

- I have reviewed and understand the contents of the APPLICATION, including any and all claims thereof, and am aware of the duty to disclose to the U.S. Patent Office all information known to be material to patentability;
- The above-identified APPLICATION was made or authorized to be made by me;
- I believe that I am the original inventor or an original joint inventor of a claimed invention in the APPLICATION; and
- I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five years, or both.

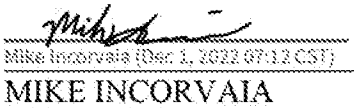
Executed by the undersigned on the date indicated.



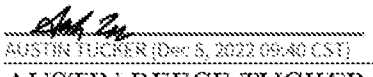
DAVID M. TUCKER Date



STEPHEN T. POWERS Date



MIKE INCORVAIA Date



AUSTIN REECE TUCKER Date

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/991,595	08/12/2020	3663	1865	012644_00013_PRV_UTL	40	3

CONFIRMATION NO. 6990

CORRECTED FILING RECEIPT

28827
GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

OC000000136373565

Date Mailed: 10/13/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

DAVID M. TUCKER, Katy, TX;
STEPHEN T. POWERS, Houston, TX;
MIKE INCORVAIA, Hendersonville, TN;
AUSTIN REECE TUCKER, Katy, TX;

Applicant(s)

ESS-HELP, INC., Houston, TX;

Power of Attorney: The patent practitioners associated with Customer Number 28827

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/885,659 08/12/2019

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 08/18/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/991,595**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

** **SMALL ENTITY** **

Title

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Preliminary Class

701

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

CORRECTED ADS FORM

Application Number	16991595
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Inventor Information

****If no data is shown, no data has been corrected****

	Data of Record	Updated Data
Order Number		
Name		
Residence Information		
Residency		
City		
State		
Country of Residence		
Mailing Address of Inventor		
Address 1		
Address 2		
City,State/Province, Postal Code		
Country		

Application Information

	Data of Record	Updated Data
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	
Attorney Docket Number	012644_00013_PRV_UTL	
Entity Type	Small	

Domestic Benefit/National Stage Information

****If no data is shown, no data has been corrected****

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121,365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S. C. 119(e) or 120, and 37 CFR 1.78(a).

		Data of Record	Updated Data
	Prior Application Status		
	Application Number		
	Continuity Type		
	Prior Application Number		
	Filing Date (YYYY-MM-DD)		
	Patent Number		
	Issue Date (YYYY-MM-DD)		

Foreign Priority Information

****If no data is shown, no data has been corrected****

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

		Data of Record	Updated Data
	Application Number		
	Country		
	Filing Date		
	Access Code		

Applicant Information

****If no data is shown, no data has been corrected****
Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

	Data of Record	Updated Data
Applicant Type	ASG	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is		
Name of the Deceased or Legally Incapacitated Inventor		
Applicant is an Organization	Yes	
Name		
Organization Name	ESS-HELP, INC.	
Address 1		313 Lilac Street, 1st Floor
Address 2		

City,State/Province,Postal Code	~~Houston TX~~	Houston TX 77009
Country		
Phone Number		
Fax Number		
Email Address		

Assignee Information including Non-Applicant Assignee Information

****If no data is shown, no data has been corrected****
Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office

	Data of Record	Updated Data
Order		
Applicant is an Organization		
Name		
Organization Name		
Mailing Address		
Address 1		
Address 2		
City,State/Province,Postal Code		
Country		
Phone Number		
Fax Number		
Email Address		

Signature

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/david g. woodral/	Registration Number	57277
First Name	David	Last Name	Woodral

Electronic Acknowledgement Receipt

EFS ID:	46793738
Application Number:	16991595
International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
Filer Authorized By:	David Gene Woodral
Attorney Docket Number:	012644_00013_PRV_UTL
Receipt Date:	11-OCT-2022
Filing Date:	12-AUG-2020
Time Stamp:	14:25:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet to update/ correct info	CorrectedADS.pdf	99794 7dfa1faca7dc614659d9f628af58edf2e93b1082	no	5

Warnings:

Information:	
Total Files Size (in bytes):	99794

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL	6990

28827 7590 09/07/2022

GABLEGOTWALS
110 North Elgin Avenue, Suite 200
TULSA, OK 74120-1495

EXAMINER	
SWIDLER, TYLER A	

ART UNIT	PAPER NUMBER
3663	

NOTIFICATION DATE	DELIVERY MODE
09/07/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

iplaw@gablelaw.com

Office Action Summary	Application No. 16/991,595	Applicant(s) TUCKER et al.	
	Examiner TYLER SWIDLER	Art Unit 3663	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 12 August 2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-40 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-40 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 12 August 2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date See Continuation Sheet.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☑ Other: Rump_DE19507433A1.pdf.

Continuation of Attachment(s) 2) Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date: 9/11/2020; 9/11/2020; 2/23/2021; 3/18/2021; 7/21/2021; 8/17/2021

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1) **The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.**

Priority

2) **The claims are originally presented having a filing date of August 12, 2020. Applicant's claim for the benefit of provisional application 62/885,659 with the filing date of August 12, 2019 is acknowledged.**

Information Disclosure Statement

3) **The information disclosure statements (IDS) submitted on February 23, 2021; March 18, 2021; July 21, 2021; and August 17, 2021 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.**

4) **The information disclosure statement filed September 11, 2020 fails to comply with 37 CFR 1.98(a)(3)(i) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each reference listed that is not in the English language, specifically FR2833903; JP2013-86657; and 2009012554. It has**

been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 112

5) The following is a quotation of 35 U.S.C. 112(b):

> **(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.**

6) The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> **The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.**

7) Claim 34 is rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

8) Claim 34 recites the limitation "the high conspicuity external visual indicator" in line 1. There is insufficient antecedent basis for this limitation in the claim. For purposes of the prior art rejection below, the examiner interprets "the high conspicuity external visual indicator" to be in reference to the "high conspicuity external visual indicator" of claim 33.

Claim Rejections - 35 USC § 103

9) In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as

subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

10) The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> **A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.**

11) Claim(s) 1-2, 26-29 is/are rejected under 35 U.S.C. 103 as being unpatentable over Dastgir (US Pub. No. 2019/0248364).

12) Regarding claim 1, Dastgir teaches a system for signaling a hazard condition on a vehicle, comprising: a microprocessor configured to receive an electronic signal from the vehicle that is indicative of a hazardous condition involving the vehicle (see at least Dastgir para 35: "the sensing devices 40a-40n communicate sensor signals directly to the controller 34 and/or may communicate the signals to other controllers (not shown) which, in turn, communicate processed data from the signals to the controller 34 over a communication bus (not shown) or other communication means."); wherein, in response to receiving the

signal indicative of a hazardous event, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition (see at least Dastgir para 39: "In various embodiments, the controller 34 communicates road hazard information including the identified road hazard and the location to the cloud computing system 140 via, for example the communication system 36 (FIG. 1)."). While Dastgir does not explicitly teach a first radio transmitter in operative communication with the microprocessor, Dastgir does teach in para 29: "As shown in more detail in FIG. 1, the autonomous vehicle 100 generally includes … a sensor system 28, an actuator system 30, at least one data storage device 32, at least one controller 34, and a communication system 36." It is known in the art to use radio transceivers and other wireless communication devices in vehicle communication systems. It is well known in the art that communications systems may include radio transmitters as claimed, as such devices are known for communicating between vehicles for a heads-up on a wide range of potential threats (see at least Kelley Blue Book as cited by the applicant). It would have been obvious to someone skilled in the art before the effective filing date to use a radio transceiver because such devices are known for communicating potential threats on the 5.9 GHz spectrum (Kelley Blue Book).

13) **Regarding claim 2, Dastgir remains as applied to claim 1. Dastgir further teaches** da global positioning system unit that provides location data corresponding to the vehicle to the microprocessor **(see at least Dastgir para 38: "When a road hazard is determined to be present, the instructions are further configured to process additional data such as GPS data and image data to localize the road hazard, and then selectively control the vehicle 100a based on the location of the road hazard and the location of the vehicle 100a. ")** and the first wireless signal includes the location data **(see at least Dastgir para 39: "In various embodiments, the controller 34 communicates road hazard information including the identified road hazard and the location to the cloud computing system 140 via, for example the communication system 36 (FIG. 1).").**

14) **Regarding claim 26, Dastgir teaches** a system for providing real time indication of a hazardous vehicle condition comprising: a server in communication with a first microprocessor of a first vehicle **(see at least Dastgir para 39: "In various embodiments, the road hazard vehicle control system 10 further includes a cloud computing system 140. The cloud computing system 140 can be remote from the vehicles 100, such as, but not limited to, a server system or other system as shown and/or may be incorporated into the vehicles 100. ")**, the first microprocessor operative to receive a signal from the first

vehicle indicating a hazardous condition **(see at least Dastgir para 35: "the sensing devices 40a-40n communicate sensor signals directly to the controller 34 and/or may communicate the signals to other controllers (not shown) which, in turn, communicate processed data from the signals to the controller 34 over a communication bus (not shown) or other communication means.");** wherein the server receives the indication of the hazardous condition from the first microprocessor and provides the indication to a second vehicle **(see at least Dastgir para 39: "In various embodiments, the controller 34 communicates road hazard information including the identified road hazard and the location to the cloud computing system 140 via, for example the communication system 36 (FIG. 1)."). It would have been obvious to combine the embodiments of Dastgir to include a microprocessor that receives an indication of a hazardous condition and forwarding that indication to a server based on the motivation to store hazard information and distribute it to relevant vehicles (see at least Dastgir para 39-40).**

15) **Regarding claim 27, Dastgir remains as applied to claim 26. Dastgir further teaches** wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle **(see at least Dastgir para 40: " The data management module 150 further**

receives vehicle information from other vehicles 100b and selectively communicates the stored, categorized road hazard information to the other vehicles 100b based on the received vehicle information.").

16) Regarding claim 28, Dastgir remains as applied to claim 26. Dastgir further teaches wherein the first microprocessor is in communication with a global positioning system associated with the first vehicle (see at least Dastgir para 38: "When a road hazard is determined to be present, the instructions are further configured to process additional data such as GPS data and image data to localize the road hazard, and then selectively control the vehicle 100a based on the location of the road hazard and the location of the vehicle 100a. ") and includes location data therefrom in the signal indicating a hazardous condition (see at least Dastgir para 39: "In various embodiments, the controller 34 communicates road hazard information including the identified road hazard and the location to the cloud computing system 140 via, for example the communication system 36 (FIG. 1)").

17) Regarding claim 29, Dastgir remains as applied to claim 28. Dastgir further teaches wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition (see at least Dastgir para 40: " The data management module 150 further receives vehicle information from other vehicles 100b and

selectively communicates the stored, categorized road hazard information to the other vehicles 100b based on the received vehicle information.") and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a roadway path of the second vehicle (see at least Dastgir para 40: "For example, the data management module 150 selectively communicates the road hazard information to other vehicles 100b associated with an immediate or near immediate threat of the road hazard.").

18) Claim(s) 3-6, 8-16, 18, 21-25, 30, and 32-35 is/are rejected under 35 U.S.C. 103 as being unpatentable over Dastgir further in view of Bensoussan et al. (US Pub. No. 2013/0229289).

19) Regarding claim 3, Dastgir remains as applied to claim 1. Dastgir teaches communicating between personal devices (para 31) but does not explicitly teach using the location data from the personal device. However Bensoussan teaches in a similar field of hazard warning a second radio transmitter in operative communication with a personal electronic device (see at least Bensoussan para 55: "A hazard warning system including a cellular telephone may be configured to communicate with hazard warning systems integrated or installed in vehicles"), the personal electronic device providing location data to the microprocessor that is included in the first wireless signal (see at least Bensoussan para 67: "A hazard warning system

incorporating a GPS receiver or another location-sensing device (e.g., a device such as a cell phone that uses cell phone tower triangulation to determine location) may, for example, transmit information about the location of a hazard"). It would have been obvious to someone skilled in the art to include location information based on the motivation to communicate with other vehicles that are relevant to the hazard so that they may take proper actions in response to the approaching hazard.

20) Regarding claim 4, Dastgir remains as applied to claim 1. Dastgir does not explicitly teach an indication inside the vehicle. However Bensoussan teaches in a similar field of hazard warning a radio receiver in operative communication with the microprocessor (see at least Bensoussan para 59: "Embodiment 140 includes a receiver 120 in communication with controller 104 and adapted to receive a signal 152' that is transmitted by a second embodiment 140' carried in another vehicle in proximity to vehicle 170."); wherein the microprocessor receives an indication of a hazard condition of another vehicle via the radio receiver and provides an indication of the same within the vehicle (see at least Bensoussan para 59: "When signal 152' is forwarded by receiver 120 as an information signal that is received and interpreted by controller 104, a controller 104 may cause a display 158 to emit an appropriate visible signal 160."). It would have been obvious to someone skilled in the art

to modify the invention to include a display in Dastgir based on the motivation to inform a manual operator of future hazards.

21) Regarding claim 5, the combination of Dastgir and Bensoussan remains as applied to claim 4. Bensoussan further teaches wherein the microprocessor provides the indication of the hazard condition of another vehicle electronically to another system within the vehicle (see at least Bensoussan para 52: "Embodiment 140 also includes a receiver 120 in communication through controller 104 to operate a local warning device 126").

22) Regarding claim 6, the combination of Dastgir and Bensoussan remains as applied to claim 4. Bensoussan further teaches wherein the microprocessor provides the indication of the hazard condition of another vehicle visually to an occupant of the vehicle (see at least Bensoussan para 61: "A local display device 158 is illustrated in FIG. 4. Display device 158 may include a display panel 178 on which a text message and/or one or more indicator element may be indicated. The panel 178 may be configured to convey an appropriate text message to the operator of a vehicle in which the local display device 158 is carried.").

23) Regarding claim 8, the combination of Dastgir and Bensoussan remains as applied to claim 4. Bensoussan further teaches wherein the microprocessor provides the indication of

the hazard condition of another vehicle audibly to an occupant of the vehicle **(see at least Bensoussan para 59: "Controller 104 may optionally cause speaker 162 to emit an appropriate audible alert 164. One or more speakers present in an audio system (e.g., an audio entertainment system) of vehicle 170 may be used as speaker 162. Alternatively, a hazard warning system may include a dedicated speaker.").**

24) **Regarding claim 9, the combination of Dastgir and Bensoussan remains applied to claim 4. Bensoussan further teaches** wherein the microprocessor provides the indication of the hazard condition of another vehicle to a personal electronic device associated with an occupant of the vehicle **(see at least Bensoussan para 55: "A hazard warning system including a cellular telephone may be configured to communicate with hazard warning systems integrated or installed in vehicles.").**

25) **Regarding claim 10, Dastgir remains as applied to claim 1. Dastgir does not explicitly teach forwarding hazards to other vehicles. Bensoussan teaches in a similar field of reporting hazard conditions** wherein the microprocessor is configured to detect an indication from another vehicle that the other vehicle in in a hazardous condition **(see at least Bensoussan para 60: "An embodiment 140' may be adapted to receive signal 152 from embodiment 140")** and transmits a second wireless signal via the first radio transmitter that indicates the other vehicle is in

the hazardous condition **(see at least Bensoussan para 60: ", and embodiment 140' may subsequently rebroadcast such signal as retransmitted signal 152''."). It would have been obvious to someone skilled in the art before the effective filing date to include forwarding hazards based on the motivation to inform more drivers provide additional time for an operator of an approaching vehicle to prepare to arrive at the hazard site (Bensoussan Para 60).**

26) **Regarding claim 11, the combination of Dastgir and Bensoussan remains as applied to claim 10. Dastgir further teaches** wherein the indication from the other vehicle is a line of sight communication **(see at least Dastgir para 33: "a sensing device 130 senses conditions associated with a roadway 132 along the vehicle's path ").**

27) **Regarding claim 12, the combination of Dastgir and Bensoussan remains as applied to claim 11. Dastgir further teaches** wherein the indication from the other vehicle is an indication from a forward-looking sensor communicatively coupled to the microprocessor **(see at least Dastgir para 33: " (in front of the vehicle 100a, behind the vehicle 100a, to the sides of the vehicle 100a, etc.)").**

28) **Regarding claim 13, the combination of Dastgir and Bensoussan remains as applied to claim 12. Dastgir further teaches** wherein the forward-looking sensor comprises a camera

(see at least Dastgir para 33: "The sensor system 28 includes one or more sensing devices 40a-40n that sense observable conditions of the exterior environment and/or the interior environment of the autonomous vehicle 10, and/or other vehicle conditions. In various embodiments, the sensing devices 40a-40n that sense the environment can include, but are not limited to, radars, lidars, global positioning systems, optical cameras,").

29) Regarding claim 14, Dastgir teaches An emergency vehicle safety system comprising: a microprocessor that receives notification of a hazardous condition involving the vehicle (see at least Dastgir para 35: "the sensing devices 40a-40n communicate sensor signals directly to the controller 34 and/or may communicate the signals to other controllers (not shown) which, in turn, communicate processed data from the signals to the controller 34 over a communication bus (not shown) or other communication means.") and wherein the microprocessor provides a first radio communication via the radio transmitter upon receipt of the notification of a hazardous condition involving the vehicle (see at least Dastgir para 39: "In various embodiments, the controller 34 communicates road hazard information including the identified road hazard and the location to the cloud computing system 140 via, for example the communication system 36 (FIG. 1)."). While Dastgir does not explicitly teach a radio transmitter operatively coupled to the microprocessor. Dastgir

does teach in para 29: "As shown in more detail in FIG. 1, the autonomous vehicle 100 generally includes … a sensor system 28, an actuator system 30, at least one data storage device 32, at least one controller 34, and a communication system 36." It is known in the art to use radio transceivers and other wireless communication devices in vehicle communication systems as such devices are known for communicating between vehicles for a heads-up on a wide range of potential threats (see at least Kelley Blue Book as cited by the applicant). It would have been obvious to someone skilled in the art before the effective filing date to use a radio transceiver because such devices are known for communicating potential threats on the 5.9 GHz spectrum (Kelley Blue Book). Dastgir does not explicitly teach a visual indicator. However Bensoussan teaches in a similar field of hazard warning a visual indicator visible from an exterior of the vehicle and operatively coupled to the microprocessor (see at least Bensoussan para 51: " a second embodiment, generally indicated at 140, includes a detector 106 in communication through a controller 104 to operate a remote warning signal transmitter 108. As illustrated, a remote warning signal transmitter 108 may be embodied as one or more of: an alarm 142 operable to transmit a loud sonic signal 144 that is audibly perceptible to approaching traffic (e.g., a siren); a warning light 146 operable to transmit a warning signal 148 that is

visibly perceptible to approaching traffic (e.g., a flashing light);"); wherein the microprocessor provides a high conspicuity visual signal on the visual indicator upon receipt of the notification of a hazardous condition involving the vehicle (see at least Bensoussan para 57: "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles."). It would have been obvious to someone skilled in the art before the effective filing date to modify Dastgir to include a visual indicator based on the motivation to communicate with vehicles that do not have v2v communication capabilities.

30) Regarding claim 15, the combination of Dastgir and Bensoussan remains as applied to claim 14. Bensoussan further teaches wherein the radio transmitter provides the first radio communication to a cellular phone tower (see at least Bensoussan para 48: "Apparatus 130 may be structured to permit a vehicle operator to transmit a text message to other operators, to specific selected receivers (e.g., via cellular telephone transmission to selected telephone numbers), or to authorities").

31) Regarding claim 16, the combination of Dastgir and Bensoussan remains as applied claim 14. Bensoussan further teaches wherein the radio transmitter provides the first radio communication to a receiver of another vehicle (see at least

Bensoussan para 48: "Apparatus 130 may also be configured to permit a vehicle operator to transmit a warning to systems in other vehicles, such as when the operator detects that the vehicle has a flat tire, is running out of fuel, is hydroplaning, is stuck in snow, or is otherwise a hazard to other vehicles.").

32) Regarding claim 18, the combination of Dastgir and Bensoussan remains as applied to claim 14. Bensoussan further teaches wherein the visual indicator comprises a set of lights operative as hazard flashers and turn indicator lights (see at least Bensoussan para 16: "In some embodiments, a warning light may include one or more element selected from the group including a brake light, a turn signal light, a taillight, a running light, a fog light, and a headlight of the first vehicle.").

33) Regarding claim 21, the combination of Dastgir and Bensoussan remains as applied to claim 14. Bensoussan further teaches wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a user operated switch inside the vehicle (see at least Bensoussan para 68: "A hazard warning system may include a voice-recognition system. For example, upon observing a hazard, a vehicle operator may activate the hazard warning system, and may then orally report the nature of the hazard (e.g., "debris in the center lane").").

While not explicitly a switch, Bensoussan does teach a user input to notify a hazardous conditions (para 68) and a switch to turn off or override signal 116 (para 48). It would have been obvious to someone skilled in the art to combine the two embodiments to include a toggle switch to send out a hazard condition signal based on the motivation allow the operator to transmit a warning to systems in other vehicle for hazards from the vehicle such as a flat tire or running out of gas (para 48).

34) Regarding claim 22, the combination of Dastgir and Bensoussan remains as applied to claim 14. Bensoussan further teaches wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a vehicle safety subsystem (see at least Bensoussan para 40: "A stand-alone collision-detecting system having similar operational features may be incorporated in a hazard warning system.").

35) Regarding claim 23, the combination of Dastgir and Bensoussan remains as applied to claim 14. Bensoussan further teaches wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a personal electronic device (see at least Bensoussan para 55: "In some embodiments, a hazard warning system may incorporate a cellular telephone (e.g., an Apple IPHONE.RTM., an ANDROID.TM. phone, a WINDOWS PHONE.TM., etc.), and may be configured to employ one or more sensors built in to the cellular telephone (e.g., a

microphone, an accelerometer, a global positioning system (GPS) receiver, etc.).").

36) Regarding claim 24, the combination of Dastgir and Bensoussan remains as applied to claim 14. Dastgir further teaches wherein the microprocessor receives location data for the vehicle from a global position system unit and provides the location data in the first radio communication (see at least Dastgir para 38: "When a road hazard is determined to be present, the instructions are further configured to process additional data such as GPS data and image data to localize the road hazard, and then selectively control the vehicle 100a based on the location of the road hazard and the location of the vehicle 100a").

37) Regarding claim 25, the combination of Dastgir and Bensoussan remains as applied to claim 24. Bensoussan further teaches wherein the global positioning system unit is provided, in part, by a personal electronic device (see at least Bensoussan para 67: "A hazard warning system incorporating a GPS receiver or another location-sensing device (e.g., a device such as a cell phone that uses cell phone tower triangulation to determine location) may, for example, transmit information about the location of a hazard.").

38) Regarding claim 30, Dastgir remains as applied to claim 29. Dastgir does not explicitly teach a visual indication. However

Bensoussan teaches in a similar field of endeavor wherein the alert to the occupant of the second vehicle is a visual indication (see at least Bensoussan para 61: "A local display device 158 is illustrated in FIG. 4. Display device 158 may include a display panel 178 on which a text message and/or one or more indicator element may be indicated. The panel 178 may be configured to convey an appropriate text message to the operator of a vehicle in which the local display device 158 is carried."). It would have been obvious to someone skilled in the art to alert before the effective filing date to combine Dastgir and Bensoussan to include alerting the driver about future hazards based on the motivation to give the driver ample time to react.

39) Regarding claim 32, Dastgir remains as applied to claim 29. Dastgir does not explicitly teach an audio alert. However Bensoussan teaches in a similar field of endeavor wherein the alert to the occupant of the second vehicle is an audio alert (see at least Bensoussan para 59: "Controller 104 may optionally cause speaker 162 to emit an appropriate audible alert 164. One or more speakers present in an audio system (e.g., an audio entertainment system) of vehicle 170 may be used as speaker 162. Alternatively, a hazard warning system may include a dedicated speaker."). It would have been obvious to someone skilled in the art to alert before the effective filing date to combine Dastgir

and Bensoussan to include alerting the driver about future hazards based on the motivation to give the driver ample time to react.

40) Regarding claim 33, Dastgir remains as applied to claim 29. Dastgir does not explicitly teach an external visual alert. However Bensoussan teaches in a similar field of endeavor wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided (see at least Bensoussan para 57: "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles."). It would have been obvious to someone skilled in the art to alert before the effective filing date to combine Dastgir and Bensoussan to include alerting the driver about future hazards based on the motivation to give the driver ample time to react.

41) Regarding claim 34, Dastgir remains as applied to claim 29. Dastgir does not explicitly teach an external visual alert activated by deceleration. However Bensoussan teaches in a similar field of endeavor wherein the high conspicuity external visual indicator is activated when the operator of the second vehicle decelerates as the second vehicle approaches the location of the first vehicle (see at least Bensoussan para 70: "For example, a hazard warning system hereof may be configured to receive a signal from a pre-collision system indicating that

a collision is imminent. The hazard warning system may transmit a warning of the impending collision to other vehicles before the collision occurs"). While Bensoussan does not explicitly teach activating a visual indicator in a deceleration environment, Bensoussan does teach transmitting warning pre-collision. The collision could be caused by improper deceleration into another vehicle and the transmitted warning can be visual (para 57). It would have been obvious to someone skilled in the art to alert before the effective filing date to combine Dastgir and Bensoussan to include alerting the driver about future hazards based on the motivation to give the driver ample time to react.

42) Regarding claim 35, Dastgir remains as applied to claim 29. Dastgir does not explicitly teach an external visual alert that is a strobe light at the rear of the second vehicle. However Bensoussan teaches in a similar field of endeavor wherein the high conspicuity external visual indicator is activated to strobe the lights at the rear of the second vehicle (see at least Bensoussan para 51: " a second embodiment, generally indicated at 140, includes a detector 106 in communication through a controller 104 to operate a remote warning signal transmitter 108. As illustrated, a remote warning signal transmitter 108 may be embodied as one or more of: an alarm 142 operable to transmit a loud sonic signal 144 that is audibly

perceptible to approaching traffic (e.g., a siren); a warning light 146 operable to transmit a warning signal 148 that is visibly perceptible to approaching traffic (e.g., a flashing light)"). It would have been obvious to someone skilled in the art before the effective filing date to combine Dastgir and Bensoussan to include flashing lights based on the motivation to catch the attention of approaching drivers.

43) Claim(s) 36 is/are rejected under 35 U.S.C. 103 as being unpatentable over Dastgir in view of Sims et al. (US Pub. No. 2013/0141251).

44) Regarding claim 36, Dastgir remains as applied to claim 28. Dastgir does not explicitly teach sending message when a vehicle is within a certain range. However, Sims teaches in a similar field of hazard warning wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a threshold distance of the second vehicle (see at least Sims para 63: "The range of the signal 15 shows that the second following car, 40 does not receive any information about this accident. The advantage of this is that drivers are not overwhelmed with too much information at one time. Drivers are only informed of hazards or potential hazards which are imminent."). This would have been

obvious to someone skilled in the art before the effective filing date to limit the transmission range of the alerts from Dastgir because the signal being broadcast beyond a useful range is not beneficial.

45) Claim(s) 7, 17, and 31 is/are rejected under 35 U.S.C. 103 as being unpatentable over Dastgir further in view of Bensoussan further in view of Sims.

46) Regarding claim 7, the combination of Dastgir and Bensoussan remains as applied to claim 6. Bensoussan teaches visually indicating hazards to occupants via a display device(para 61), but Bensoussan does not explicitly teach a heads up display. However Sims teaches in a similar field of endeavor a heads-up display, and wherein the visual indication of the hazard condition of another vehicle is provided to an occupant of the vehicle using said heads-up display (see at least Sims para 113: "Accessories available for use with the present system include a remote "pass request" button, remote indications for driver in rally, visor indications, audible alarm output to intercom, start lights, data transmit units, heads up display and timing/distance measurement functions."). Accordingly, the prior art references teach that it is known that display devices and heads-up displays are elements that are functional equivalents for providing a visual indication of hazards and warnings. Therefore, it would have been obvious to

one skilled in the art before the effective filing date of the claimed invention to have substituted a display device from Bensoussan with the heads-up display of Sims. The substitution would have resulted in the predictable result of displaying hazards to the driver.

47) Regarding claim 17, the combination of Dastgir and Bensoussan remains as applied to claim 14. Bensoussan teaches communicating via satellites (para 3) but does not explicitly teach wherein the radio transmitter provides the first radio communication to a satellite system. However, Sims teaches in a similar field of hazard warning a "comparable" device where it is known to send warning data over satellites (see at least Sims para 47: "Any warning data generated between vehicles can also be transmitted via Satellite or GSM (Global System for Mobile Communications) to an operations database such as a database present in master control."). Therefore, one of ordinary skill in the art before the effective filing date could have sent warning over satellite communications. The results would have been predictable to one of ordinary skill in the art before the effective filing date.

48) Regarding claim 31, the combination of Dastgir and Bensoussan remains as applied to claim 30. Bensoussan teaches visually indicating hazards to occupants (para 61), but Bensoussan does not explicitly teach a heads up display. However

Sims teaches in a similar field of endeavor a heads-up display, and wherein the visual indication of the hazard condition of another vehicle is provided to an occupant of the vehicle using said heads-up display (see at least Sims para 113: "Accessories available for use with the present system include a remote "pass request" button, remote indications for driver in rally, visor indications, audible alarm output to intercom, start lights, data transmit units, heads up display and timing/distance measurement functions."). Accordingly, the prior art references teach that it is known that display devices and heads-up displays are elements that are functional equivalents for providing a visual indication of hazards and warnings. Therefore, it would have been obvious to one skilled in the art before the effective filing date of the claimed invention to have substituted a display device from Bensoussan with the heads-up display of Sims. The substitution would have resulted in the predictable result of displaying hazards to the driver.

49) Claim(s) 37-38 is/are rejected under 35 U.S.C. 103 as being unpatentable over Dastgir further in view of Sims further in view of Bensoussan.

50) Regarding claim 37, the combination of Dastgir and Sims remains as applied to claim 36. The combination does not explicitly teach only providing an alert when a course

intercepts. However Bensoussan teaches in a similar field wherein the second microprocessor only provides the alert when the second vehicle is on a course to intercept the first vehicle (see at least Bensoussan para 60: "Of course, a feedback signal may be included in such an arrangement, to prevent the signal 152 from being re-broadcast beyond a range useful to others. For example, it may not be beneficial to warn motorists that a collision has occurred 80 km away, or to warn motorists travelling in a parallel direction but offset in a direction transverse to a direction of travel toward the hazard site (e.g., on a parallel street)."). It would have been obvious to someone skilled in the art before the effective filing date to modify Dastgir and Sims with Bensoussan to only show the alert when it would be useful (para 60).

51) Regarding claim 38, the combination of Dastgir and Sims remains as applied to claim 36. The combination does not explicitly teach an exterior alert when a notification is received. However, Bensoussan teaches in a similar field of endeavor wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided (see at least Bensoussan para 57: "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles.").

52) Claim(s) 19-20 is/are rejected under 35 U.S.C. 103 as being unpatentable over Dastgir further in view of Bensoussan further in view of Rump et al. (DE19507433).

53) Regarding claim 19, the combination of Dastgir and Bensoussan remains as applied to claim 18. While Bensoussan teaches using taillights, and brakelights as warning lights, Bensoussan does not explicitly teach wherein the high conspicuity visual signal comprises a signal having a flash rate in excess of a flash rate associated with the use of the set of lights as hazard flashers and in excess of a flash rate associated with the use of the set of lights as turn indicator lights. However, Rump teaches in a similar field of lighting for hazardous conditions, flashing the lights at a faster rate than expected has been taught in the art of warning of hazardous movements (see at least Rump para 12: "The flashing can consist not only in a change between lighting and non-lighting of the brake lights but also in a clocked change between two or more different intensities of the current supply and thus the brightness"). It would have been obvious to someone skilled in the art before the effective filing date to modify the combination of Dastgir and Bensoussan with Rump to include blinking at different clocks based on the motivation to draw attention of nearby drivers and differentiate from normal operation.

54) **Regarding claim 20, the combination of Dastgir, Bensoussan and Rump remains as applied to claim 19. Bensoussan further teaches** wherein the microprocessor does not provide the first radio signal via the radio transmitter when the visual indicator is used as hazard flashers or as turn indicators **(see at least Bensoussan para 25: "Certain warning light arrangements may include a headlight, turn signal light, taillight, running light, fog light, or brake light as a broadcasting device.").**

55) **Claim(s) 39-40 is/are rejected under 35 U.S.C. 103 as being unpatentable over Dastgir in view of Bensoussan in view of Sims in view of Tao et al. (US Pub. No. 20190202476).**

56) **Regarding claim 39, the combination of Dastgir, Bensoussan, and Sims remains as applied to claim 38. The combination does not explicitly teach communicating with a server and alerting when on a roadway path and within a range. However Tao teaches in a similar field of endeavor** wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition **(see at least Tao para 151: " transmits obstacle warning information to the second vehicle 12 to cause the second vehicle 12 to avoid a collision with the obstacle")** and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a roadway path and within a threshold distance of the second vehicle **(see at least Tao para 153:**

"Specifically, the if it is determined that the obstacle is located in the lane where the second vehicle is currently located according to the information of the obstacle and the vehicle information of the second vehicle, performing the obstacle warning on the second vehicle includes: if it is determined that the obstacle is located in the lane where the second vehicle is currently located according to the information of the obstacle and the vehicle information of the second vehicle, performing the obstacle warning on the second vehicle when a distance between the second vehicle and the obstacle is within a preset range."). It would have been obvious to someone skilled in the art before the effective filing date to modify the combination of Dastgir, Bensoussan, and Sims with Tao to include communicating over a server based on the motivation to communicate with other vehicles so they may avoid the hazardous conditions.

57) Regarding claim 40, the combination of Dastgir, Bensoussan, Sims, and Tao remains as applied to claim 39. Bensoussan further teaches wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided (see at least Bensoussan para 57: "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles.").

Conclusion

58) The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rider et al. (US Pub. No. 2015/0179066) teaches reporting road hazards and providing alerts visually and/or audibly. Haab et al. (US Pub. No. 2010/0253499) teaches a flash pattern of lights.

59) Any inquiry concerning this communication or earlier communications from the examiner should be directed to TYLER SWIDLER whose telephone number is (571)272-3913. The examiner can normally be reached Monday- Thursday 8 - 5 pm EST and Friday 8 - 12 pm EST.

60) Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

61) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on (571)272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/T.S./
Examiner, Art Unit 3663

/ANGELA Y ORTIZ/
Supervisory Patent Examiner, Art Unit 3663

Notice of References Cited	Application/Control No. 16/991,595	Applicant(s)/Patent Under Reexamination TUCKER et al.	
	Examiner TYLER SWIDLER	Art Unit 3663	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
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*	B	US-20190202476-A1	07-2019	TAO; SHENG	B60W30/095	1/1
*	C	US-20190248364-A1	08-2019	Dastgir; Rana	B60W10/20	1/1
*	D	US-20100253499-A1	10-2010	Haab; Daniel B.	H05B47/18	340/471
	E					
	F					
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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	DE-19507433-A1	06-1996	DE	RUMP S	B60Q1/441
	O					
	P					
	Q					
	R					
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	TYLER SWIDLER	3663

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/12/2020								
	1	✓								
	2	✓								
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	37	✓								
	38	✓								
	39	✓								
	40	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/991,595	TUCKER et al.
	Examiner	Art Unit
	TYLER SWIDLER	3663

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
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Class	Subclass	Date	Examiner

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Search Notes	Date	Examiner
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Performed CPC search	08/15/2022	
Performed Text search	08/15/2022	
Combined CPC and text search	08/16/2022	
Refined Text search	08/16/2022	
Refined Text search	08/17/2022	

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	TYLER SWIDLER	3663

Interference Search			
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	
Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Signature	/david g. woodral/	Date (YYYY-MM-DD)	2020-09-11
Name/Print	Woodral, David G.	Registration Number	57277

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Art Unit	
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Attorney Docket Number	012644_00013_PRV_UTL

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/T.S./	1	8405498		2013-03-26	Smith et al	
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/T.S./	3	20150061895		2015-03-05	Ricci	

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	Attorney Docket Number	012644_00013_PRV_UTL

/T.S./	4	20150314723		2015-11-05	Ghiata et al	
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Signature	/david g. woodral/	Date (YYYY-MM-DD)	2021-08-17
Name/Print	Woodral, David G.	Registration Number	57277

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	4	((("ESS-HELP") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/08/15 04:33 PM
L2	352	((("TUCKER") near3 ("DAVID")) OR (("POWERS") near3 ("STEPHEN")) OR (("INCORVAIA") near3 ("MIKE")) OR (("TUCKER") near3 ("AUSTIN"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/15 04:34 PM
L3	104818	(G08G1/162 OR B60K35/00 OR B60Q1/30 OR B60Q1/46 OR B60Q9/008 OR B60W30/0956 OR B60W30/16 OR B60W50/14 OR G01S19/42 OR G08G1/22 OR H04B1/3822 OR B60K2370/1529 OR B60K2370/178 OR B60W2050/146 OR B60W2420/42 OR B60W2556/65 OR B60K2370/1868 OR B60K2370/193 OR B60K2370/21 OR B60K2370/5915 OR B60W2556/45 OR B60W2556/50 OR B60K37/00 OR G08G1/0962 OR G08G1/096791 OR B60Q1/525).cpc.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/15 04:35 PM
L4	1170	(reciev$3 sent send$3) near10 (hazard danger obstruction crash accident hazardous dangerous) AND (transmit$3 send$3 notify$3) near3 (radio wifi internet cellular satellite) AND (GPS GNSS locaiton locat$3) AND (visual audible orat$3) near3 (notification indication alarm alert)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/15 04:45 PM
L5	1170	((reciev$3 sent send$3) near10 (hazard danger	(US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	ON	ON	2022/08/15 04:45 PM

		obstruction crash accident hazardous dangerous)) AND (transmit$3 send$3 notify$3) near3 (radio wifi internet cellular satellite) AND (GPS GNSS locaiton locat$3) AND (visual audible orat$3) near3 (notification indication alarm alert)	DERWENT)				
L6	157	L5 AND L3	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/16 10:18 AM
L7	32236	(signal$3 notify$3 alert$3) near3 (hazard hazardous danger dangerous obstacle) AND (transmit$3 send$3) AND (location position gps gnss)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/16 11:03 AM
L8	3466	L7 AND L3	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/16 11:17 AM
L9	13359	L7 AND (server cloud) AND (visual light indicator audio auditory oratory)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/16 11:18 AM
L10	1878	L9 AND L3	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/16 11:18 AM
L11	1872	L9 AND L3 AND (car truck automobile vehicle)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/16 11:24 AM
L12	1434	L9 AND L3 AND (car truck automobile vehicle) AND (camera visible) AND (rate frequency)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/17 05:39 PM
L13	1193	L9 AND L3 AND (car truck automobile vehicle) AND (camera visible) AND (rate frequency NEAR (light flash$3))	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/17 05:39 PM
L14	0	2010/0114467.did. 2010/0114418.did.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/17 06:03 PM
L15	4	"20100114467".did. "20100114418".did.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/17 06:03 PM
L16	32333	(flash$3 strob$3) near10 (brake turn tail)	(US-PGPUB; USPAT; USOCR; EPO; JPO;	OR	ON	ON	2022/08/17 06:06 PM

			DERWENT)				
L17	10	(flash$3 strob$3) near10 (brake turn tail) AND (volvo mercedes).as.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/17 06:06 PM
L18	11	(flash$3 strob$3 flicker$3) near10 (brake turn tail) AND (volvo mercedes).as.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/17 06:15 PM
L19	92	("10055985" OR "20020036908" OR "20020078879" OR "20020105432" OR "20030001728" OR "20030132852" OR "20040100373" OR "20040257214" OR "20050099286" OR "20050134448" OR "20060022520" OR "20060125616" OR "20060209547" OR "20070142977" OR "20070159319" OR "20070194905" OR "20080100432" OR "20090219150" OR "20090322508" OR "20100109859" OR "20100134271" OR "20100225465" OR "20100253499" OR "20120185130" OR "20130093582" OR "20130190985" OR "20140055619" OR "20140146552" OR "20140149025" OR "20140300462" OR "20140361686" OR "20140368324" OR "20150061492" OR "20150088397" OR "20150116133" OR "20150127212" OR "20160144778" OR "20170274819" OR "20170305349" OR "20170364070" OR "3553644" OR "4176340" OR "4227174" OR "4357594" OR "4550305" OR "4981363" OR "5043699" OR "5264826" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/22 08:57 AM

		"5374920" OR "5434758" OR "5481243" OR "5510763" OR "5515026" OR "5519389" OR "5646385" OR "5736925" OR "5775712" OR "5850177" OR "6023221" OR "6025775" OR "6028512" OR "6078145" OR "6081188" OR "6181243" OR "6229438" OR "6323766" OR "6351211" OR "6397133" OR "6420799" OR "6445289" OR "6456206" OR "6515584" OR "6623151" OR "6674182" OR "6744359" OR "6842111" OR "6858986" OR "6879251" OR "6922137" OR "7119672" OR "7150554" OR "7199704" OR "7455139" OR "7852203" OR "7961086" OR "8049610" OR "8319662" OR "8393750" OR "8398284" OR "8415901" OR "8669853" OR "8903617").pn.					
L20	5	("20120268262" OR "20120313792" OR "20130141251" OR "20130229289" OR "20170124876").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/22 09:16 AM
L21	26	("10173674" OR "10351050" OR "10598332" OR "20060043433" OR "20090045754" OR "20110205521" OR "20130054087" OR "20150151671" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/22 09:17 AM

		"20160039336" OR "20160152176" OR "20160257243" OR "20160339837" OR "20170080850" OR "20170243450" OR "20170274816" OR "20170352274" OR "20180056857" OR "20180061225" OR "20180094777" OR "20190234601" OR "20190361453" OR "20200094734" OR "20200236745" OR "7046160" OR "9494940" OR "9643533").pn.					
L22	2	("20120043888" OR "20170072835").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/22 09:18 AM
L23	13	("20140306826" OR "20140375810" OR "20150061895" OR "20150314723" OR "20170246987" OR "20190210515" OR "20190279447" OR "20190283693" OR "20200189446" OR "20200189453" OR "8405498" OR "9481331" OR "9616810").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/22 09:20 AM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	
Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

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/T.S./	1	10173674	B2	2019-01-08	BIDNER	
/T.S./	2	10351050	B1	2019-07-16	ELWELL	
/T.S./	3	10598332	B1	2020-03-24	ELWELL	
/T.S./	4	7046160	B2	2006-05-16	PEDERSON, ET AL.	
/T.S./	5	9494940	B1	2016-11-15	KENTLEY	
/T.S./	6	9643533	B1	2017-05-09	HOUSS	

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	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

/T.S./	1	20060043433	A1	2006-03-02	MATSUSHITA	
/T.S./	2	2009045754	A1	2009-02-19	JOZWIK	
/T.S./	3	2011205521	A1	2011-08-25	MIMEAULT, ET AL.	
/T.S./	4	2013054087	A1	2013-02-28	MOHAMED	
/T.S./	5	2015151671	A1	2015-06-04	REFIOR, ET AL.	
/T.S./	6	20160152176	A1	2016-06-02	KANG	
/T.S./	7	2016039336	A1	2016-02-11	NORDSTROM, ET AL.	
/T.S./	8	2016257243	A1	2016-09-08	SON, ET AL.	
/T.S./	9	2016339837	A1	2016-11-24	BOLDUC, ET AL.	
/T.S./	10	2017080850	A1	2017-03-23	DREXLER, ET AL.	
/T.S./	11	2017243450	A1	2017-08-24	KELLER, ET AL.	

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	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

/T.S./	12	2017274816	A1	2017-09-28	ZHAO	
/T.S./	13	2017352274	A1	2017-12-07	KODAMA, ET AL.	
/T.S./	14	20180094777	A1	2018-04-05	VARGAS-CHAMBERS	
/T.S./	15	2018056857	A1	2018-03-01	NATALE, ET AL.	
/T.S./	16	2018061225	A1	2018-03-01	MIGLIANICO	
/T.S./	17	2019234601	A1	2019-08-01	WESCOTT	
/T.S./	18	2019361453	A1	2019-11-28	KENTLEY-KLAY, ET AL.	
/T.S./	19	20200236745	A1	2020-07-23	GARRETT, ET AL.	
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Examiner Name	
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/T.S./	1	107650778	CN	A	2018-02-02	BEIJING XIAOMI MOBILE SOFTWARE CO LTD		×
/T.S./	2	110949241	CN	A	2020-04-03	SHANGHAI PATEO YUEZHEN NETWORKING TECHNOLOGY SERVI		☒
/T.S./	3	111216624	CN	A	2020-06-02	BEIJING BYD MOULD CO LTD		☒
/T.S./	4	102015205368	DE	A1	2016-09-09	CONTI TEMIC MICROELECTRONIC GMBH [DE		☒
/T.S./	5	102017215865	DE	A1	2019-03-14	FORD GLOBAL TECH LLC [US]		☒
/T.S./	6	102018128565	DE	A1	2020-05-14	BAYERISCHE MOTOREN WERKE AG [DE]		☒
/T.S./	7	202017100790	DE	U1	2017-03-22	FORD GLOBAL TECH LLC [US]		☒
/T.S./	8	3178698	EP	A1	2017-06-14	SL CORP [KR]		☐
/T.S./	9	3287320	EP	A1	2018-02-28	ALSTOM TRANSP TECH [FR]		☒
/T.S./	10	3702213	EP	A1	2020-09-02	KOITO MFG CO LTD [JP]		☐
/T.S./	11	3056801	FR	A1	2018-03-30	VALEO VISION [FR]		☒

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/T.S./	12	2006069245	JP	Aa	2006-03-16	ICHIKOH INDUSTRIES LTD + (ICHIKOH IND LTD)		☒
/T.S./	13	2006182172	JP	A	2006-07-13	ICHIKOH INDUSTRIES LTD + (ICHIKOH IND LTD)		☒
/T.S./	14	2014201298	JP	A	2014-10-27	KUNIHIRO SHOJI KK		☒
/T.S./	15	2018020751	JP	A	2018-02-08	SOMEYA KATSUAKI		☒
/T.S./	16	2019206225	JP	A	2019-12-05	OSAKA SAIREN SEISAKUSHO KK		☒
/T.S./	17	2020090183	JP	A	2020-06-11	KOITO MFG CO LTD		☒
/T.S./	18	4485901	JP	B2	2006-04-27	KOITO MFG CO LTD		☒
/T.S./	19	6561286	JP	B1	2019-08-21	Auto Ito Co., Ltd.		☒
/T.S./	20	100656243	KR	B1	2006-12-13	SSANGYONG MOTOR CO		☒
/T.S./	21	200484734	KR	Y1	2017-11-15	Nam Sang-soo		☒
/T.S./	22	25623	SI	A	2019-10-30	FAKULTETA ZA INFORMACIJSKE STUDIJE V NOVEM MESTU		☒

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	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

/T.S./	23	202022812	TW	A	2020-06-16	LAN GUO TONG		☒
/T.S./	24	202041101	TW	A	2020-11-01	WHELEN ENG		☒
/T.S./	25	2020096060	WO	A1	2020-05-14	IOMAP LLC		☒

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Examiner Signature	/TYLER AUSTIN LIPPE SWIDLER/	Date Considered	08/22/2022

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Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2021-03-18
Name/Print	Woodral, David G.	Registration Number	57277

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	
Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2021-07-21
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

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Examiner Signature	/TYLER AUSTIN LIPPE SWIDLER/	Date Considered	08/22/2022

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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Signature	/david g. woodral/	Date (YYYY-MM-DD)	2020-09-11
Name/Print	Woodral, David G.	Registration Number	57277

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/T.S./	1	20120268262	A1	2012-10-25	POPOVIC	
/T.S./	2	20120313792	A1	2012-12-13	BEHM et al.	
/T.S./	3	20130141251	A1	2013-06-06	SIMS et al.	
/T.S./	4	20130229289	A1	2013-09-05	BENSOUSSAN et al.	
/T.S./	5	20170124876	A1	2017-05-04	ROGERS	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
/T.S./	1	International Search Report and Written Opinion Issued 11/23/2020 in PCT/US2020/045930	

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Examiner Signature	/TYLER AUSTIN LIPPE SWIDLER/	Date Considered	08/22/2022

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Signature	/david g. woodral/	Date (YYYY-MM-DD)	2021-02-23
Name/Print	Woodral, David G.	Registration Number	57277

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Bibliographic Data

Application No: 16/991,595

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged: /TYLER AUSTIN LIPPE SWIDLER/ (Examiner's Signature) | (Initials)

Title: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
08/12/2020	701	3663	012644_00013_PRV_UTL
RULE			

APPLICANTS

ESS-HELP, INC., Houston, TX,

INVENTORS

DAVID M. TUCKER, Katy, TX, UNITED STATES

STEPHEN T. POWERS, Houston, TX, UNITED STATES

MIKE INCORVAIA, Hendersonville, TN, UNITED STATES

AUSTIN REECE TUCKER, Katy, TX, UNITED STATES

CONTINUING DATA

This application has PRO of 62885659 08/12/2019

FOREIGN APPLICATIONS

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TULSA, OK 74120-1495

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8405498		2013-03-26	Smith et al	
	2	9481331		2016-11-01	Tucker et al	
	3	9616810		2017-04-11	Tucker et al	

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	1	20140306826		2014-10-16	Ricci	
	2	20140375810		2014-12-25	Rodriguez	
	3	20150061895		2015-03-05	Ricci	

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	4	20150314723		2015-11-05	Ghiata et al	
	5	20170246987		2017-08-31	Liljestrand	
	6	20190210515		2019-07-11	Aust	
	7	20190279447		2019-09-12	Ricci	
	8	20190283693		2019-09-19	Tucker et al	
	9	20200189446		2020-06-18	Tucker et al	
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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	**08/17/2021 11:53:07 AM ET**	**012644_00013_PRV_UTL**

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	Michelle Kimball
PATENT CENTER #	60283464	FILING DATE	08/12/2020
CUSTOMER #	28827	FIRST NAMED INVENTOR	DAVID M. TUCKER
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	David Woodral

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2021-08-17_IDS.pdf	5	Information Disclosure Statement (IDS) Form (SB08)	983 KB

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2021-08-17_IDS.pdf	4911D1E6E0C4843FF3384F066D193AAA3F3913920AA9005588 BF2ACDDA125E0B67A51BD11D6D0E75F170177C29508B005E C2764E86254474211D9A6FD1A06FF8

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	
Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20120043888	A1	2012-02-23	SALTER, et al.	
	2	20170072835	A1	2017-03-16	SHANK, et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2002274295	JP	A	2002-09-25	MINORU		
	2	2015009647	JP	A	2015-01-19	HIRONORI		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	CHRIS DAVIES, "Inside Cadillac's early bet on Vehicle-to-Vehicle tech", "Inside Cadillac's early bet on Vehicle-to-Vehicle tech", 03/10/2017, Publisher: https://www.slashgear.com/inside-cadillacs-early-bet-on-v2v-vehicle-to-vehicle-tech-10478130/	
	2	, "V2V Safety Technology Now Standard on Cadillace CTS Sedans video", , Publisher: https://media.chevrolet.com/media/ca/en/cadillac/bcportal.html/currentVideoId/5353289496001/pnId/0/typeId/c/currentChannelId/Most%20Recent.html	
	3	KELLEY BLUE BOOK, "2017 Cadillac CTS Sedan Adds V2V Capability", 03/10/2017, Publisher: https://www.kbb.com/car-news/2017-cadillac-cts-sedan-adds-v2v-capability/	

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2021-07-21
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/991,595	**07/21/2021 10:58:29 AM ET**	**012644_00013_PRV_UTL**

Title of Invention

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6990	FILED BY	Michelle Kimball
PATENT CENTER #	60245913	FILING DATE	08/12/2020
CUSTOMER #	28827	FIRST NAMED INVENTOR	DAVID M. TUCKER
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	David Woodral

Documents

TOTAL DOCUMENTS: 6

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
InsideCadillace.pdf	7	Non Patent Literature	2293 KB
JP2002274295A.pdf	27	Foreign Reference	1021 KB
JP2015009647 A.pdf	22	Foreign Reference	217 KB
V2VSafetyTechnologyNowStandardonCadillacCTSSedans.pdf	9	Non Patent Literature	1033 KB
2017CadillacCTSSedanAddsV2VCapabilityKelleyBlueBook.pdf	3	Non Patent Literature	264 KB

2021-07-21_IDS.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	984 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
InsideCadillace.pdf	91A84BB65B289EA3E84684C2D25D670911AC0A1E0F6BCAA9DFFD06F906A266EA4670C533EEB8D9EA0B40398721F607ABE40A0ABD45F0EE42E62E38EF6DF99B35
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V2VSafetyTechnologyNowStandardonCadillacCTSSedans.pdf	E01AC4311DE8CD9D797CF17FA215DC49BDBB6D5C0028AC1DB130AB43FCE415DFABCE945920BC0491924BC5B9AEFB3EE9D79D3A61F6D4147292713FDD50BBADA9
2017CadillacCTSSedanAddsV2VCapabilityKelleyBlueBook.pdf	B41AE6FE759F7ED98A0E0850F02001B77EEC19D0FEE85C8B840A113D84042866EADAB0792EDA48100E38B25B1E1945E486026A57022B44F88FF8630C41048C4F
2021-07-21_IDS.pdf	B6D50522283F29B0994018A6EFF2B072A65CC11C8065464C88A0CFEDF18888648FB5C19224232109F2CD82B7216EF3066494F819CBFAD8C63EC637A6B2785276

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	
Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10173674	B2	2019-01-08	BIDNER	
	2	10351050	B1	2019-07-16	ELWELL	
	3	10598332	B1	2020-03-24	ELWELL	
	4	7046160	B2	2006-05-16	PEDERSON, ET AL.	
	5	9494940	B1	2016-11-15	KENTLEY	
	6	9643533	B1	2017-05-09	HOUSS	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear

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	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

	1	20060043433	A1	2006-03-02	MATSUSHITA	
	2	2009045754	A1	2009-02-19	JOZWIK	
	3	2011205521	A1	2011-08-25	MIMEAULT, ET AL.	
	4	2013054087	A1	2013-02-28	MOHAMED	
	5	2015151671	A1	2015-06-04	REFIOR, ET AL.	
	6	20160152176	A1	2016-06-02	KANG	
	7	2016039336	A1	2016-02-11	NORDSTROM, ET AL.	
	8	2016257243	A1	2016-09-08	SON, ET AL.	
	9	2016339837	A1	2016-11-24	BOLDUC, ET AL.	
	10	2017080850	A1	2017-03-23	DREXLER, ET AL.	
	11	2017243450	A1	2017-08-24	KELLER, ET AL.	

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	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

	12	2017274816	A1	2017-09-28	ZHAO	
	13	2017352274	A1	2017-12-07	KODAMA, ET AL.	
	14	20180094777	A1	2018-04-05	VARGAS-CHAMBERS	
	15	2018056857	A1	2018-03-01	NATALE, ET AL.	
	16	2018061225	A1	2018-03-01	MIGLIANICO	
	17	2019234601	A1	2019-08-01	WESCOTT	
	18	2019361453	A1	2019-11-28	KENTLEY-KLAY, ET AL.	
	19	20200236745	A1	2020-07-23	GARRETT, ET AL.	
	20	2020094734	A1	2020-03-26	KING	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

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	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

	1	107650778	CN	A	2018-02-02	BEIJING XIAOMI MOBILE SOFTWARE CO LTD		☒
	2	110949241	CN	A	2020-04-03	SHANGHAI PATEO YUEZHEN NETWORKING TECHNOLOGY SERVI		☒
	3	111216624	CN	A	2020-06-02	BEIJING BYD MOULD CO LTD		☒
	4	102015205368	DE	A1	2016-09-09	CONTI TEMIC MICROELECTRONIC GMBH [DE		☒
	5	102017215865	DE	A1	2019-03-14	FORD GLOBAL TECH LLC [US]		☒
	6	102018128565	DE	A1	2020-05-14	BAYERISCHE MOTOREN WERKE AG [DE]		☒
	7	202017100790	DE	U1	2017-03-22	FORD GLOBAL TECH LLC [US]		☒
	8	3178698	EP	A1	2017-06-14	SL CORP [KR]		☐
	9	3287320	EP	A1	2018-02-28	ALSTOM TRANSP TECH [FR]		☒
	10	3702213	EP	A1	2020-09-02	KOITO MFG CO LTD [JP]		☐
	11	3056801	FR	A1	2018-03-30	VALEO VISION [FR]		☒

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	Attorney Docket Number	012644_00013_PRV_UTL

	12	2006069245	JP	Aa	2006-03-16	ICHIKOH INDUSTRIES LTD + (ICHIKOH IND LTD)		☒
	13	2006182172	JP	A	2006-07-13	ICHIKOH INDUSTRIES LTD + (ICHIKOH IND LTD)		☒
	14	2014201298	JP	A	2014-10-27	KUNIHIRO SHOJI KK		☒
	15	2018020751	JP	A	2018-02-08	SOMEYA KATSUAKI		☒
	16	2019206225	JP	A	2019-12-05	OSAKA SAIREN SEISAKUSHO KK		☒
	17	2020090183	JP	A	2020-06-11	KOITO MFG CO LTD		☒
	18	4485901	JP	B2	2006-04-27	KOITO MFG CO LTD		☒
	19	6561286	JP	B1	2019-08-21	Auto Ito Co., Ltd.		☒
	20	100656243	KR	B1	2006-12-13	SSANGYONG MOTOR CO		☒
	21	200484734	KR	Y1	2017-11-15	Nam Sang-soo		☒
	22	25623	SI	A	2019-10-30	FAKULTETA ZA INFORMACIJSKE STUDIJE V NOVEM MESTU		☒

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	Examiner Name	
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	23	202022812	TW	A	2020-06-16	LAN GUO TONG		☒
	24	202041101	TW	A	2020-11-01	WHELEN ENG		☒
	25	2020096060	WO	A1	2020-05-14	IOMAP LLC		☒

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Signature	/david g. woodral/	Date (YYYY-MM-DD)	2021-03-18
Name/Print	Woodral, David G.	Registration Number	57277

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	42221095
Application Number:	16991595
International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
Filer Authorized By:	David Gene Woodral
Attorney Docket Number:	012644_00013_PRV_UTL
Receipt Date:	18-MAR-2021
Filing Date:	12-AUG-2020
Time Stamp:	16:40:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	2021-03-18_IDS.pdf	1008396 e808b3c33da738508b80dbe8dd30006fa52c96e0	no	8

Warnings:

Information:					
2	Foreign Reference	CN107650778A-WithMachineTranslation.pdf	5606243 af906ec43ec6ba4c9fda3b3609e995af72b685cb	no	51
Warnings:					
Information:					
3	Foreign Reference	CN110949241A-WithMachineTranslation.pdf	1279933 0b5bbeac9cc40dcacf91b1003811f3ebb40c0fab	no	20
Warnings:					
Information:					
4	Foreign Reference	CN111216624A-WithMachineTranslation.pdf	1421838 4b7de828c0e17360746ce50a4ce721bd33e93077	no	19
Warnings:					
Information:					
5	Foreign Reference	DE102015205368A1-WithMachineTranslation.pdf	1044278 bc0c44a0c914f103d93c0b906827635c71ed4b60	no	17
Warnings:					
Information:					
6	Foreign Reference	DE102017215865A1-WithMachineTranslation.pdf	425982 fe77508e0cd4f9cc248e748704884f540839833f	no	8
Warnings:					
Information:					
7	Foreign Reference	DE102018128565A1-WithMachineTranslation.pdf	1078746 3140db068f1da4950c1a79d979c849ec384bd348	no	16
Warnings:					
Information:					
8	Foreign Reference	DE202017100790U1-WithMachineTranslation.pdf	1152370 e16919b616f1281df8f19de032f0f1506025a516	no	20
Warnings:					
Information:					

9	Foreign Reference	EP3178698A1.pdf	1675521 1ea8bca96dca82e1c2e3e78c49165ef583b9cd77	no	40
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10	Foreign Reference	EP3287320A1-WithMachineTranslation.pdf	504358 af4e1b1ceb55a95a087c585d546d806c275fc649	no	10
Warnings:					
Information:					
11	Foreign Reference	EP3702213A1.pdf	2889290 af44cb4a291450e3af1637dddd00e11f718d275b	no	49
Warnings:					
Information:					
12	Foreign Reference	FR3056801A1-WithMachineTranslation.pdf	2296963 0783e6d5a94e8b0c30c8d5455d6bec8871d76af1	no	39
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13	Foreign Reference	JP2006069245A-WithMachineTranslation.pdf	788438 da07ea090a81ea7abc3c48b47b88c03c51423157	no	16
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14	Foreign Reference	JP2006182172A-WithMachineTranslation.pdf	900163 7dd77c3b9e1b16679baa83dc4bbbd0cad23d3eeb	no	18
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Information:					
15	Foreign Reference	JP2014201298A-WithMachineTranslation.pdf	1003578 0553cfbe2802e62b9e8c3c84e6ba9126ab994f42	no	20
Warnings:					
Information:					

16	Foreign Reference	JP2018020751A-WithMachineTranslation.pdf	793668 e33c51ac645457d18c0287a808ee64e236d6a223	no	17
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Information:					
17	Foreign Reference	JP2019206225A-WithMachineTranslation.pdf	811049 8d055ffde8e1f83544bab7d9ea05a480fa430c91	no	13
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Information:					
18	Foreign Reference	JP2020090183A-WithMachineTranslation.pdf	942766 765164f68f60fe9c0abc17232beb5b813bc624a6	no	17
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Warnings:					
Information:					
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22	Foreign Reference	KR200484734Y1-WithMachineTranslation.pdf	1702181 4b23f81cdd25ac8d58a1ac8c6c1ff23dd9cdb444	no	18
Warnings:					
Information:					

23	Foreign Reference	SI25623A-WithMachineTranslation.pdf	902394 c12af3a55823a62c4a60aedc30bafe8c382df6df	no	17
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Information:					
24	Foreign Reference	TW202022812A-WithMachineTranslation.pdf	8911994 bbe0f273c3b1448216655320364 1f3426a4c2c40	no	139
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Information:					
25	Foreign Reference	TW202041101A-WithMachineTranslation.pdf	2973868 902e2d2dd35a5edd4c3afb9bf03de57681bcde60	no	47
Warnings:					
Information:					
26	Foreign Reference	WO2020096060A1_WithMachineTranslation.pdf	1616267 b7bac8b45bb07b7d61015f1c3135433836194579	no	34
Warnings:					
Information:					
		Total Files Size (in bytes):	44443019		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	
Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20120268262	A1	2012-10-25	POPOVIC	
	2	20120313792	A1	2012-12-13	BEHM et al.	
	3	20130141251	A1	2013-06-06	SIMS et al.	
	4	20130229289	A1	2013-09-05	BENSOUSSAN et al.	
	5	20170124876	A1	2017-05-04	ROGERS	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	International Search Report and Written Opinion Issued 11/23/2020 in PCT/US2020/045930	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2021-02-23
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: DAVID G. WOODRAL
GABLE GOTWALS
100 WEST FIFTH STREET, SUITE 1100
TULSA, OK 74103-4217

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 012644_00013_PRV_PCT	Date of mailing *(day/month/year)* 23 NOV 2020 **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 20/45930	International filing date *(day/month/year)* 12 August 2020 (12.08.2020)
Applicant ESS-HELP, INC.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   How? Directly to the International Bureau preferably through ePCT, or on paper to:
   The International Bureau of WIPO, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland

   For more detailed instructions, see the *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

   Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

   Within **22 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Lee Young Telephone No. PCT Helpdesk: 571-272-4300

Form PCT/ISA/220 (revised January 2020)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference		FOR FURTHER ACTION
012644_00013_PRV_PCT		see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 20/45930	12 August 2020 (12.08.2020)	12 August 2019 (12.08.2019)
Applicant ESS-HELP, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 2

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2019)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 20/45930

A. CLASSIFICATION OF SUBJECT MATTER

IPC - B60Q 1/52; H04W 4/46; G08G 1/16; H04W 4/02 (2020.01)

CPC - H04W 4/46; G08G 1/16; G08G 1/161; B60Q 1/52; H04W 4/021; G08G 1/162

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2013/0229289 A1 (Bensoussan et al.) 05 September 2013 (05.09.2013), para [0014], [0048], [0051], [0053], [0055]-[0057], [0059]-[0060], [0067], [0070], [0073]	1-6, 8-10, 14-25 --- 7, 11-13, 32-35, 38-40
X --- Y	US 2012/0313792 A1 (BEHM et al.) 13 December 2012 (13.12.2012), para [0014], [0016], [0020]-[0022], [0028], [0033], [0038]	26-30, 36-37 --- 31-35, 38-40
Y	US 2012/0268262 A1 (Popovic) 25 October 2012 (25.10.2012), para [0028], [0043], [0078]-[0079]	7, 11-13, 31
A	US 2017/0124876 A1 (Rogers) 04 May 2017 (04.05.2017), entire document	1-40
A	US 2013/0141251 A1 (Sims et al.) 06 June 2013 (06.06.2013), entire document	1-40

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents.
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 October 2020	23 NOV 2020
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Lee Young Telephone No. PCT Helpdesk: 571-272-4300

Form PCT/ISA/210 (second sheet) (July 2019)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: DAVID G. WOODRAL
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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* 23 NOV 2020

Applicant's or agent's file reference	FOR FURTHER ACTION
012644_00013_PRV_PCT	See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 20/45930	12 August 2020 (12.08.2020)	12 August 2019 (12.08.2019)

International Patent Classification (IPC) or both national classification and IPC

IPC - B60Q 1/52; H04W 4/46; G08G 1/16; H04W 4/02 (2020.01)

CPC - H04W 4/46; G08G 1/16; G08G 1/161; B60Q 1/52; H04W 4/021; G08G 1/162

Applicant ESS-HELP, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	06 October 2020	Lee Young PCT Help Desk Telephone No. 571-272-4300

Form PCT/ISA/237 (cover sheet) (revised January 2019)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(b)).

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Form PCT/ISA/237 (Box No. I) (revised January 2019)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	7, 11-13, 31-35, 38-40	YES
	Claims	1-6, 8-10, 14-30, 36-37	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-40	NO
Industrial applicability (IA)	Claims	1-40	YES
	Claims	NONE	NO

2. Citations and explanations:
Claims 1-6, 8-10, and 14-25 lack novelty under PCT Article 33(2) as being anticipated by US 2013/0229289 A1 to Bensoussan et al. (hereinafter 'Bensoussan').

Regarding claim 1, Bensoussan discloses a system for signaling a hazard condition on a vehicle (hazard warning system 140; See FIG 2-3; para [0053] "As illustrated in FIG. 3, a hazard warning system, such as embodiment 140, may be adapted to be carried in or on an automotive vehicle, generally 170. In general, such automotive vehicle 170 may encompass cars, trucks, motorcycles, heavy transport vehicles, delivery vehicles, and the like."), comprising:

a microprocessor configured to receive an electronic signal from the vehicle that is indicative of a hazardous condition involving the vehicle (controller 104 receives hazardous indicator from detector 106; para [0056] "With continued reference to FIG. 3, automotive vehicle 170 carries a controller 104 in communication with a detector 106 and a remote warning signal transmitter 150. When vehicle 170 is involved in a detectable collision, warning signal transmitter 150 broadcasts a remote warning signal 152 to operators of other vehicles in the local area of the collision."); and

a first radio transmitter in operative communication with the microprocessor (radio transmitter 150; See FIG 2; para [0056] "With continued reference to FIG. 3, automotive vehicle 170 carries a controller 104 in communication with a detector 106 and a remote warning signal transmitter 150. When vehicle 170 is involved in a detectable collision, warning signal transmitter 150 broadcasts a remote warning signal 152 to operators of other vehicles in the local area of the collision."; para [0051] "With reference now to FIG. 2, a second embodiment, generally indicated at 140, includes a detector 106 in communication through a controller 104 to operate a remote warning signal transmitter 108. As illustrated, a remote warning signal transmitter 108 may be embodied as one or more of: an alarm 142 operable to transmit a loud sonic signal 144 that is audibly perceptible to approaching traffic (e.g., a siren); a warning light 146 operable to transmit a warning signal 148 that is visibly perceptible to approaching traffic (e.g., a flashing light); and a transmitter 150 operable to transmit a remote warning signal 152 that may be received by a signal receiving apparatus 120 carried in an approaching vehicle.");

wherein, in response to receiving the signal indicative of a hazardous event, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition (para [0056] "With continued reference to FIG. 3, automotive vehicle 170 carries a controller 104 in communication with a detector 106 and a remote warning signal transmitter 150. When vehicle 170 is involved in a detectable collision, warning signal transmitter 150 broadcasts a remote warning signal 152 to operators of other vehicles in the local area of the collision."; para [0051] "As illustrated, a remote warning signal transmitter 108 may be embodied as one or more of: an alarm 142 operable to transmit a loud sonic signal 144 that is audibly perceptible to approaching traffic (e.g., a siren); a warning light 146 operable to transmit a warning signal 148 that is visibly perceptible to approaching traffic (e.g., a flashing light); and a transmitter 150 operable to transmit a remote warning signal 152 that may be received by a signal receiving apparatus 120 carried in an approaching vehicle.").

Regarding claim 2, Bensoussan discloses the system of claim 1. Bensoussan discloses further comprising a global positioning system unit that provides location data corresponding to the vehicle to the microprocessor and the first wireless signal includes the location data (GPS receiver to provide location; para [0067] "A hazard warning system incorporating a GPS receiver or another location-sensing device (e.g., a device such as a cell phone that uses cell phone tower triangulation to determine location) may, for example, transmit information about the location of a hazard. For example, if a vehicle operator observes a hazard, the operator may activate a warning to systems in other vehicles. The warning may include an approximate location of the hazard and/or the time the hazard was observed. In some embodiments, the warning may be passively initiated by the hazard warning system without human intervention, and may nonetheless include information about the location and/or time of the hazard.").

Regarding claim 3, Bensoussan discloses the system of claim 1. Bensoussan discloses further comprising a second radio transmitter in operative communication with a personal electronic device, the personal electronic device providing location data to the microprocessor that is included in the first wireless signal (second transmitter of cell phone; para [0067] "A hazard warning system incorporating a GPS receiver or another location-sensing device (e.g., a device such as a cell phone that uses cell phone tower triangulation to determine location) may, for example, transmit information about the location of a hazard. For example, if a vehicle operator observes a hazard, the operator may activate a warning to systems in other vehicles.").
---Continuation on supplemental pages---

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 34-35, currently depending on claim 29, lack antecedant basis for claiming "the high conspicuity external visual indicator" that was first introduced in claim 33. For the purpose of the opinion, claims 34-35 have been interpreted to depend upon claim 33.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box No. V.2. Citations and explanations:
Regarding claim 4, Bensoussan discloses discloses the system of claim 1. Bensoussan discloses further further comprising:
a radio receiver in operative communication with the microprocessor (receiver 120; FIG 3); wherein the microprocessor receives an indication of a hazard condition of another vehicle via the radio receiver and provides an indication of the same within the vehicle (para [0059] "Embodiment 140 includes a receiver 120 in communication with controller 104 and adapted to receive a signal 152' that is transmitted by a second embodiment 140' carried in another vehicle in proximity to vehicle 170. When signal 152' is forwarded by receiver 120 as an information signal that is received and interpreted by controller 104, a controller 104 may cause a display 158 to emit an appropriate visible signal 160. Controller 104 may optionally cause speaker 162 to emit an appropriate audible alert 164. One or more speakers present in an audio system (e.g., an audio entertainment system) of vehicle 170 may be used as speaker 162. Alternatively, a hazard warning system may include a dedicated speaker.").

Regarding claim 5, Bensoussan discloses the system of claim 4. Bensoussan discloses further wherein the microprocessor provides the indication of the hazard condition of another vehicle electronically to another system within the vehicle (audio entertainment system; para [0059] "When signal 152' is forwarded by receiver 120 as an information signal that is received and interpreted by controller 104, a controller 104 may cause a display 158 to emit an appropriate visible signal 160. Controller 104 may optionally cause speaker 162 to emit an appropriate audible alert 164. One or more speakers present in an audio system (e.g., an audio entertainment system) of vehicle 170 may be used as speaker 162.").

Regarding claim 6, Bensoussan discloses the system of claim 4. Bensoussan discloses further wherein the microprocessor provides the indication of the hazard condition of another vehicle visually to an occupant of the vehicle (para [0059] "Embodiment 140 includes a receiver 120 in communication with controller 104 and adapted to receive a signal 152' that is transmitted by a second embodiment 140' carried in another vehicle in proximity to vehicle 170. When signal 152' is forwarded by receiver 120 as an information signal that is received and interpreted by controller 104, a controller 104 may cause a display 158 to emit an appropriate visible signal 160.").

Regarding claim 8, Bensoussan discloses the system of claim 4. Bensoussan discloses further wherein the microprocessor provides the indication of the hazard condition of another vehicle audibly to an occupant of the vehicle (speaker 162; para [0059] "Embodiment 140 includes a receiver 120 in communication with controller 104 and adapted to receive a signal 152' that is transmitted by a second embodiment 140' carried in another vehicle in proximity to vehicle 170. When signal 152' is forwarded by receiver 120 as an information signal that is received and interpreted by controller 104, a controller 104 may cause a display 158 to emit an appropriate visible signal 160. Controller 104 may optionally cause speaker 162 to emit an appropriate audible alert 164. One or more speakers present in an audio system (e.g., an audio entertainment system) of vehicle 170 may be used as speaker 162.").

Regarding claim 9, Bensoussan discloses the system of claim 4. Bensoussan discloses wherein the microprocessor provides the indication of the hazard condition of another vehicle to a personal electronic device associated with an occupant of the vehicle (para [0055] "In some embodiments, a hazard warning system may incorporate a cellular telephone..., and may be configured to employ one or more sensors built in to the cellular telephone (e.g., a microphone, an accelerometer, a global positioning system (GPS) receiver, etc.). Such a hazard warning system may operate as a software application or "App" on the phone. A hazard warning system operating as a software application on a cellular telephone may include logic to differentiate a vehicle collision from other changes in velocity, such as a dropped phone, etc. A hazard warning system including a cellular telephone may be configured to communicate with hazard warning systems integrated or installed in vehicles.").

Regarding claim 10, Bensoussan discloses the system of claim 1. Bensoussan discloses further wherein the microprocessor is configured to detect an indication from another vehicle that the other vehicle in in a hazardous condition, and transmits a second wireless signal via the first radio transmitter that indicates the other vehicle is in the hazardous condition (para [0059] "Embodiment 140 includes a receiver 120 in communication with controller 104 and adapted to receive a signal 152' that is transmitted by a second embodiment 140' carried in another vehicle in proximity to vehicle 170."; para [0060] "Some transmitters of remote warning signals 150 have a fixed transmission range. Transmitters may include low-power RF transmitters or low-power radar transmitters, such as those deployed in certain automobile parking radar systems. An embodiment 140' may be adapted to receive signal 152 from embodiment 140, and embodiment 140' may subsequently rebroadcast such signal as retransmitted signal 152". In such an arrangement, the remote warning signal may be transmitted a greater distance, and provide additional time for an operator of an approaching vehicle to prepare to arrive at the hazard site.").

Regarding claim 14, Bensoussan discloses an emergency vehicle safety system (hazard warning system 140; See FIG 2-3; para [0053] "As illustrated in FIG. 3, a hazard warning system, such as embodiment 140, may be adapted to be carried in or on an automotive vehicle, generally 170. In general, such automotive vehicle 170 may encompass cars, trucks, motorcycles, heavy transport vehicles, delivery vehicles, and the like.") comprising:

a microprocessor that receives notification of a hazardous condition involving the vehicle (controller 104 receives hazardous indicator from detector 106; para [0056] "With continued reference to FIG. 3, automotive vehicle 170 carries a controller 104 in communication with a detector 106 and a remote warning signal transmitter 150. When vehicle 170 is involved in a detectable collision, warning signal transmitter 150 broadcasts a remote warning signal 152 to operators of other vehicles in the local area of the collision.");
(continued of claim 14)
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Form PCT/ISA/237 (Supplemental Box) (revised January 2019)

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box No. V.2. Citations and explanations:
(continued of claim 14)
a visual indicator visible from an exterior of the vehicle and operatively coupled to the microprocessor (warning light 146; See FIG 3; para [0057] "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'. The beacon 172 or vehicle lights 174 may be integrated into the vehicle 170 such that the vehicle 170 retains its styling and/or aesthetic appeal.");

a radio transmitter operatively coupled to the microprocessor (radio transmitter 150; See FIG 2; para [0056] "With continued reference to FIG. 3, automotive vehicle 170 carries a controller 104 in communication with a detector 106 and a remote warning signal transmitter 150. When vehicle 170 is involved in a detectable collision, warning signal transmitter 150 broadcasts a remote warning signal 152 to operators of other vehicles in the local area of the collision.; para [0051] With reference now to FIG. 2, a second embodiment, generally indicated at 140, includes a detector 106 in communication through a controller 104 to operate a remote warning signal transmitter 108. As illustrated, a remote warning signal transmitter 108 may be embodied as one or more of: an alarm 142 operable to transmit a loud sonic signal 144 that is audibly perceptible to approaching traffic (e.g., a siren); a warning light 146 operable to transmit a warning signal 148 that is visibly perceptible to approaching traffic (e.g., a flashing light); and a transmitter 150 operable to transmit a remote warning signal 152 that may be received by a signal receiving apparatus 120 carried in an approaching vehicle.");

wherein the microprocessor provides a high conspicuity visual signal on the visual indicator upon receipt of the notification of a hazardous condition involving the vehicle (para [0056] "With continued reference to FIG. 3, automotive vehicle 170 carries a controller 104 in communication with a detector 106 and a remote warning signal transmitter 150. When vehicle 170 is involved in a detectable collision, warning signal transmitter 150 broadcasts a remote warning signal 152 to operators of other vehicles in the local area of the collision.; para [0057] Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'."); and

wherein the microprocessor provides a first radio communication via the radio transmitter upon receipt of the notification of a hazardous condition involving the vehicle (para [0056] "With continued reference to FIG. 3, automotive vehicle 170 carries a controller 104 in communication with a detector 106 and a remote warning signal transmitter 150. When vehicle 170 is involved in a detectable collision, warning signal transmitter 150 broadcasts a remote warning signal 152 to operators of other vehicles in the local area of the collision."; para [0051] "As illustrated, a remote warning signal transmitter 108 may be embodied as one or more of: an alarm 142 operable to transmit a loud sonic signal 144 that is audibly perceptible to approaching traffic (e.g., a siren); a warning light 146 operable to transmit a warning signal 148 that is visibly perceptible to approaching traffic (e.g., a flashing light); and a transmitter 150 operable to transmit a remote warning signal 152 that may be received by a signal receiving apparatus 120 carried in an approaching vehicle.").

Regarding claim 15, Bensoussan discloses the system of claim 14. Bensoussan discloses further wherein the radio transmitter provides the first radio communication to a cellular phone tower (para [0067] "A hazard warning system incorporating a GPS receiver or another location-sensing device (e.g., a device such as a cell phone that uses cell phone tower triangulation to determine location) may, for example, transmit information about the location of a hazard."; para [0014] "In some embodiments, the first remote warning signal may be transmitted to other vehicles via repeaters or amplifiers, such as repeaters mounted in satellites or in terrestrial infrastructure (e.g., towers, underpasses, buildings, etc.). One advantage of automatic, direct vehicle-to-vehicle communication is that warnings may be more immediate, and may be more effective at preventing additional collisions than conventional methods of warning of hazards.").

Regarding claim 16, Bensoussan discloses the system of claim 14. Bensoussan discloses further wherein the radio transmitter provides the first radio communication to a receiver of another vehicle (para [0059] "Embodiment 140 includes a receiver 120 in communication with controller 104 and adapted to receive a signal 152' that is transmitted by a second embodiment 140' carried in another vehicle in proximity to vehicle 170. When signal 152' is forwarded by receiver 120 as an information signal that is received and interpreted by controller 104, a controller 104 may cause a display 158 to emit an appropriate visible signal 160. Controller 104 may optionally cause speaker 162 to emit an appropriate audible alert 164. One or more speakers present in an audio system (e.g., an audio entertainment system) of vehicle 170 may be used as speaker 162. Alternatively, a hazard warning system may include a dedicated speaker.)".

Regarding claim 17, Bensoussan discloses the system of claim 14. Bensoussan discloses further wherein the radio transmitter provides the first radio communication to a satellite system (satellite system; para [0014] "In some embodiments, the first remote warning signal may be transmitted to other vehicles via repeaters or amplifiers, such as repeaters mounted in satellites or in terrestrial infrastructure (e.g., towers, underpasses, buildings, etc.). One advantage of automatic, direct vehicle-to-vehicle communication is that warnings may be more immediate, and may be more effective at preventing additional collisions than conventional methods of warning of hazards. Furthermore, systems configured to communicate directly with other systems may be deployed without modifying infrastructure. Another benefit of the hazard warning systems disclosed herein is that warnings may be transmitted around curves or over hills, and may provide vehicle operators information regarding hazards beyond their immediate vision (which, when traveling at high speeds, may be a distance traveled in a relatively short period of time").
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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box No. V.2. Citations and explanations:
Regarding claim 18, Bensoussan discloses the system of claim 14. Bensoussan discloses further wherein the visual indicator comprises a set of lights operative as hazard flashers and turn indicator lights (para [0057] "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'.").

Regarding claim 19, Bensoussan discloses the system of claim 18. Bensoussan discloses wherein the high conspicuity visual signal comprises a signal having a flash rate in excess of a flash rate associated with the use of the set of lights as hazard flashers and in excess of a flash rate associated with the use of the set of lights as turn indicator lights (See FIG 3; para [0057] "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'.").

Regarding claim 20, Bensoussan discloses the system of claim 19. Bensoussan discloses wherein the microprocessor does not provide the first radio signal via the radio transmitter when the visual indicator is used as hazard flashers or as turn indicators (para [0057] "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'. The beacon 172 or vehicle lights 174 may be integrated into the vehicle 170 such that the vehicle 170 retains its styling and/or aesthetic appeal.").

Regarding claim 21, Bensoussan discloses the system of claim 14. Bensoussan discloses further wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a user operated switch inside the vehicle (para [0048] "Furthermore, a vehicle operator may activate the apparatus 130 upon observing a hazard, such as a collision, a disabled vehicle, debris in a roadway (e.g., dropped cargo, fallen trees or rocks), wildlife, roadkill, an emergency vehicle; emergency or traffic control personnel, a pedestrian, a slippery road surface, a work crew, etc. Thus, the system 100 may be operable to generate a signal 116 based only on the input of a vehicle operator, which signal 116 may warn operators of nearby vehicles of a hazard.").

Regarding claim 22, Bensoussan discloses the system of claim 14. Bensoussan discloses further wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a vehicle safety subsystem (para [0070] "Hazard warning systems hereof may supplement and/or interact with anti-collision systems or pre-collision systems available in some automobiles (e.g., systems that use radar to detect when a vehicle is at risk of collision, systems that pre-charge brakes before a predicted collision, systems that apply brakes to slow a vehicle before a predicted collision, or systems that tighten safety belts before a predicted collision). For example, a hazard warning system hereof may be configured to receive a signal from a pre-collision system indicating that a collision is imminent. The hazard warning system may transmit a warning of the impending collision to other vehicles before the collision occurs.").

Regarding claim 23, Bensoussan discloses the system of claim 14. Bensoussan discloses wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a personal electronic device (para [0055] "In some embodiments, a hazard warning system may incorporate a cellular telephone, and may be configured to employ one or more sensors built in to the cellular telephone (e.g., a microphone, an accelerometer, a global positioning system (GPS) receiver, etc.). Such a hazard warning system may operate as a software application or "App" on the phone. A hazard warning system operating as a software application on a cellular telephone may include logic to differentiate a vehicle collision from other changes in velocity, such as a dropped phone, etc. A hazard warning system including a cellular telephone may be configured to communicate with hazard warning systems integrated or installed in vehicles.").

Regarding claim 24, Bensoussan discloses the system of claim 14. Bensoussan discloses wherein the microprocessor receives location data for the vehicle from a global position system unit and provides the location data in the first radio communication (cell phone provides location data; para [0067] "A hazard warning system incorporating a GPS receiver or another location-sensing device (e.g., a device such as a cell phone that uses cell phone tower triangulation to determine location) may, for example, transmit information about the location of a hazard. For example, if a vehicle operator observes a hazard, the operator may activate a warning to systems in other vehicles. The warning may include an approximate location of the hazard and/or the time the hazard was observed. In some embodiments, the warning may be passively initiated by the hazard warning system without human intervention, and may nonetheless include information about the location and/or time of the hazard.").

Regarding claim 25, Bensoussan discloses the system of claim 24. Bensoussan discloses wherein the global positioning system unit is provided, in part, by a personal electronic device (GPS receiver of cell phone; para [0067] "A hazard warning system incorporating a GPS receiver or another location-sensing device (e.g., a device such as a cell phone that uses cell phone tower triangulation to determine location) may, for example, transmit information about the location of a hazard. For example, if a vehicle operator observes a hazard, the operator may activate a warning to systems in other vehicles. The warning may include an approximate location of the hazard and/or the time the hazard was observed.").
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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box No. V.2. Citations and explanations:
Claims 26-30, 36-37 lack novelty under PCT Article 33(2) as being anticipated by US 2012/0313792 A1 to BEHM et al. (hereinafter 'Behm').

Regarding claim 26, Behm discloses a system for providing real time indication of a hazardous vehicle condition (FIG 1; para [0014] "FIG. 1 shows an illustrative system in accordance with aspects of the invention. In embodiments, the system comprises a navigation system 10 associated with a vehicle 15, a location based service (LBS) component 20, and at least one emergency vehicle signal transmitter 30a, 30b,... 30n associated with at least one respective emergency vehicle 35a, 35b,... , 35n, collectively referred to as a transmitter 30 and emergency vehicle 35."), comprising:

a server (LBS server; See FIG 7; para [0022] "FIG. 7 shows an illustrative environment for managing processes of the LBS component 20 in accordance with the invention. To this extent, the LBS component 20 may include a server or other computer infrastructure 112 that can perform one or more of the processes described herein. In particular, the computer infrastructure 112 includes a computing device 114. The computing device 114 can be resident on a network infrastructure or computing device of a third party service provider (any of which is generally represented in FIG. 7)") in communication with a first microprocessor of a first vehicle (microprocessor of smartphone; para [0038] "In accordance with particular aspects of the invention, the transmitter 30 comprises a transmitter computing device comprising a local wireless transmitter (e.g., Bluetooth transmitter) that is integrated with, or operatively connected to, the siren and/or emergency lights system of the emergency vehicle 35. The transmitter 30 also comprises a smart phone mounted in or on the emergency vehicle 35. The transmitter computing device is configured to determine the location and type of the emergency vehicle 35 when the siren and/or emergency lights are activated, e.g., as already described herein. The transmitter computing device comprising the local wireless transmitter essentially operates inside the emergency vehicle 35 due to the small range, e.g., ten meters, of the local wireless transmitter. Accordingly, the transmitter computing device provides the location information and the type of vehicle to the smart phone, e.g., via message or signal using the local wireless communication, and the smart phone then relays this data to the LBS component 20 via the cellular network."),
the first microprocessor operative to receive a signal from the first vehicle indicating a hazardous condition (para [0033] "According to further aspects of the invention, the transmitter 30 (described with respect to FIGS. 1 and 7) is configured to provide data to the LBS component 20 when the siren and/or emergency lights of an emergency vehicle are activated. In alternative embodiments, the transmitter 30 is always on and detects when the siren and/or emergency lights are turned on and off, e.g., by receiving a signal from the warning system of the emergency vehicle 35."; para [0038] "The transmitter 30 also comprises a smart phone mounted in or on the emergency vehicle 35. The transmitter computing device is configured to determine the location and type of the emergency vehicle 35 when the siren and/or emergency lights are activated, e.g., as already described herein. The transmitter computing device comprising the local wireless transmitter essentially operates inside the emergency vehicle 35 due to the small range, e.g., ten meters, of the local wireless transmitter. Accordingly, the transmitter computing device provides the location information and the type of vehicle to the smart phone, e.g., via message or signal using the local wireless communication, and the smart phone then relays this data to the LBS component 20 via the cellular network.");

wherein the server receives the indication of the hazardous condition from the first microprocessor and provides the indication to a second vehicle (LBS relays hazard condition from EV to vehicle 15; para [0021] "According to further aspects of the invention, the LBS component 20 (described with respect to FIG. 1) collects the location of one or more emergency vehicles 35 that have the siren and/or emergency lights activated (e.g., are responding to calls) and provides Emergency Vehicle Notification (EVN) data of the one or more emergency vehicles 35 to one or more GPS-based navigation devices 50 of one or more vehicles 15. In embodiments, the EVN data comprises the location of the emergency vehicle 35 (e.g., longitude and latitude) and the type of the emergency vehicle (e.g., police, fire, ambulance, etc.). In embodiments, the EVN data may also comprise identification data associated with the emergency vehicle 35, such as a vehicle identifier (e.g., ID number) normally displayed on the roof or other exterior portion of an emergency vehicle.").

Regarding claim 27, Behm discloses the system of claim 26. Behm discloses further wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle (microprocessor, not shown, of navigation system 10, 50; para [0016] "In embodiments, the navigation system 10 comprises a GPS-based navigation device 50 that is structured and arranged to: receive data from the LBS component 20 identifying the location and type of an emergency vehicle 35 when the siren and/or emergency lights of the emergency vehicle 35 are activated; receive or determine a location of the vehicle 15, e.g., from the GPS system 40; determine the location of the emergency vehicle 35 with respect to the location of the vehicle 15, e.g., based on the received data from the LBS component 20 and the GPS system 40; and display the location and type of the emergency vehicle 35 with respect to the location of the vehicle 15 on a visual display. In implementations, the GPS-based navigation device 50 may be referred to as a GPS with Emergency Vehicle Detection (EVD).").

Regarding claim 28, Behm discloses the system of claim 26. Behm discloses further wherein the first microprocessor is in communication with a global positioning system associated with the first vehicle and includes location data therefrom in the signal indicating a hazardous condition (para [0038] "The transmitter 30 also comprises a smart phone mounted in or on the emergency vehicle 35. The transmitter computing device is configured to determine the location and type of the emergency vehicle 35 when the siren and/or emergency lights are activated, e.g., as already described herein. The transmitter computing device comprising the local wireless transmitter essentially operates inside the emergency vehicle 35 due to the small range, e.g., ten meters, of the local wireless transmitter. Accordingly, the transmitter computing device provides the location information and the type of vehicle to the smart phone, e.g., via message or signal using the local wireless communication, and the smart phone then relays this data to the LBS component 20 via the cellular network."; para [0015] "In accordance with aspects of the invention, respective locations (e.g., longitude and latitude) of the emergency vehicle 35 and the vehicle 15 are determined using a global positioning system (GPS) 40. The GPS 40 may also determine at least one of direction of travel and rate of travel for at least one of the emergency vehicle 35 and the vehicle 15. Conventional GPS techniques may be used in determining location, direction of travel, and rate of travel, such that further explanation is not believed necessary.").
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International application No.
PCT/US 20/45930

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box No. V.2. Citations and explanations:
Regarding claim 29, Behm discloses the system of claim 28. Behm discloses further wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition (microprocessor, not shown, of navigation system 10, 50; para [0016] "In embodiments, the navigation system 10 comprises a GPS-based navigation device 50 that is structured and arranged to: receive data from the LBS component 20 identifying the location and type of an emergency vehicle 35 when the siren and/or emergency lights of the emergency vehicle 35 are activated; receive or determine a location of the vehicle 15, e.g., from the GPS system 40; determine the location of the emergency vehicle 35 with respect to the location of the vehicle 15, e.g., based on the received data from the LBS component 20 and the GPS system 40; and display the location and type of the emergency vehicle 35 with respect to the location of the vehicle 15 on a visual display. In implementations, the GPS-based navigation device 50 may be referred to as a GPS with Emergency Vehicle Detection (EVD).") and
provides an alert to an occupant of the second vehicle only when the first vehicle is located within a roadway path of the second vehicle (See FIG 6; para [0020] "FIGS. 3-6 show illustrative examples of the GPS-based navigation device 50 displaying the location of an emergency vehicle relative to the location of the vehicle associated with the GPS-based navigation device 50. In yet another example, FIG. 6 shows the GPS-based navigation device 50 displaying a street map 55, an icon 60 representing the driver's vehicle, and an icon 65" representing a police car approaching from behind.").

Regarding claim 30, Behm discloses the system of claim 29. Behm discloses further wherein the alert to the occupant of the second vehicle is a visual indication (visual display; para [0016] "In embodiments, the navigation system 10 comprises a GPS-based navigation device 50 that is structured and arranged to: receive data from the LBS component 20 identifying the location and type of an emergency vehicle 35 when the siren and/or emergency lights of the emergency vehicle 35 are activated; receive or determine a location of the vehicle 15, e.g., from the GPS system 40; determine the location of the emergency vehicle 35 with respect to the location of the vehicle 15, e.g., based on the received data from the LBS component 20 and the GPS system 40; and display the location and type of the emergency vehicle 35 with respect to the location of the vehicle 15 on a visual display.").

Regarding claim 36, Behm discloses the system of claim 28, Behm discloses wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition (microprocessor, not shown, of navigation system 10, 50; para [0016] "In embodiments, the navigation system 10 comprises a GPS-based navigation device 50 that is structured and arranged to: receive data from the LBS component 20 identifying the location and type of an emergency vehicle 35 when the siren and/or emergency lights of the emergency vehicle 35 are activated; receive or determine a location of the vehicle 15, e.g., from the GPS system 40; determine the location of the emergency vehicle 35 with respect to the location of the vehicle 15, e.g., based on the received data from the LBS component 20 and the GPS system 40; and display the location and type of the emergency vehicle 35 with respect to the location of the vehicle 15 on a visual display. In implementations, the GPS-based navigation device 50 may be referred to as a GPS with Emergency Vehicle Detection (EVD).") and
provides an alert to an occupant of the second vehicle only when the first vehicle is located within a threshold distance of the second vehicle (para [0016] "determine the location of the emergency vehicle 35 with respect to the location of the vehicle 15, e.g., based on the received data from the LBS component 20 and the GPS system 40; and display the location and type of the emergency vehicle 35 with respect to the location of the vehicle 15 on a visual display."; para [0028] "In embodiments, the EVN manager 160 is configured to use a default predefined range or to receive a user-defined predefined range from the GPS-based navigation device 50. For example, the programming of the GPS-based navigation device 50 may be configured to permit a user to set the predefined range, e.g., using an interactive options menu displayed as part of a graphical user interface. In this manner, different users of the vehicle 15 may set the predefined range to suit their preference. For example, a first driver may use the GPS-based navigation device 50 to set the predefined range to one mile when the first driver is operating the vehicle 15, and a second driver may use the GPS-based navigation device 50 to set the predefined range to 300 yards when the second driver is operating the vehicle 15.").

Regarding claim 37, Behm discloses the system of claim 36. Behm discloses further wherein the second microprocessor only provides the alert when the second vehicle is on a course to intercept the first vehicle (See FIG 3-4; para [0020] "FIGS. 3-6 show illustrative examples of the GPS-based navigation device 50 displaying the location of an emergency vehicle relative to the location of the vehicle associated with the GPS-based navigation device 50. For example, FIG. 3 shows the GPS-based navigation device 50 displaying a street map 55, an icon 60 representing the driver's vehicle, and an icon 65' representing a fire truck approaching an upcoming intersection from the right. As another example, FIG. 4 shows the GPS-based navigation device 50 displaying a street map 55, an icon 60 representing the driver's vehicle, and an icon 65" representing a police car approaching an upcoming intersection from the left.").

Claims 7, and 11-13 lack an inventive step under PCT Article 33(3) as being obvious over Bensoussan in view of US 2012/0268262 A1 ('Popovic').

Regarding claim 7, Bensoussan discloses the system of claim 6. Bensoussan does not disclose comprising a heads-up display, and wherein the visual indication of the hazard condition of another vehicle is provided to an occupant of the vehicle using said heads-up display.
(continued of claim 7)
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International application No.
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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box No. V.2. Citations and explanations:
(continued of claim 7)
Popovic in the related art of vehicle hazard warning system discloses a heads-up display, and wherein the visual indication of the hazard condition of another vehicle is provided to an occupant of the vehicle using said heads-up display (HUD 140; para [0028] "Motor vehicle 102 can include warning system 100. Warning system 100 can be any system or combination of systems used in providing warning information to a driver regarding potential driving hazards as well as other warning information. In some cases, warning system 100 can receive warning information from another device and/or system associated with motor vehicle 102. In other cases, warning system 100 can include one or more devices for gathering and/or receiving warning information. In some cases, warning system 100 can include devices or systems for gathering information, analyzing information and providing warning information to a driver, for example, through a visual alert of some kind."; para [0043] "Warning system 100 can include provisions for highlighting potential hazards in a driving environment. In some cases, warning system 100 may include port 130 for communicating with heads up display device 140, also referred to simply as HUD 140. Further details of HUD 140 are discussed below.").

It would have been obvious to a person having ordinary skill in the art to modify the system of Bensoussan with the teaching of a heads-up display, and wherein the visual indication of the hazard condition of another vehicle is provided to an occupant of the vehicle using said heads-up display as disclosed by Popovic as this would have provided the advantage for providing hazardous warning within the view of the driver without turning attention away from driving (See Popovic- para [0028], [0043]).

Regarding claim 11, Bensoussan discloses the system of claim 10. Bensoussan does not disclose wherein the indication from the other vehicle is a line of sight communication.

Popovic in the related art of vehicle hazard warning system discloses wherein the indication from the other vehicle is a line of sight communication (LOS communication; See FIG 13; para [0078] "This information may include information about objects in the driving environment including nearby vehicles, buildings, pedestrians and/or other objects. In some cases, cameras can be used to detect information about these objects. In other cases, other sensors could be used, such as thermal sensors, radar or other remote sensing devices 133. In step 1302, warning system 100 may receive driver monitoring information. This may include determining the driver's viewing direction, eye movements, the driver's line of sight, head position, head tilt as well as any other kind of information. Next, in step 1304, warning system 100 may determine the viewpoint of the driver. In particular, warning system 100 determines what location or region of combiner 202 (such as a windshield) the driver is currently viewing as well as what objects may be visible to the driver from that viewpoint."; para [0079] "In step 1310, warning system 100 acts on remote vehicle visibility determined in the previous step 1308. If the remote vehicle is visible, warning system 100 may proceed to step 1312 to determine a warning image. The warning image can be a predetermined warning image, or can be generated according to information about the remote vehicle. If the vehicle is detected by a camera, for example, a warning image can be generated that roughly corresponds to the size and shape of the remote vehicle as viewed by the driver. In step 1314, warning system 100 may display the warning image at a location of combiner 202 that corresponds to the driver's view of the remote vehicle so that the warning image is superimposed onto the remote vehicle.").

It would have been obvious to a person having ordinary skill in the art to modify the system of Bensoussan with the teaching of the indication from the other vehicle is a line of sight communication as disclosed by Popovic as this would have provided the advantage for directly receiving the hazard warning and providing effective warning to the driver (See Popovic- para [0078]-[0079]).

Regarding claim 12, Bensoussan in view of Popovic discloses the system of claim 11. Popovic discloses further wherein the indication from the other vehicle is an indication from a forward-looking sensor communicatively coupled to the microprocessor (camera as forward-looking sensor; para [0078] "In some cases, cameras can be used to detect information about these objects. In other cases, other sensors could be used, such as thermal sensors, radar or other remote sensing devices 133. In step 1302, warning system 100 may receive driver monitoring information. This may include determining the driver's viewing direction, eye movements, the driver's line of sight, head position, head tilt as well as any other kind of information. Next, in step 1304, warning system 100 may determine the viewpoint of the driver. In particular, warning system 100 determines what location or region of combiner 202 (such as a windshield) the driver is currently viewing as well as what objects may be visible to the driver from that viewpoint.").

Regarding claim 13, Bensoussan in view of Popovic discloses the system of claim 12. Popovic discloses further wherein the forward-looking sensor comprises a camera (cameras; para [0078] "In some cases, cameras can be used to detect information about these objects. In other cases, other sensors could be used, such as thermal sensors, radar or other remote sensing devices 133. In step 1302, warning system 100 may receive driver monitoring information. This may include determining the driver's viewing direction, eye movements, the driver's line of sight, head position, head tilt as well as any other kind of information.").

Claims 31 lack an inventive step under PCT Article 33(3) as being obvious over Behm in view of Popovic.

Regarding claim 31, Behm discloses the system of claim 30. Behm does not disclose wherein the visual indication is provided on a heads-up display.

(continued of claim 31)
---Continuation on next page---

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International application No.
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Supplemental Box

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Continuation of:
Box No. V.2. Citations and explanations:
(continued of claim 31)
Popovic in the related art of vehicle hazard warning system discloses the visual indication is provided on a heads-up display (HUD 140; para [0028] "Motor vehicle 102 can include warning system 100. Warning system 100 can be any system or combination of systems used in providing warning information to a driver regarding potential driving hazards as well as other warning information. In some cases, warning system 100 can receive warning information from another device and/or system associated with motor vehicle 102. In other cases, warning system 100 can include one or more devices for gathering and/or receiving warning information. In some cases, warning system 100 can include devices or systems for gathering information, analyzing information and providing warning information to a driver, for example, through a visual alert of some kind."; para [0043] "Warning system 100 can include provisions for highlighting potential hazards in a driving environment. In some cases, warning system 100 may include port 130 for communicating with heads up display device 140, also referred to simply as HUD 140. Further details of HUD 140 are discussed below.").

It would have been obvious to a person having ordinary skill in the art to modify the system of Behm with the teaching of the visual indication is provided on a heads-up display as disclosed by Popovic as this would have provided the advantage for providing hazardous warning within the view of the driver without turning attention away from driving (See Popovic- para [0028], [0043]).

Claims 32-35, 38-40 lack an inventive step under PCT Article 33(3) as being obvious over Behm in view of Bensoussan.

Regarding claim 32, Behm discloses the system of claim 29. Behm does not disclose wherein the alert to the occupant of the second vehicle is an audio alert.

Bensoussan in the related art discloses the alert to the occupant of the second vehicle is an audio alert (speaker 162 producing audible alert; para [0059] "Embodiment 140 includes a receiver 120 in communication with controller 104 and adapted to receive a signal 152' that is transmitted by a second embodiment 140' carried in another vehicle in proximity to vehicle 170. When signal 152' is forwarded by receiver 120 as an information signal that is received and interpreted by controller 104, a controller 104 may cause a display 158 to emit an appropriate visible signal 160. Controller 104 may optionally cause speaker 162 to emit an appropriate audible alert 164. One or more speakers present in an audio system (e.g., an audio entertainment system) of vehicle 170 may be used as speaker 162. Alternatively, a hazard warning system may include a dedicated speaker.").

It would have been obvious to a person having ordinary skill in the art to modify the system of Behm with the teaching of the alert to the occupant of the second vehicle is an audio alert as disclosed by Bensoussan as this would have provided the advantage for audibly alert the vehicle occupant of hazard conditions in addition to visual alert (See Bensoussan- para [0059]).

Regarding claim 33, Behm discloses the system of claim 29. Behm does not disclose wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided.

Bensoussan in the related art discloses the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided (para [0057] "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'. The beacon 172 or vehicle lights 174 may be integrated into the vehicle 170 such that the vehicle 170 retains its styling and/or aesthetic appeal.").

It would have been obvious to a person having ordinary skill in the art to modify the system of Behm with the teaching of the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided as disclosed by Bensoussan as this would have provided the advantage for permitting observation from all angles of approach to the broadcasting vehicle (See Bensoussan- para [0057]).

Regarding claim 34 (According to Box No. VIII), Behm in view of Bensoussan discloses the system of claim 33. Bensoussan discloses further wherein the high conspicuity external visual indicator is activated when the operator of the second vehicle decelerates as the second vehicle approaches the location of the first vehicle (para [0073] "FIG. 6 illustrates a traffic situation in which the direction of traffic motion is indicated by arrows 200. Vehicles 202, 204, and 206 are spaced apart by about the minimum safe distance for operation at the speed of the illustrated traffic. Vehicles 208, 210, and 212 have just become involved in a collision, generally 213, and an airbag was deployed in at least vehicle 210, which caused broadcast of remote warning signal 152. While vehicle 214 may not be able to stop in time to avoid joining the collision 213, the operator of vehicle 216 may receive warning signal 152 and gain an additional increment of time sufficient to avoid the collision 213.").

Regarding claim 35 (According to Box No. VIII), Behm in view of Bensoussan discloses the system of claim 33. Bensoussan discloses further wherein the high conspicuity external visual indicator is activated to strobe the lights at the rear of the second vehicle (para [0057] "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'. The beacon 172 or vehicle lights 174 may be integrated into the vehicle 170 such that the vehicle 170 retains its styling and/or aesthetic appeal.").
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Box No. V.2. Citations and explanations:
Regarding claim 38, Behm discloses the system of claim 36. Behm does not disclose wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided.

Bensoussan in the related art discloses the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided (para [0057] "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172. However, one or more vehicle lights 174 already carried by vehicle 170, such as a headlight, turn signal, taillight, running light, fog light, and/or brake signal, may be used as a broadcasting element for a visible signal 148'. The beacon 172 or vehicle lights 174 may be integrated into the vehicle 170 such that the vehicle 170 retains its styling and/or aesthetic appeal.").

It would have been obvious to a person having ordinary skill in the art to modify the system of Behm with the teaching of the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided as disclosed by Bensoussan as this would have provided the advantage for permitting observation from all angles of approach to the broadcasting vehicle to effectively warn other drivers of hazard condition (See Bensoussan- para [0057]).

Regarding claim 39, Behm in view of Bensoussan discloses the system of claim 38. Behm discloses further wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition (microprocessor, not shown, of navigation system 10, 50; para [0016] "In embodiments, the navigation system 10 comprises a GPS-based navigation device 50 that is structured and arranged to: receive data from the LBS component 20 identifying the location and type of an emergency vehicle 35 when the siren and/or emergency lights of the emergency vehicle 35 are activated; receive or determine a location of the vehicle 15, e.g., from the GPS system 40; determine the location of the emergency vehicle 35 with respect to the location of the vehicle 15, e.g., based on the received data from the LBS component 20 and the GPS system 40; and display the location and type of the emergency vehicle 35 with respect to the location of the vehicle 15 on a visual display. In implementations, the GPS-based navigation device 50 may be referred to as a GPS with Emergency Vehicle Detection (EVD).) and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a roadway path (See FIG 6; para [0020] "FIGS. 3-6 show illustrative examples of the GPS-based navigation device 50 displaying the location of an emergency vehicle relative to the location of the vehicle associated with the GPS-based navigation device 50. In yet another example, FIG. 6 shows the GPS-based navigation device 50 displaying a street map 55, an icon 60 representing the driver's vehicle, and an icon 65" representing a police car approaching from behind."); and

within a threshold distance of the second vehicle (para [0016] "determine the location of the emergency vehicle 35 with respect to the location of the vehicle 15, e.g., based on the received data from the LBS component 20 and the GPS system 40; and display the location and type of the emergency vehicle 35 with respect to the location of the vehicle 15 on a visual display."; para [0028] "In embodiments, the EVN manager 160 is configured to use a default predefined range or to receive a user-defined predefined range from the GPS-based navigation device 50. For example, the programming of the GPS-based navigation device 50 may be configured to permit a user to set the predefined range, e.g., using an interactive options menu displayed as part of a graphical user interface. In this manner, different users of the vehicle 15 may set the predefined range to suit their preference. For example, a first driver may use the GPS-based navigation device 50 to set the predefined range to one mile when the first driver is operating the vehicle 15, and a second driver may use the GPS-based navigation device 50 to set the predefined range to 300 yards when the second driver is operating the vehicle 15.").

Regarding claim 40, Behm in view of Bensoussan discloses the system of claim 39. Bensoussan discloses further wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided (para [0057] "Further, warning light 146 may broadcast a remote warning signal 148 that can be perceived by operators of approaching vehicles. In certain embodiments, the device used to broadcast light signal 148 may be structured to permit observation of the signal 148 from all angles of approach to the broadcasting vehicle. One such device includes roof-mounted beacon 172.").

Claims 1-40 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

Electronic Acknowledgement Receipt

EFS ID:	42000931
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International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS_2021-02-23.pdf	1006763 1d7975a02c3080e72bbcf421fd57de2216caac6f	no	4

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2	Non Patent Literature	ISR_WO_PCT_US2020_045930.pdf	3013569 ff14b9ea80374e1a8ff6285defc59694975eb2e0	no	15
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16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL

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The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/991,595	08/12/2020		1865	012644_00013_PRV_UTL	40	3

CONFIRMATION NO. 6990

UPDATED FILING RECEIPT

28827
GABLE & GOTWALS
100 WEST FIFTH STREET, 10TH FLOOR
TULSA, OK 74103

OC000000120770984

Date Mailed: 10/21/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

DAVID M. TUCKER, Katy, TX;
STEPHEN T. POWERS, Houston, TX;
MIKE INCORVAIA, Hendersonville, TN;
AUSTIN REECE TUCKER, Katy, TX;

Applicant(s)

ESS-HELP, INC., Houston, TX;

Power of Attorney: The patent practitioners associated with Customer Number 28827

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/885,659 08/12/2019

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 08/18/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/991,595**

Projected Publication Date: 02/18/2021

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/991,595

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	80		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	350		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	40 minus 20 =	* 20	x 50 =	1000	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 240 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	1830		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL

CONFIRMATION NO. 6990

28827
GABLE & GOTWALS
100 WEST FIFTH STREET, 10TH FLOOR
TULSA, OK 74103

INFORMAL NOTICE

OC000000120770985

Date Mailed: 10/21/2020

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  DAVID M. TUCKER
  STEPHEN T. POWERS
  MIKE INCORVAIA
  AUSTIN REECE TUCKER

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dnguyen/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): ESS-Help, Inc. Inventor(s): TUCKER, et al. Application No.: 16/991,595 Filed: 08/12/2020 Title: SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS Attorney Docket No.: 012644_00013_PRV_UTL	Confirmation No.: 6990 Art Unit: Examiner:

Commissioner for Patents
Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Dear Sir:

This paper is filed in response to a Notice to File Corrected Application Papers ("Notice") mailed on August 19, 2020. Enclosed are the following documents and fees to complete the filing requirements of the above-identified application.

(X) At any time during the pendency of this application, please charge any underpayment of fees required under 37 CFR 1.16 or 1.17 or credit any overpayment to Deposit Account No. 50-1971. Please also consider this paragraph to constitute a conditional petition for extension of time if such is required for the acceptance of this paper.

(X) Five (5) replacement drawing sheets (containing Figures 1-5) in compliance with 37 CFR 1.84 and 37 CFR 1.121, properly indicating "replacement sheet" in the header of each page of drawings.

Respectfully submitted,

Date: October 19, 2020

/david g. woodral/

David G. Woodral, Registration No. 57277
GABLE GOTWALS
1100 ONEOK Plaza
100 West Fifth Street
Tulsa, OK 74103
Telephone: (918) 595-4800
Fax: (918) 595-4990

Customer No. 28827

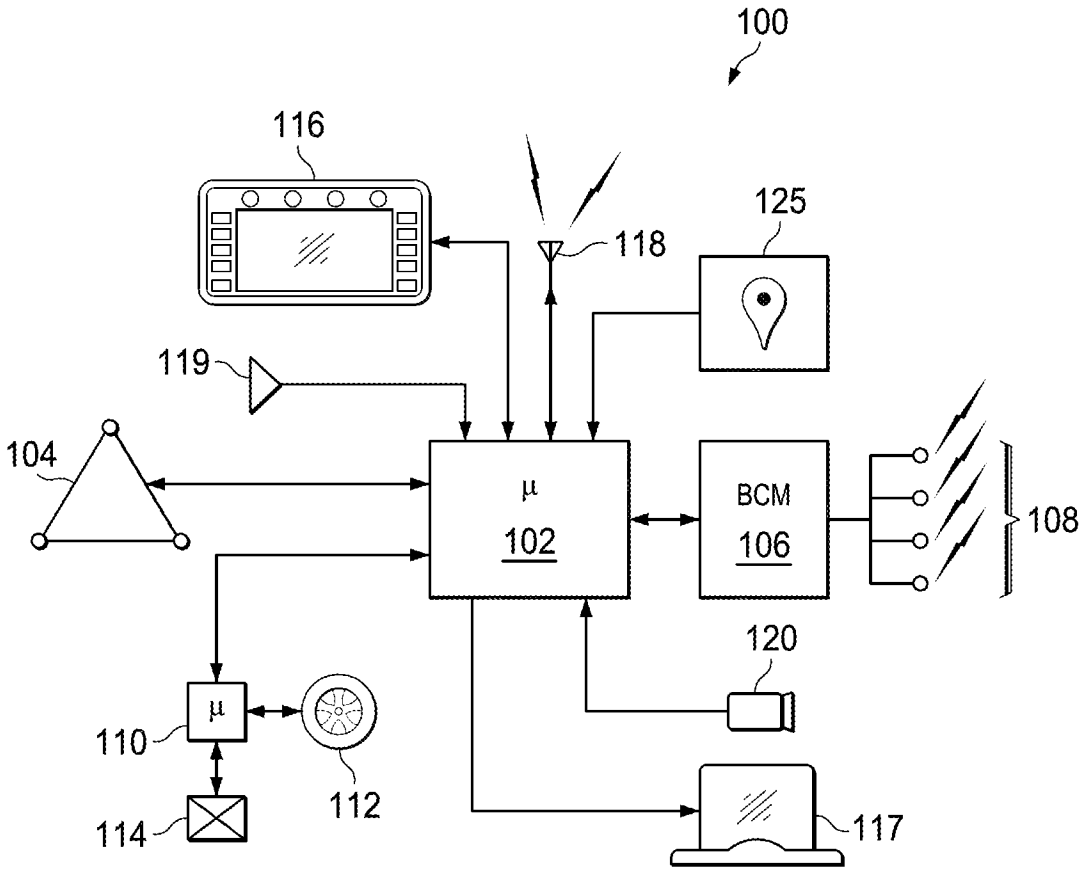


FIG. 1

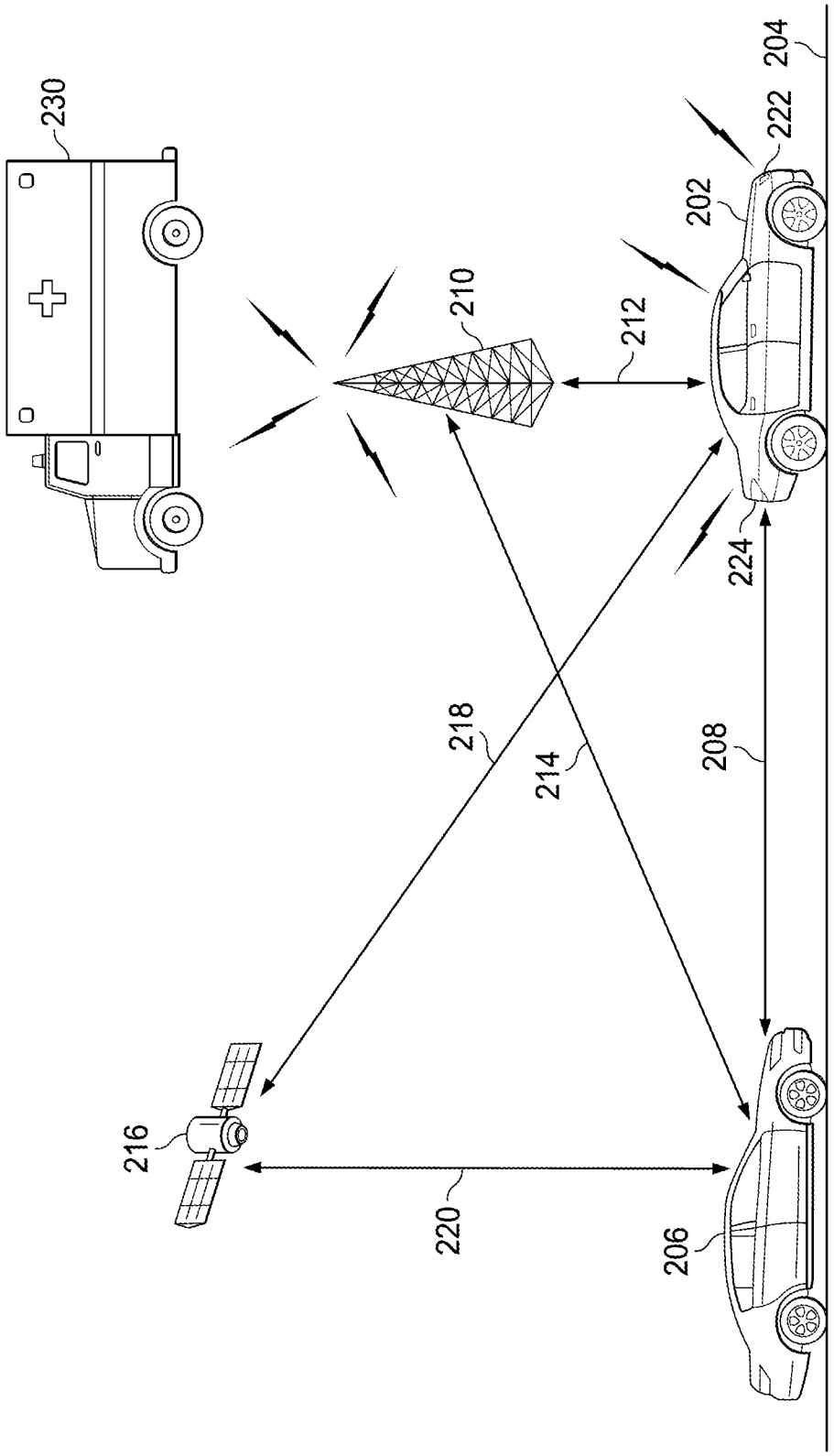


FIG. 2

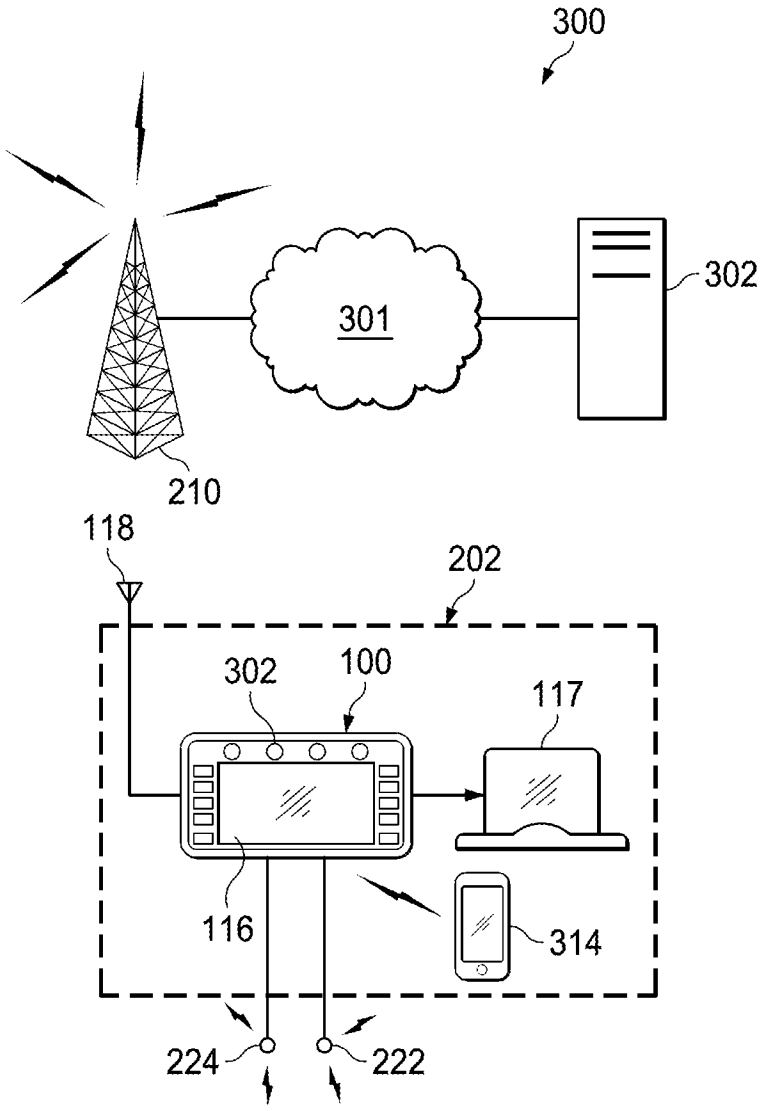


FIG. 3

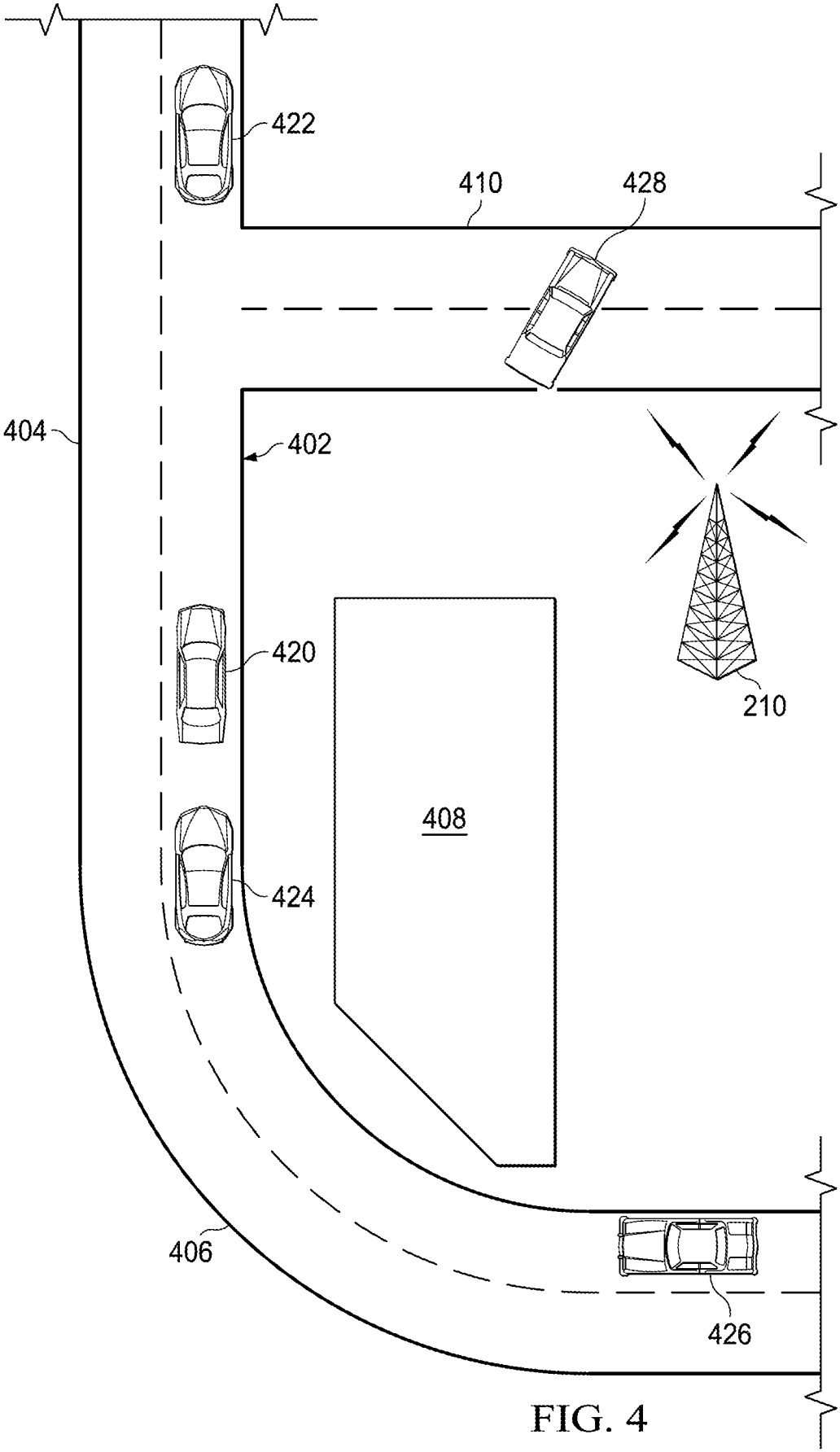


FIG. 4

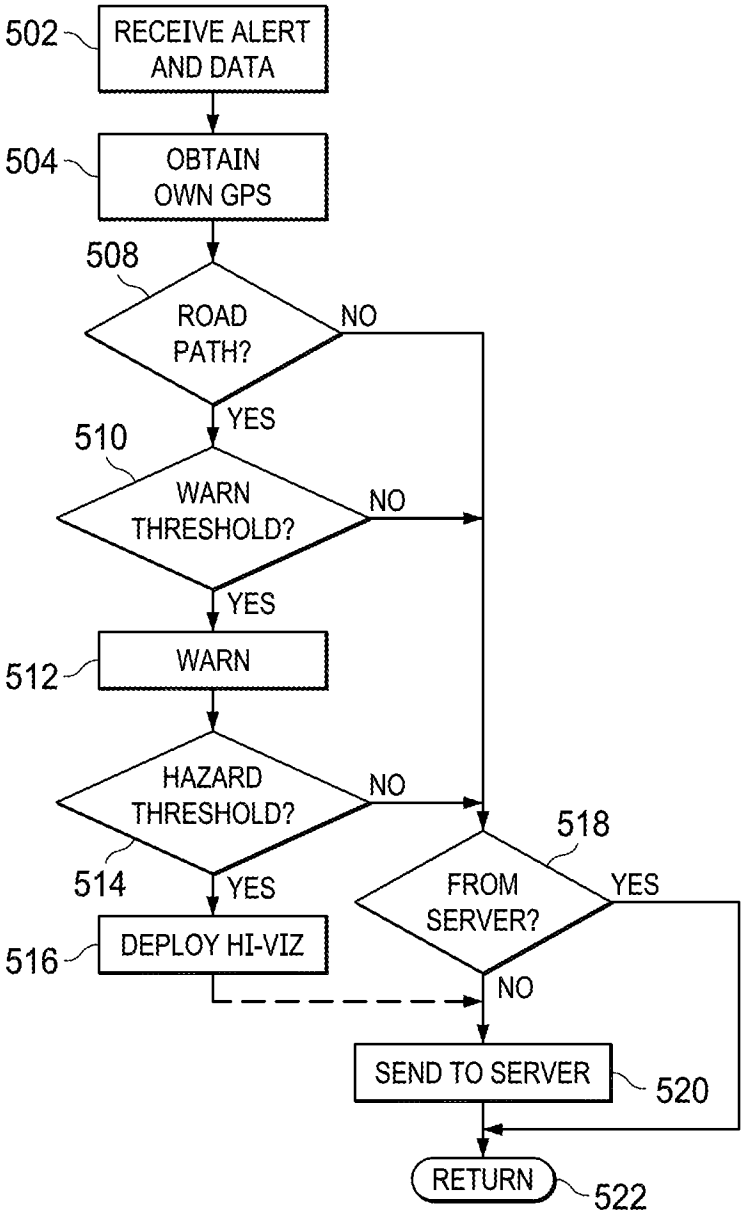

502
RECEIVE ALERT AND DATA
504
OBTAIN OWN GPS
508
ROAD PATH?
NO
YES
510
WARN THRESHOLD?
NO
YES
512
WARN
HAZARD THRESHOLD?
NO
514
YES
516
DEPLOY HI-VIZ
518
FROM SERVER?
YES
NO
SEND TO SERVER
520
RETURN
522

FIG. 5

Electronic Acknowledgement Receipt

EFS ID:	40881979
Application Number:	16991595
International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
Filer Authorized By:	David Gene Woodral
Attorney Docket Number:	012644_00013_PRV_UTL
Receipt Date:	19-OCT-2020
Filing Date:	12-AUG-2020
Time Stamp:	16:14:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	ResponseMissingParts.pdf	77133 f8a5ba152876dab2b0d6e4f535f96c741b991391	no	2

Warnings:

Information:					
2	Drawings-only black and white line drawings	FormalFigures.pdf	414782 be9cdab1f66a81c91edc368181fe7bf62ae3f26c	no	5
Warnings:					
Information:					
			Total Files Size (in bytes):	491915	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	
Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8669853	B1	2014-03-11	GARDNER	
	2	8903617	B2	2014-12-02	BRAUNBERGER et al.	
	3	5736925		1998-04-07	KNAUFF	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020036908	A1	2002-03-28	PEDERSON	
	2	20020078879		2002-06-27	Wood	
	3	20020105432		2002-08-08	Pederson, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

	4	20030001728		2003-01-02	Flick	
	5	20030132852	A1	2003-07-17	POVEY et al.	
	6	20040100373	A1	2004-05-27	PONZIANI	
	7	20040257214	A1	2004-12-23	SMITHSON	
	8	20050099286		2005-05-12	DeYOUNG	
	9	20050134448	A1	2005-06-23	PERLMAN, et al.	
	10	20060022520	A1	2006-02-02	MATHENY	
	11	20060125616		2006-06-15	Song	
	12	20060209547		2006-09-21	Biondo et al	
	13	20070142977		2007-06-21	Munoz	
	14	20070159319	A1	2007-07-12	MALDONADO	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

	15	20070194905	A1	2007-08-23	HERRIG, et al.	
	16	20080100432	A1	2008-05-01	HOFFMAN	
	17	20090219150	A1	2009-09-03	DEYOUNG	
	18	20090322508	A1	2009-12-31	MALIK	
	19	20100109859	A1	2010-05-06	LAKOSKY	
	20	20100134271		2010-06-03	Edwards et al	
	21	20100225465	A1	2010-09-09	EKCHIAN, et al.	
	22	20100253499		2010-10-07	Haab et al	
	23	20120185130	A1	2012-07-19	EKCHIAN et al.	
	24	20130093582	A1	2013-04-18	WALSH et al.	
	25	20130190985		2013-07-25	Nakano et al	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

	26	20140055619	A1	2014-02-27	HOLLAND et al.	
	27	20140146552	A1	2014-05-29	HUI	
	28	20140149025	A1	2014-05-29	FAZI	
	29	20140300462	A1	2014-10-09	RUSS	
	30	20140361686	A1	2014-12-11	WOLFE	
	31	20140368324	A1	2014-12-18	SEIFERT	
	32	20150061492	A1	2015-03-05	BRAUNBERGER	
	33	20150088397		2015-03-26	Burton	
	34	20150116133	A1	2015-04-30	MAWBEY et al.	
	35	20150127212	A1	2015-05-07	CHACON, et al.	
	36	20160144778		2016-05-26	Tucker et al	

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	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

	37	20170274819		2017-09-28	Domingo	
	38	20170305349		2017-10-26	Naboulsi	
	39	20170364070		2017-12-21	OBA	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2020-09-11
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: DAVID G. WOODRAL
FELLERS, SNIDER, BLANKENSHIP, BAILEY & TIPPENS, P.C.
321 SOUTH BOSTON, SUITE 800
TULSA, OK 74103-3318

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 29 DEC 2016
Applicant's or agent's file reference 16-266 WO	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 16/54489	International filing date *(day/month/year)* 29 September 2016 (29.09.2016)
Applicant TUCKER, DAVID M.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   How? Directly to the International Bureau of WIPO preferably through ePCT or on paper to, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

   Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

   Within **19 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Lee W. Young PCT Helpdesk: 571-272-4300 Telephone No. PCT OSP: 571-272-7774

Form PCT/ISA/220 (July 2014)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 16-266 WO	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 16/54489	International filing date *(day/month/year)* 29 September 2016 (29.09.2016)	(Earliest) Priority Date *(day/month/year)*
Applicant TUCKER, DAVID M.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 9 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1 **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 20

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 16/54489

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - B60Q 1/52, B60Q 1/26 (2016.01)
CPC - B60Q1/38, B60Q1/46, B60Q1/52
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - B60Q 1/52, B60Q 1/26 (2016.01)
CPC - B60Q1/38, B60Q1/46, B60Q1/52

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - B60Q1/2607
USPC - 340/988, 342/457, 340/905

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Electronic Database Searched: Patbase, Google Patents, Google Scholar
Search Terms Used: Emergency strobing, safety lighting, vehicle wiring harness, vehicle flasher module, strobing circuit, hazard light/flasher, OR circuit, auxiliary vehicle lamp, multifunction output, microcontroller, driver accessible, multi-purpose light, etc.,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2009/0219150 A1 (DeYoung) 03 September 2009 (03.09.2009); entire document, especially, Abstract, FIG. 2, 4,6, para [0045], [0066]-[0083], [0106], [0107] and claim 1	1-5, 7, 8, 15, 16, 18,19 --- 6, 9-14,17, 20
Y	US 7,150,554 B2 (Calderas) 19 December 2006 (19.12.2006); entire document, especially, Abstract, FIG. 1, col. 3, ln 7-10, col.3, ln 15-20	6, 17
Y	US 5,646,385 A (Bogovican et al.) 08 July 1997 (08.07.1997); especially, Abstract, FIG. 1, 3, col. 1, ln 9-13, col. 3, ln 16-27	9-13, 20
Y	US 2015/ 0116133 A1 (Mawbey et al.) 30 April 2015 (30.04.2015); especially, Abstract, FIG. 2, para [0011], [0026], [0028]	13, 14
A	US 6,515,584 B2 (DeYoung) 04 February 2003 (04.02.2003); entire document	1-20
A	US 6, 420,799 B1 (Sakamoto et al.) 16 July 2002 (16.07.2002); entire document	1-20

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 November 2016	29 DEC 2016
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: DAVID G. WOODRAL
FELLERS, SNIDER, BLANKENSHIP, BAILEY & TIPPENS, P.C.
321 SOUTH BOSTON, SUITE 800
TULSA, OK 74103-3318

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	29 DEC 2016
Applicant's or agent's file reference 16-266 WO	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 16/54489	29 September 2016 (29.09.2016)	

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - B60Q 1/52, B60Q 1/26 (2016.01)
CPC - B60Q1/38, B60Q1/46, B60Q1/52

Applicant TUCKER, DAVID M.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule *43bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 *bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	18 November 2016	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 16/54489

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 16/54489

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-5, 7, 8, 15, 16, 18 and 19 lack an inventive step under PCT Article 33(3) as being obvious over US 2009/0219150 A1 (DeYoung).

Regarding claim 1, De Young discloses: A system for implementing emergency strobing of existing vehicle lights comprising (Abstract - automotive hazard flashers described make more usable the distinctive, high-visibility flash hazard signals and para [0045] - Version C is intended to be the sole flasher for a vehicle. It produces turn signals and standard rate hazard signals):
an interface to a vehicle wiring harness configured to receive input to an existing vehicle flasher module (FIG. 6, para [0045] - provides additional features and uses a different sensing approach from Versions A and B. Version C is intended to be the sole flasher for a vehicle. It produces turn signals and standard rate hazard signals. In addition, it can produce, in a vehicle's turn signal lamps, the auxiliary High-Visibility Flash in any of these three applications and para [0072] - the High-Visibility Flash is conducted via direct wiring to all turn signal lamps, which produce the auxiliary-High-Visibility Flash hazard signal);
a strobing circuit that responds to an activation signal from the vehicle wiring harness that is indicative of a hazard flasher deployment event by producing an electrical output having a strobing pattern that is perceptibly faster than a cycle of existing vehicle signal lights (FIG. 2, para [0073] - if, while an auxiliary High-Visibility Flash is being generated, the microprocessor is informed, via the internal Sensor connections, that the lamps are receiving a flash rate different from the auxiliary High-Visibility Flash rate, which will occur when a turn signal or standard rate hazard is signaled, the auxiliary High-Visibility hazard flash will be canceled and para [0074] - a standard hazard signal will be canceled by activation of a turn signal only if the standard hazard signal is programmed to flash at a slower or faster rate than the rate at which the turn signal is programmed);
and an OR circuit having two inputs one of which accepts the electrical output from the strobing circuit (FIG. 6, para [0078] - the unit is activated when power is applied to the circuit at the 12V battery input. Power is thus applied through the Power Regulator to the microprocessor (uP), which activates, goes through its reset routine and then goes to a standby state until either a Right Turn (RFrontIn), a Left Turn (LfrontIn), a Backup Lamp activation, or High-Visibility flash switch is detected by the uP. In the standby state SPD2 is high at +12VDC. If either the right or left turn signal switch or the standard hazard switch is activated, the input signal to the uP goes high to +5VDC. The uP proceeds with a Standard turn signal program of de-activating and activating the lamp drive output (STDDrOut). When the STDDrOut signal is low, SPD2 is high. When the STDDrOut signal is high, SPD2 is low. When a high STDDrOut signal is applied to the base of Q2, a Darlington transistor, the collector of Q2 is pulled to ground potential and the flasher relay is energized, making SPD2 low and the lamp is off. R9 limits the base drive current to Q2 to about 1 ma. D7 reduces the EMI from the relay when it de-energizes);
the multifunction output providing for lighting of the existing vehicle lamp when either the output from the strobing circuit is active or the output from the intercepted output is active (claim 1 - hazard warning flasher, which makes it possible, at the drivers selection, by means of a manual switch, for motor vehicles to use the vehicle's turn signal lamps to produce either of two hazard warning flash patterns: a. A standard, turn-signal-like hazard flash; b. An alternative or auxiliary hazard flash with a different flash pattern and/or rate of flash and FIG. 6, para [0079] - if the Standard hazard flash switch is pushed on, the unit will go into the Standard hazard flash function. K2 is activated by Q2 and connects all lamps to SPD2 through the Existing Standard Hazard Flash Switch to make them act in concert).
DeYoung does not explicitly disclose in the embodiment used above:
The OR circuit having the two inputs and another of which intercepts output to an existing auxiliary vehicle lamp that is not otherwise activated with existing vehicle flashers or signal lights;
wherein the OR circuit has a multifunction output for connection to the existing auxiliary vehicle lamp in place of the intercepted output.
However, DeYoung in a different embodiment discloses:
another of which intercepts output to an existing auxiliary vehicle lamp that is not otherwise activated with existing vehicle flashers or signal lights (FIG. 4, para [0106] - By separate wiring from the flasher, the same auxiliary High-Visibility Flash hazard signals are produced synchronously in Supplementary Flasher Lamps as are displayed in the turn signal lamps. Supplementary Flasher Lamps produce only the auxiliary High-Visibility Flash hazard signal, not turn signals or standard hazard signals);
wherein the OR circuit has a multifunction output for connection to the existing auxiliary vehicle lamp in place of the intercepted output (para [0106] - The supplementary flasher lamps can be permanently affixed to any vehicle or can be lamps temporarily attached to a vehicle to produce the auxiliary High-Visibility Flash hazard signal in the Supplementary Flasher Lamps synchronously with the turn signal lamps. Activation of a turn signal would cancel the auxiliary High-Visibility Flash hazard signal in the supplementary flasher lamps and in the turn signal lamps).
It would have been obvious to a person of ordinary skill in the art to have included the supplementary flasher lamps to the version C unit as per the other embodiment of DeYoung since this allows for providing greater display than that provided by auxiliary hazard signals in the turn signal lamps alone (See para [0106]-[0107]).

---See Continuation on Supplemental Page---

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of:
Citations and Explanation:
Regarding claim 2, DeYoung discloses the system of claim 1.
Furthermore, DeYoung discloses: wherein the strobing circuit controls a plurality of existing vehicle hazard lights through the vehicle wiring harness to provide illumination of the existing vehicle hazard lights in the strobing pattern in response to the activation signal from the vehicle wiring harness that is indicative of hazard flasher deployment (FIG. 6, para [0079] - if the Standard hazard flash switch is pushed on, the unit will go into the Standard hazard flash function. K2 is activated by Q2 and connects all lamps to SPD2 through the Existing Standard Hazard Flash Switch to make them act in concert and para [0080] - if the High-Visibility hazard flash switch is momentarily pushed, the unit will go into the High-Visibility hazard flash function. K1 is activated by Q1 and connects to all lamps through the D4, D5, D8 and D9 diodes to make them act in concert. At any time the High-Visibility hazard flash function may be cancelled by turning on either turn signal or the standard hazard signal or by momenterily pushing the High-Visibility hazard flash switch).

Regarding claim 3, DeYoung discloses the system of claim 2.
Furthermore, DeYoung discloses: wherein the strobing circuit accepts the activation signal, which would otherwise be input to the existing vehicle flasher module to activate a nonstrobing hazard flasher deployment of the existing vehicle hazard lamps (FIG. 6 and para [0081] - the Backup lights are turned on, all lamps will flash at the High-Visibility rate. If the turn signal is turned on, the High-Visibility hazard flash will be turned off. When the turn signal is then turned off and the Backup lights are still on, all lamps will again flash at the High-Visibility rate until the backup lamps are turned off. If the High-Visibility flash switch is pushed, the High-Visibility flash function will be terminated); and wherein the strobing circuit produces the electrical output to create the strobing pattern of the existing vehicle hazard lamps (para [0078] - power is thus applied through the Power Regulator to the microprocessor (uP), which activates, goes through its reset routine and then goes to a standby state until either a Right Turn (RFrontIn), a Left Turn (LfrontIn), a Backup Lamp activation, or High-Visibility flash switch is detected by the uP. In the standby state SPD2 is high at +12VDC. If either the right or left turn signal switch or the standard hazard switch is activated, the input signal to the uP goes high to +5VDC. The uP proceeds with a Standard turn signal program of de-activating and activating the lamp drive output (STDDrOut). When the STDDrOut signal is low, SPD2 is high and para [0079] - if the Standard hazard flash switch is pushed on, the unit will go into the Standard hazard flash function. K2 is activated by Q2 and connects all lamps to SPD2 through the Existing Standard Hazard Flash Switch to make them act in concert),
in place of what would otherwise be output by the existing vehicle flasher module to the existing vehicle hazard lamps producing the non-strobing hazard flashing of the existing vehicle lamps (para [0083] - The LfrontIn signal input will be described. All other input circuits are identical. R7 helps bias the uP input low when the input is fed from an LED light array. Without R7, the input will not be pulled low properly when the LED array is turned off. D4 (pins 2 & 3) blocks the +12V lamp voltage from getting to the uP. The uP operates on +5 Volts. When the Left Turn Lamp is turned on, SPD4 goes to +12V. R5 pulls the anode of D4 (pins 1 & 2) to +5 Volts. If a transient signal of high voltage is detected on the +5 Volts, it is clamped by U3 pin 2. U3 is a TL7726 is a hex clamping circuit).

Regarding claim 4, DeYoung discloses the system of claim 3.
Furthermore, DeYoung discloses: wherein the strobing circuit provides a plurality of different strobing effects, the plurality of strobing effects being selected by subsequent activation signals indicative of subsequent hazard flasher deployment (para [0076] - the uP performs logic operations based on time to create the flashing outputs from the Flasher Unit and para [0077] - the High-Visibility Flash rate is a series of flashes as follows: On 166 ms, off 200 ms, on 166 ms, off 200 ms, on 166 ms, off 200 ms, on 166 ms, off 466 ms, then repeating. This sequence may be any other combination of repeating or non-repeating flashes. The Standard Flash rate is 333 ms on followed by 333 ms off, then repeating).

Regarding claim 5, DeYoung discloses the system of claim 4.
Furthermore, DeYoung discloses: wherein at least one of the plurality of strobing effects indicates a directional signal by strobing existing vehicle lamps on one of the left or right side of the vehicle before those of the other side, with the multifunction output strobing therebetween (FIG. 2, para [0066] - this unit provides three separate flash outputs, all displayed in the vehicle's turn signal lamps: 1) Turn signals, 2) Standard rate hazard signals, and 3) Auxiliary High-Visibility Flash hazard signals. The standard rate hazard signal will usually be the same rate as the turn signal, but it can be programmed to be different and para [0067] - the Turn Signal & Standard Rate Hazard Relay begins in the closed position. If the Turn Signal Switch is closed to the left or right turn signal position, the relay will begin to open and close at the programmed rate for turn signal flashes and the left or right lamps will produce a turn signal. If the Standard Hazard Switch is closed, the relay will begin to open and close at the programmed rate for standard hazard signal flashes, and all turn signal lamps will produce the standard rate hazard signal).

Regarding claim 7, DeYoung discloses the system of claim 1.
Furthermore, DeYoung discloses: wherein the OR circuit connects to an output from a brake light circuit as the intercepted output (para [0082] - Accelerometer is included to detect rapid deceleration in case of accident or any emergency stop. If activated, the sudden acceleration will cause the High-Visibility flash rate function to be started. When the High-Visibility flash switch is subsequently pushed, the High-Visibility flash function will be terminated).

Regarding claim 8, De Young discloses: A vehicle lighting safety device comprising (Abstract - automotive hazard flashers described make more usable the distinctive, high-visibility flash hazard signals and para [0045] - Version C is intended to be the sole flasher for a vehicle. It produces turn signals and standard rate hazard signals):
at least one hazard input communicatively coupled to a driver accessible hazard light switch inside the vehicle (FIG. 2, 6, para [0045] - provides additional features and uses a different sensing approach from Versions A and B. Version C is intended to be the sole flasher for a vehicle. It produces turn signals and standard rate hazard signals. In addition, it can produce, in a vehicle's turn signal lamps, the auxiliary High-Visibility Flash in any of these three applications and para [0072] - the High-Visibility Flash is conducted via direct wiring to all turn signal lamps, which produce the auxiliary-High-Visibility Flash hazard signal);
a microcontroller communicatively coupled to the at least one hazard input (FIG. 6, para [0075] - the flasher Unit Version C is designed around a single chip 8-bit microprocessor. The processor used in this implementation is a Microchip PIC16F505 microprocessor and para [0076] - the uP performs logic operations based on time to create the flashing outputs from the Flasher Unit); and
---See Continuation on Supplemental Page---

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Citations and Explanation:
---Claim 8 continued-----
an output communicatively coupled to the microcontroller and capable of driving a multi-purpose light installed on the vehicle in a strobing manner in response to receiving a signal on the at least one hazard input (FIG. 6, para [0078] - the unit is activated when power is applied to the circuit at the 12V battery input. Power is thus applied through the Power Regulator to the microprocessor (uP), which activates, goes through its reset routine and then goes to a standby state until either a Right Turn (RFrontIn), a Left Turn (LfrontIn), a Backup Lamp activation, or High-Visibility flash switch is detected by the uP. In the standby state SPD2 is high at +12VDC. If either the right or left turn signal switch or the standard hazard switch is activated, the input signal to the uP goes high to +5VDC. The uP proceeds with a Standard turn signal program of de-activating and activating the lamp drive output (STDDrOut). When the STDDrOut signal is low, SPD2 is high. When the STDDrOut signal is high, SPD2 is low. When a high STDDrOut signal is applied to the base of Q2, a Darlington transistor, the collector of Q2 is pulled to ground potential and the flasher relay is energized, making SPD2 low and the lamp is off. R9 limits the base drive current to Q2 to about 1 ma. D7 reduces the EMI from the relay when it de-energizes).
DeYoung does not explicitly disclose in the embodiment used above: wherein the multi-purpose light is not a part of an existing vehicle signal light system.
However, DeYoung in a different embodiment discloses: wherein the multi-purpose light is not a part of an existing vehicle signal light system (FIG. 4, para [0106] - By separate wiring from the flasher, the same auxiliary High-Visibility Flash hazard signals are produced synchronously in Supplomentary Flasher Lamps as are displayed in the turn signal lamps. Supplementary Flasher Lamps produce only the auxiliary High-Visibility Flash hazard signal, not turn signals or standard hazard signals).
It would have been obvious to a person of ordinary skill in the art to have included the supplementary flasher lamps to the version C unit as per the other embodiment of DeYoung since this allows for providing greater display than that provided by auxiliary hazard signals in the turn signal lamps alone (See para [0106]-[0107]).

Regarding claim 15, DeYoung discloses the system of claim 8.
Furthermore, DeYoung discloses: wherein the microcontroller drives the multi-purpose light in a strobing manner without additional input apart from receiving the signal on the at least one hazard input (para [0068]-[0071] - the High-Visibility Hazard Signal Relay begins in the open position. The relay will begin to open and close at the programmed rate and pattern for High-Visibility Flashes if one of the following occurs: 1. The HighViz Flash Switch Input is triggered by the operator pushing a momentary switch; 2. The Backup Lamp Input is triggered automatically while the vehicle is in reverse gear; 3. The Accelerometer Input is triggered automatically when the vehicle decelerates more rapidly than the accelerometer's preset deceleration rate and para [0075] - pin connections to the microprocessor (uP) are as shown in table See pin 11 - Standard Hazard flash switch input).

Regarding claim 16, DeYoung discloses the system of claim 8.
Furthermore, DeYoung discloses: further comprising an OR circuit having two inputs and an output, one of the two inputs communicatively coupled to the output of the microcontroller and the other of the two inputs communicatively coupled to an existing signal output from the vehicle for controlling the multi-purpose light, the output of the OR circuit communicatively coupled to the multi-purpose light and providing activation of the multi-purpose light in response to activation of either of the two OR circuit inputs. (FIG. 6, para [0078] - the unit is activated when power is applied to the circuit at the 12V battery input. Power is thus applied through the Power Regulator to the microprocessor (uP), which activates, goes through its reset routine and then goes to a standby state until either a Right Turn (RFrontIn), a Left Turn (LfrontIn), a Backup Lamp activation, or High-Visibility flash switch is detected by the uP. In the standby state SPD2 is high at +12VDC. If either the right or left turn signal switch or the standard hazard switch is activated, the input signal to the uP goes high to +5VDC. The uP proceeds with a Standard turn signal program of de-activating and activating the lamp drive output (STDDrOut). When the STDDrOut signal is low, SPD2 is high. When the STDDrOut signal is high, SPD2 is low. When a high STDDrOut signal is applied to the base of Q2, a Darlington transistor, the collector of Q2 is pulled to ground potential and the flasher relay is energized, making SPD2 low and the lamp is off. R9 limits the base drive current to Q2 to about 1 ma. D7 reduces the EMI from the relay when it de-energizes),

Regarding claim 18, DeYoung discloses the system of 16.
Furthermore, DeYoung discloses: wherein the multi-purpose light is a light that is forward facing on the vehicle (Fig. 6, para [0075] - "Front Left Turn Lamp and Front Right Turn lamp")

Regarding claim 19, DeYoung discloses the system of 16.
Furthermore, DeYoung discloses: wherein the microcontroller provides separately timed strobing patterns on the multi-purpose light and the hazard light system (para [0077] - the High-Visibility Flash rate is a series of flashes as follows: On 166 ms, off 200 ms, on 166 ms, off 200 ms, on 166 ms, off 200 ms, on 166 ms, off 466 ms, then repeating. This sequence may be any other combination of repeating or non-repeating flashes. The Standard Flash rate is 333 ms on followed by 333 ms off, then repeating and para [0081] - if the Backup lights are turned on, all lamps will flash at the High-Visibility rate. If the turn signal is turned on, the High-Visibility hazard flash will be turned off. When the turn signal is then turned off and the Backup lights are still on, all lamps will again flash at the High-Visibility rate until the backup lamps are turned off. If the High-Visibility flash switch is pushed, the High-Visibility flash function will be terminated).

Claims 6 and 17 lack an inventive step under PCT Article 33(3) as being obvious over DeYoung in view of US 7,150,554 B2 (Calderas).

Regarding claim 6, DeYoung discloses the system of claim 1.
DeYoung does not disclose: wherein the OR circuit connects to a high center mounted stop lamp as the auxiliary vehicle lamp.
However, Calderas discloses automotive lamp is especially useful as a rear combination lamp having red LEDs serving both tail light and stop light functions, as well as amber or red LEDs providing turn and hazard signals (Abstract) and further discloses:
a high center mounted stop lamp (FIG. 1, col. 3, ln 7-10 - an automotive vehicle 20 having a rearwardly facing area 21 on which is disposed a pair of rear combination lamps 23 a(b) and a center high mount stop lamp (CHMSL) 24).
It would have been obvious to a person of ordinary skill in the art to have included the high center mounted stop lamp of Calderas in the system of DeYoung since it allows for clear visibility for the observer (See Calderas, col. 3, ln 15-20).
---See Continuation on Supplemental Page---

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Citations and Explanation:
Regarding claim 17, DeYoung discloses the system of 16.
DeYoung does not disclose: wherein the multi-purpose light is a high center mounted stop lamp.
However, Calderas discloses automotive lamp is especially useful as a rear combination lamp having red LEDs serving both tail light and stop light functions, as well as amber or red LEDs providing turn and hazard signals (Abstract) and further discloses:
a high center mounted stop lamp (FIG. 1, col. 3, ln 7-10 - an automotive vehicle 20 having a rearwardly facing area 21 on which is disposed a pair of rear combination lamps 23a (b) and a center high mount stop lamp (CHMSL) 24).
It would have been obvious to a person of ordinary skill in the art to have included the high center mounted stop lamp of Calderas in the system of DeYoung since it allows for clear visibility for the observer (See Calderas, col. 3, ln 15-20).

Claims 9-12 and 20 lack an inventive step under PCT Article 33(3) as being obvious over DeYoung in view of US 5,646,385 A to Bogovican et al. (hereinafter Bogovican).

Regarding claim 9, DeYoung discloses the device of claim 8.
Furthermore, DeYoung discloses: wherein the microcontroller is communicatively coupled to a plurality of vehicle mounted light emitting diodes (para [0083] - when the input is fed from an LED light array).
DeYoung does not disclose:
The microcontroller is coupled to a signal light stalk mounted to a vehicle steering column and
The LED, at least some of which are selectively operative by the mounted to a vehicle steering column.
However, Bogovican discloses a stalk switch assembly mountable on a steering column of a vehicle includes a base having a track mounting a control stalk (Abstract) and further discloses:
a signal light stalk mounted to a vehicle steering column and the LED, at least some of which are selectively operative by the mounted to a vehicle steering column (FIG. 1, 3, col. 3, ln 16-27 - an operator may actuate the electrical switch by moving control stalk 24 toward either track end 58 or 59. For example, the operator of a vehicle may indicate a right hand turn by moving control stalk 24 in an upward fashion in FIGS. 1 and 3. The operator of the vehicle may also actuate a second blinking light by moving control stalk 24).
It would have been obvious to a person of ordinary skill in the art to have included the control stalk of Bogovican in the system of DeYoung since it provides for easy access for the vehicle operator to operate them from the vehicle steering column (See Bogovican, col. 1, ln 9-13).

Regarding claim 10, DeYoung as modified by Bogovican discloses the device of claim 9.
Furthermore, DeYoung discloses: wherein the microcontroller operates at least part of the signal light system in a strobing manner in response to receiving the signal on the at least one hazard input thereby utilizing the at least part of the signal light system as a hazard strobing system (para [0079] - if the Standard hazard flash switch is pushed on, the unit will go into the Standard hazard flash function. K2 is activated by Q2 and connects all lamps to SPD2 through the Existing Standard Hazard Flash Switch to make them act in concert).

Regarding claim 11, DeYoung as modified by Bogovican discloses the device of claim 10.
Furthermore, DeYoung discloses: wherein the microcontroller accepts the signal input from the at least one hazard input that would otherwise control an existing, non-strobing hazard light system on the vehicle (FIG. 6 and para [0081] - the Backup lights are turned on, all lamps will flash at the High-Visibility rate. If the turn signal is turned on, the High-Visibility hazard flash will be turned off. When the turn signal is then turned off and the Backup lights are still on, all lamps will again flash at the High-Visibility rate until the backup lamps are turned off. If the High-Visibility flash switch is pushed, the High-Visibility flash function will be terminated).

Regarding claim 12, DeYoung as modified by Bogovican discloses the device of claim 11.
Furthermore, DeYoung discloses: wherein the control of the microcontroller of the hazard strobing system replaces output to the hazard light system that would have been correspondent to existing non-strobing hazard light activation (para [0080] - if the High-Visibility hazard flash switch is momentarily pushed, the unit will go into the High-Visibility hazard flash function. K1 is activated by Q1 and connects to all lamps through the D4, D5, D8 and D9 diodes to make them act in concert. At any time the High-Visibility hazard flash function may be cancelled by turning on either turn signal or the standard hazard signal or by momentarily pushing the High-Visibility hazard flash switch and para [0081] - if the Backup lights are turned on, all lamps will flash at the High-Visibility rate. If the turn signal is turned on, the High-Visibility hazard flash will be turned off. When the turn signal is then turned off and the Backup lights are still on, all lamps will again flash at the High-Visibility rate until the backup lamps are turned off. If the High-Visibility flash switch is pushed, the High-Visibility flash function will be terminated and para [0083] - The LfrontIn signal input will be described. All other input circuits are identical. R7 helps bias the uP input low when the input is fed from an LED light array. Without R7, the input will not be pulled low properly when the LED array is turned off. D4 (pins 2 & 3) blocks the +12V lamp voltage from getting to the uP. The uP operates on +5 Volts. When the Left Turn Lamp is turned on, SPD4 goes to +12V. R5 pulls the anode of D4 (pins 1 & 2) to +5 Volts. If a transient signal of high voltage is detected on the +5 Volts, it is clamped by U3 pin 2. U3 is a TL7726 is a hex clamping circuit).

Regarding claim 20, DeYoung discloses:
An emergency strobe light system for installation into a motor vehicle comprising (Abstract - automotive hazard flashers described make more usable the distinctive, high-visibility flash hazard signals and para [0045] - Version C is intended to be the sole flasher for a vehicle. It produces turn signals and standard rate hazard signals):
at least one hazard input communicatively coupled to a driver accessible hazard light switch inside the vehicle (FIG. 6, para [0045] - provides additional features and uses a different sensing approach from Versions A and B. Version C is intended to be the sole flasher for a vehicle. It produces turn signals and standard rate hazard signals. In addition, it can produce, in a vehicle's turn signal lamps, the auxiliary High-Visibility Flash in any of these three applications and para [0072] - the High-Visibility Flash is conducted via direct wiring to all turn signal lamps, which produce the auxiliary-High-Visibility Flash hazard signal);

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
Citations and Explanation:
---Claim 20 continued---
a microcontroller receiving input states of the at least one hazard input and the at least one signal input such that the microcontroller is informed whether a left or right turn signal or a hazard flasher deployment is indicated by a user (para [0075] - the Flasher Unit Version C is designed around a single chip 8-bit microprocessor and para [0078] - Power is thus applied through the Power Regulator to the microprocessor (uP), which activates, goes through its reset routine and then goes to a standby state until either a Right Turn (RFrontIn), a Left Turn (LfrontIn), a Backup Lamp activation, or High-Visibility flash switch is detected by the uP. In the standby state SPD2 is high at +12VDC. If either the right or left turn signal switch or the standard hazard switch is activated, the input signal to the uP goes high to +5VDC. The uP proceeds with a Standard turn signal program of de-activating and activating the lamp drive output (STDDrOut));
and an OR circuit allowing activation of a multi-purpose light by the microcontroller or another vehicle system (FIG. 6, para [0078] - the unit is activated when power is applied to the circuit at the 12V battery input. Power is thus applied through the Power Regulator to the microprocessor (uP), which activates, goes through its reset routine and then goes to a standby state until either a Right Turn (RFrontIn), a Left Turn (LfrontIn), a Backup Lamp activation, or High-Visibility flash switch is detected by the uP. In the standby state SPD2 is high at +12VDC. If either the right or left turn signal switch or the standard hazard switch is activated, the input signal to the uP goes high to +5VDC. The uP proceeds with a Standard turn signal program of de-activating and activating the lamp drive output (STDDrOut). When the STDDrOut signal is low, SPD2 is high. When the STDDrOut signal is high, SPD2 is low. When a high STDDrOut signal is applied to the base of Q2, a Darlington transistor, the collector of Q2 is pulled to ground potential and the flasher relay is energized, making SPD2 low and the lamp is off. R9 limits the base drive current to Q2 to about 1 ma. D7 reduces the EMI from the relay when it de-energizes);
wherein the microcontroller operates a plurality of vehicle installed signal lights in a non-strobing manner in response to an indication of a left or right turn signal (FIG. 6 and para [0081] - the Backup lights are turned on, all lamps will flash at the High-Visibility rate. If the turn signal is turned on, the High-Visibility hazard flash will be turned off. When the turn signal is then turned off and the Backup lights are still on, all lamps will again flash at the High-Visibility rate until the backup lamps are turned off. If the High-Visibility flash switch is pushed, the High-Visibility flash function will be terminated);
wherein the microcontroller operates the plurality of plurality of vehicle installed signal lights in a strobing manner in response to the indication of hazard flasher deployment (para [0079] - if the Standard hazard flash switch is pushed on, the unit will go into the Standard hazard flash function. K2 is activated by Q2 and connects all lamps to SPD2 through the Existing Standard Hazard Flash Switch to make them act in concert); and
wherein the microcontroller activates the multi-purpose light in a strobing manner via the OR circuit in response to the indication of hazard flasher deployment such that an original function of the multi-purpose light is also retained (para [0080] - if the High-Visibility hazard flash switch is momentarily pushed, the unit will go into the High-Visibility hazard flash function. K1 is activated by Q1 and connects to all lamps through the D4, D5, D8 and D9 diodes to make them act in concert. At any time the High-Visibility hazard flash function may be cancelled by turning on either turn signal or the standard hazard signal or by momentarily pushing the High-Visibility hazard flash switch and para [0081] - if the Backup lights are turned on, all lamps will flash at the High-Visibility rate. If the turn signal is turned on, the High-Visibility hazard flash will be turned off. When the turn signal is then turned off and the Backup lights are still on, all lamps will again flash at the High-Visibility rate until the backup lamps are turned off. If the High-Visibility flash switch is pushed, the High-Visibility flash function will be terminated).
DeYoung does not disclose: at least one signal input communicatively coupled to a signal light control stalk inside the vehicle.
However, Bogovican discloses a stalk switch assembly mountable on a steering column of a vehicle includes a base having a track mounting a control stalk (Abstract) and further discloses:
at least one signal input communicatively coupled to a signal light control stalk inside the vehicle (FIG. 1, 3, col. 3, ln 16-27 - an operator may actuate the electrical switch by moving control stalk 24 toward either track end 58 or 59. For example, the operator of a vehicle may indicate a right hand turn by moving control stalk 24 in an upward fashion in FIGS. 1 and 3. The operator of the vehicle may also actuate a second blinking light by moving control stalk 24).
It would have been obvious to a person of ordinary skill in the art to have included the control stalk of Bogovican in the system of DeYoung since it provides for easy access for the vehicle operator to operate them from the vehicle steering column (See Bogovican, col. 1, ln 9-13).

Claim 14 lacks an inventive step under PCT Article 33(3) as being obvious over DeYoung in view of US 2015/ 0116133 A1 to Mawbey et al. (hereinafter Mawbey).

Regarding claim 14, DeYoung discloses the device of claim 8.
DeYoung does not disclose: wherein the microcontroller receives the hazard input via a body control module.
However, Mawbey discloses a broadcast notification system for providing alert notifications to vehicle drivers (Abstract and further discloses:
A body control module (Fig. 2 and para [0026] - Each in-vehicle system 200 includes an in-vehicle module 201, which is comprised of a micro-processor 202 for controlling the functions of the module, receiving inputs and sending command messages and para [0028] - the vehicle bus system 250 also include the engine control module 258, which both gathers data from and controls the vehicle drive systems, and the body control module 260).
It would have been obvious to a person of ordinary skill in the art to have included the body control module of Mawbey and receive hazard input in the microcontroller of DeYoung since it allows for maintaining a number of conveniences and control systems of the vehicle (See Mawbey, para [0011], [0028]).

--See Continuation on Supplemental Page---

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
Citations and Explanation:
Claim 13 lacks an inventive step under PCT Article 33(3) as being obvious over DeYoung in view of Bogovican and further in view of Mawbey.

Regarding claim 13, DeYoung as modified by Bogovican discloses the device of claim 12.
Neither discloses: wherein the microcontroller comprises a body control module.
However, Mawbey discloses a broadcast notification system for providing alert notifications to vehicle drivers (Abstract and further discloses:
wherein the microcontroller comprises a body control module (Fig. 2 and para [0026] - Each in-vehicle system 200 includes an in-vehicle module 201, which is comprised of a micro-processor 202 for controlling the functions of the module, receiving inputs and sending command messages and para [0028] - the vehicle bus system 250 also include the engine control module 258, which both gathers data from and controls the vehicle drive systems, and the body control module 260).
It would have been obvious to a person of ordinary skill in the art to have included the body control module of Mawbey in the device of DeYoung and Bogovican since it allows for maintaining a number of conveniences and control systems of the vehicle (See Mawbey, para [0028]).

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

SEARCH HISTORY

Application Number	**PCT/US 16/54489**
Search Conducted By	SCS
Search Approved By	RII

IPC/CPC Classifications Searched	IPC(8) - B60Q 1/52, B60Q 1/26 (2016.01) CPC - B60Q1/38, B60Q1/46, B60Q1/52
Date Conducted	21 November 2016 (21.11.2016)

Documentation Searched	IPC(8) - B60Q1/52, B60Q1/26 (2016.01) CPC - B60Q1/2607 USPC - 340/988, 342/457, 340/905
Search Terms Used	Emergency strobing, safety lighting, vehicle wiring harness, vehicle flasher module, strobing circuit, hazard light/flasher, OR circuit, auxiliary vehicle lamp, multifunction output, microcontroller, driver accessible, multi-purpose light, etc.,
Date Conducted	21 November 2016 (21.11.2016)

Electronic Database Searched	PatBase
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (Europe) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW
Date Conducted	21 November 2016 (21.11.2016)

Search Logic:

Search 1: PN=(US20160144778) (Results 1)
Search 2: CTF 1 OR CTB 1 (Results 55)
Search 3: 2 AND FT=(hazard NEAR (flash* OR light* OR input* OR switch*)) (Results 23)
Search 4: 2 AND FT=(emergency NEAR (strobe* OR light* OR lamp*)) (Results 29)

Search 5: UC=(340/988 OR 342/457 OR 340/905) (Results 3993)
Search 6: IC=(B60Q1/52 OR B60Q1/26) (Results 20343)
Search 7: CPC=(B60Q1/38 OR B60Q1/46 OR B60Q1/52 OR B60Q1/2607) (Results 3520)
Search 8: (5 OR 6 OR 7) (Results 25330)
Search 9: 8 AND FT=(emergency NEAR (strobe* OR light* OR lamp*)) (Results 1600)
Search 10: 9 AND FT=("OR" circuit* OR switch*) (Results 1084)
Search 11: 10 AND FT=(hazard NEAR (flash* OR light* OR input* OR switch*)) (Results 260)
Search 12: 11 AND FT=(multi* function* OR multi* purpose*) (Results 7)
Search 13: 11 AND FT=(body control module OR BCM) (Results 1)
Search 14: 11 AND FT=((auxilliary OR supplemental) NEAR (light* OR lamp*)) (Results 3)
Search 15: 11 AND FT=(micro controller* OR microcontroller*) (Results 38)
Search 16: 11 AND FT=(CHMSL OR "center high mounted stop lamp*") (Results 12)
Search 17: 11 AND FT=((right OR left) NEAR turn*) (Results 63)
Search 18: FT=(emergency NEAR (strobe* OR light* OR lamp*)) (Results 25938)
Search 19: 18 AND FT=(vehicle* OR car OR lorry OR lorries OR truck* OR mini van*) (Results 8061)
Search 20: 19 AND FT=("OR" circuit* OR switch*) (Results 5086)
Search 21: 20 AND FT=(hazard NEAR (flash* OR light* OR input* OR switch*)) (Results 545)
Search 22: 21 AND FT=(multi* function* OR multi* purpose*) (Results 40)
Search 23: 21 AND FT=(body control module OR BCM) (Results 3)
Search 24: 21 AND FT=((auxilliary OR supplemental) NEAR (light* OR lamp*)) (Results 9)
Search 25: 21 AND FT=(CHMSL OR "center high mounted stop lamp*") (Results 19)
Search 26: 21 AND FT=((right OR left) NEAR turn*) (Results 116)
Search 27: 21 AND FT=(LED OR light emitting diode*) (Results 214)
Search 28: 21 AND FT=(micro controller* OR microcontroller*) (Results 86)

Electronic Database Searched	Google
Files Searched	Scholar (Articles excluding patents)
Date Conducted	21 November 2016 (21.11.2016)

Search Logic:

emergency strobe vehicle lights – About 17,400 results
emergency strobe vehicle lights hazard warning – About 16,400 results
emergency strobe vehicle lights hazard warning microcontroller – About 146 results

emergency strobe vehicle lights hazard warning (left turn signal OR right turn signal) – About 13,900 results

emergency strobe vehicle lights hazard warning (left turn signal OR right turn signal) body control module – About 7,340 results

Electronic Database Searched	Google
Files Searched	Patents (US Patents/Published Applications, EPO publications, International, China, Germany, Canada)
Date Conducted	21 November 2016 (21.11.2016)

Search Logic:

S1 - emergency strobing – About 10,935 results
S2 – S1 AND vehicle lights – About 3,066 results
S3 – S2 AND hazard flasher – About 88 results

S4 – S2 AND multi function output – About 1,401 results
S5 – S4 AND microcontroller – About 265 results
S6 – S5 AND "OR" circuit – About 260 results
S7 – S6 AND (left turn signal OR right turn signal) – About 175 results

S8 – vehicle hazard lights – About 78,125 results
S9 – S8 AND ("center high mounted stop lamp" OR CHMSL) – About 232 results

S10 – S8 AND "signal light stalk" – 1 results
S11 – S8 AND "body control module" – About 159 results

Electronic Database Searched	PatBase (RII: Supplemental Search)
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (Europe) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW

Date Conducted	28 November 2016 (28.11.2016)

Search Logic:

Search 1: UC=(340/988 OR 342/457 OR 340/905) (Results 3993)
Search 2: IC=(B60Q1/52 OR B60Q1/26) (Results 20359)
Search 3: CPC=(B60Q1/38 OR B60Q1/46 OR B60Q1/52 OR B60Q1/2607) (Results 3524)
Search 4: (1 or 2 or 3) (Results 25350)
Search 5: 4 and (vehicl* or car% or truck* or automobil* or ambulanc*) (Results 20400)
Search 6: 5 and (light* or illuminat*) (Results 15434)
Search 7: 6 and (flash* or strob*) (Results 5402)
Search 8: 7 and ("OR circuit") (Results 134)
Search 9: 8 and ((flash* or strob*) w4 pattern*) (Results 9)
Search 10: 8 and (emergenc* or hazard*) (Results 88)
Search 11: 10 and (wire* or wiring*) (Results 67)
Search 12: 11 and harness* (Results 29)
Search 13: 12 and ((wire* or wiring*) w4 harness*) (Results 28)
Search 14: (vehicl* or car% or truck* or automobil* or ambulanc*) (Results 1000000)
Search 15: 14 and (light* or illuminat*) (Results 1000000)
Search 16: 15 and (flash* or strob*) (Results 275047)
Search 17: 16 and ((flash* or strob*) w4 (light* or illuminat*)) (Results 49735)
Search 18: 17 and ("OR circuit") (Results 979)
Search 19: 18 and ((flash* or strob*) w4 pattern*) (Results 59)
Search 20: 19 and (emergenc* or hazard*) (Results 35)
Search 21: 18 and (wire* or wiring*) (Results 744)
Search 22: 21 and ((wire* or wiring*) w4 harness*) (Results 82)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: David Gene Woodral
Fellers, Snider, Blankenship, Bailey & Tippens, P.C.
321 South Boston, Suite 800
Tulsa, OK 74103-3318
United States of America

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 31 MAR 2016
Applicant's or agent's file reference 16-020WO	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US16/15125	International filing date *(day/month/year)* 27 January 2016 (27.01.2016)
Applicant David M. Tucker	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   How? Directly to the International Bureau of WIPO preferably through ePCT or on paper to, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

   Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

   Within **19 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Shane Thomas PCT Helpdesk: 571-272-4300 Telephone No. PCT OSP: 571-272-7774

Form PCT/ISA/220 (July 2014)

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 16-020WO	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US16/15125	International filing date *(day/month/year)* 27 January 2016 (27.01.2016)	(Earliest) Priority Date *(day/month/year)* 06 October 2015 (06.10.2015)
Applicant David M. Tucker		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☒ the text is approved as submitted by the applicant.

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   ☒ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. 3

   ☒ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US16/15125

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - B60Q 1/52, 1/50 (2016.01)
CPC - B60Q 1/26, 1/46
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - B60Q 1/52, 1/50, 1/34, 1/38 (2016.01)
CPC - B60Q 1/26, 1/46, 1/44, 1/52, 1/445

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatSeer (US, EP, WO, JP, DE, GB, CN, FR, KR, ES, AU, IN, CA, INPADOC Data); Google/Google Scholar, EBSCO Discovery Service, IEEE
Keywords: vehicle, hazard, turn, signal, lamp, strobe, flasher, blinker, faster, harness

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2009/0219150 A1 (DE YOUNG, J.) 03 September 2009; figures 6 and 7, paragraphs [0005], [0045], [0079], [0086].	1-3 and 5-13 4 and 14-17
Y	US 2015/061492 A1 (VISION WORKS IP CORPORATION) 05 March 2015; paragraphs [0069], [0082], [0113].	4
Y	US 5,646,385 A (BOGOVICAN, D. et al.) 08 July 1997; abstract, figure 1, column 1, lines 37-39.	15-17
Y	US 5,374,920 A (EVENS, H.) 20 December 1994; figures 1, 3 and 5, column 5, lines 40-43, column 8, lines 7-10 and 21-24, column 9, lines 30-35 and 50-51.	14
Y	US 5,043,699 A (HAYDEN, R.) 27 August 1991; abstract, figure 1, column 3, lines 4-6, 26-29 and 67-68, column 4 lines 1-20.	14
Y	US 6,028,512 A (SCHROPP R. et al.) 22 February 2000; abstract, figure 2.	14

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 March 2016 (12.03.2016)	31 MAR 2016
Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: David Gene Woodral
Fellers, Snider, Blankenship, Bailey & Tippens, P.C.
321 South Boston, Suite 800
Tulsa, OK 74103-3318
United States of America

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	31 MAR 2016

Applicant's or agent's file reference	FOR FURTHER ACTION
16-020WO	See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US16/15125	27 January 2016 (27.01.2016)	06 October 2015 (06.10.2015)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - B60Q 1/52, 1/50 (2016.01)
CPC - B60Q 1/26, 1/46

Applicant David M. Tucker

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [X] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	12 March 2016 (12.03.2016)	Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US16/15125

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US16/15125

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	4, 14-17	YES
	Claims	1-3 and 5-13	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-17	NO
Industrial applicability (IA)	Claims	1-17	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1-3 and 5-13 lack novelty under PCT Article 33(2) as being anticipated by US 2009/0219150 A1 to De Young, J. (hereinafter "DE YOUNG").

As per claim 1, DE YOUNG discloses a system for implementing strobing of existing vehicle hazard lights (means of for operating hazard warning flashing light signals; abstract) comprising: an interface to a vehicle wiring harness configured to receive input to an existing vehicle flasher module (version C of the flasher unit replaces the existing unit (existing vehicle flasher module) as sole flasher for a vehicle and receives input signals from the existing standard hazard flash switch (interface to a vehicle wiring harness); figure 6, paragraphs [0045], [0079], [0086]); and a strobing circuit that responds to an activation signal from the vehicle wiring harness that is indicative of a hazard flasher deployment event by producing an electrical output through the interface to the vehicle wiring harness that causes a strobing of existing vehicle hazard lamps (when the standard hazard flash switch is pushed on (activation signal; hazard flasher deployment event), the flasher unit (strobing circuit) connects all lamps (existing vehicle hazard lamps) to SPD2 (vehicle wiring harness) to make them flash in concert (causes a strobing; electrical output); figure 6, paragraph [0079]); wherein the strobing effect on each of the existing vehicle hazard lamps has a cycle that is perceptibly faster than a cycle of existing vehicle signal lights (the hazard signal generates a high-visibility-flash (strobing effect) in the vehicles' turn signal lamps (existing vehicle hazard lamps; existing vehicle signal lights) that is rapid and highly distinctive (perceptibly faster) from standard turn signals; paragraphs [0005], [0074]); and wherein a user signals a hazard flasher deployment by an existing vehicle hazard flasher switch inside the vehicle (the driver (inside the vehicle) uses the existing standard hazard flash manual switch (existing vehicle hazard flasher switch) to select (user signals) the hazard warning flash (hazard flasher deployment); paragraph [0079]; claim 1 of De Young).

As per claim 2, DE YOUNG discloses the system of claim 1. DE YOUNG further discloses wherein the strobing circuit provides a plurality of different strobing effects via the wiring harness (the flasher unit (strobing circuit) connects all lamps to SPD2 (wiring harness) to make them flash in either of two hazard warning flash patterns (different strobing effects); paragraphs [0079-0080]; claim 1 of De Young), the plurality of strobing effects being selected by subsequent activation signals indicative of subsequent hazard flasher deployment (the flasher unit connects all lamps to SPD2 to make them flash in concert (strobing effects), where the standard hazard switch initiates the standard hazard function (subsequent activation signals). The high-visibility hazard flash switch switches the unit to the high-visibility hazard flash mode (subsequent activation signals); paragraphs [0079-0080]; claim 1 of De Young]).

As per claim 3, DE YOUNG discloses the system of claim 2. DE YOUNG further discloses wherein at least one of the plurality of strobing effects indicates a directional signal by strobing existing vehicle lamps on one of the left or right side of the vehicle before those of the other side (the flasher unit produces left turn signal (strobing effects and directional signal) by turning on left turn lamp (strobing existing vehicle lamps and left side) which can be followed by a right turn signal by turning on the right turn lamp (right side and before those of the other side); paragraphs [0045], [0049], [0064]).

As per claim 5, DE YOUNG discloses the system of claim 1. DE YOUNG further discloses wherein the strobing effect on each of the existing vehicle hazard lamps has a cycle of at least 4 Hertz (the flasher unit produces a high-visibility flash (strobing effect) that flashes up to 250 flashes per minute (at least 4 Hertz) on vehicles turn signal lamps (existing vehicle hazard lamps); paragraphs [0003], [0074]).

As per claim 6, DE YOUNG discloses the system of claim 1. DE YOUNG further discloses wherein the strobing circuit comprises a programmable microcontroller (flasher unit version C (strobing circuit) is designed about a Microchip PIC16F505 microprocessor (programmable microcontroller); paragraph [0075]).

As per claim 7, DE YOUNG discloses the system of claim 1. DE YOUNG further discloses wherein the strobing circuit further comprises an accelerometer and causes the strobing of existing vehicle hazard lamps in response to predetermined acceleration events being detected by the accelerometer (flasher unit version C (strobing circuit) includes an accelerometer to detect deceleration greater than a preset deceleration rate (predetermined acceleration events) and cause a high-visibility flash rate (causes the strobing) in the vehicles' turn signal lamps (existing vehicle hazard lamps); paragraphs [0045], [0075], [0082]).

-***-Continued Within the Next Supplemental Box-***-

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US16/15125

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claim 11 is objected to under PCT Rule 66.2(a)(iii) as containing the following defect in the form or contents thereof: Claim 11 contains the text "wherein in of the plurality of strobing patterns". This appears to be a typographical error. For the purposes of this opinion, the above cited text has been best understood to read "wherein the plurality of strobing patterns".

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

-***-Continued from Box V: Citations and Explanations-***-

As per claim 8, DE YOUNG discloses the system of claim 1. DE YOUNG further discloses wherein the strobing circuit is interfaced to an existing vehicle safety system and causes the strobing of existing vehicle hazard lamps in response to a notification of a predetermined safety related event by the existing vehicle safety system (flasher unit version C (strobing circuit) receives input from the backup lamp drive (existing vehicle safety system) when backup lamp line is driven (notification of a predetermined safety related event) and generates a high-visibility flash rate (causes the strobing) in the vehicles' turn signal lamps (existing vehicle hazard lamps); paragraphs [0045], [0075], [0081]).

As per claim 9, DE YOUNG discloses a vehicle safety device comprising: a microcontroller (flasher unit version C is designed about a Microchip PIC16F505 microprocessor (microcontroller); paragraph [0075]); an analog input block configured to accept inputs from a vehicle wiring harness indicative of deployment of a left signal, a right signal, and hazard flashers (flasher unit version C includes signal conditioning bias resistors and protective diodes (analog input block) for inputs FRONT LEFT TURN LAMP, SPD4, and FRONT RIGHT TURN LAMP, SPD8, (vehicle wiring harness), which indicate that a left (left signal) or right (right signal) or both (hazard flashers) turn lamps are turned on; figure 6, paragraph [0083]); a body control module input block configured to accept inputs from a vehicle body control module indicative of a left signal, a right signal, and hazard flashers (flasher unit version D includes signal conditioning bias resistors and protective diodes (body control module input block) for inputs FRONT LEFT TURN LAMP and FRONT RIGHT TURN LAMP, which come from the existing standard flasher (vehicle body control module) and indicate that a left (left signal) or right (right signal) or both (hazard flashers) turn lamps are turned on; figure 7, paragraphs [0086], [0093]); and an output signal block configured to drive at least a front left signal light, a front right signal light, a rear left signal light, and a rear right signal light (flasher unit version C includes signal conditioning bias resistors and protective diodes (output signal block) for outputs FRONT LEFT TURN LAMP (front left signal light), SPD4, FRONT RIGHT TURN LAMP (front right signal light), SPD8, REAR LEFT TURN LAMP (rear left signal light), SPD3, and REAR RIGHT TURN LAMP (rear right signal light), SPD7; figure 6, paragraph [0083]); wherein the microcontroller accepts input from either of the analog input block or the body control module input block to determine when hazard flashers have been deployed (the microprocessor (microcontroller) receives input HIGH VISIBILITY FLASH SWITCH which is conditioned by bias resistors, R15, R16 and R18 and a protective diode, D11 (analog input block) to determine if the high-visibility hazard switch is activated (hazard flashers have been deployed); figure 6, paragraph [0080]) and, when hazard flashers are deployed, drives at least the front left signal light, the front right signal light, the rear left signal light, and the rear right signal light in a repeating flash pattern comprising a portion having a cycle rate that is perceptibly faster than a signal light cycle rate (if the high-visibility hazard switch is activated (hazard flashers have been deployed), the unit produces the high-visibility hazard flash signal (repeating flash pattern and portion having a cycle rate) that is rapid and distinctive (perceptibly faster) from standard turn signals to all lamps (front left signal light, front right signal light, rear left signal light, and rear right signal light); figure 6, paragraphs [0005], [0080]).

As per claim 10, DE YOUNG discloses the vehicle safety device of claim 9. DE YOUNG further discloses wherein the microcontroller drives at least the front left signal light, the front right signal light, the rear left signal light, and the rear right signal light in a plurality of strobing patterns (if the standard hazard flash switch is activated, the flasher unit microprocessor (microcontroller) produces the standard hazard flash (strobing patterns) to all lamps (front left signal light, front right signal light, rear left signal light, and rear right signal light). If the high-visibility hazard switch is activated, the flasher unit microprocessor produces a different flash pattern, the high-visibility hazard flash signal (plurality of strobing patterns) to all lamps; paragraphs [0076], [0079], [0080]).

As per claim 11, DE YOUNG discloses the vehicle safety device of claim 9. DE YOUNG further discloses wherein the plurality of strobing patterns is selected by a user using an existing vehicle hazard light switch (if the standard hazard flash switch (existing vehicle hazard light switch) is activated by the driver, the flasher unit produces the standard hazard flash (strobing patterns) to all lamps. If the high-visibility hazard switch (existing vehicle hazard light switch) is activated by the driver, the flasher unit a different flash pattern, the high-visibility hazard flash signal (plurality of strobing patterns) to all lamps; paragraphs [0025], [0079], [0080]).

As per claim 12, DE YOUNG discloses the vehicle safety device of claim 9. DE YOUNG further discloses wherein the microcontroller drives at least the front left signal light and left rear signal light in a repeating non-strobing pattern in response to input indicative of a left signal (when the turn signal switch is closed to the left signal position, the flasher unit microprocessor (microcontroller) produces a turn signal by opening and closing a relay at a preprogrammed rate (repeating non-strobing pattern) and the left lamps produce a turn signal (front left signal light and left rear signal light); paragraphs [0067], [0076]) and drives at least the front right signal light and rear right signal light in the repeating non-strobing pattern in response to input indicative of input indicative of a right signal (when the turn signal switch is closed to the right signal position, the flasher unit microprocessor (microcontroller) produces a turn signal by opening and closing a relay at a preprogrammed rate (repeating non-strobing pattern) and the right lamps produce a turn signal (front right signal light and rear right signal light); paragraphs [0067], [0076]).

As per claim 13, DE YOUNG discloses the vehicle safety device of claim 9. DE YOUNG further discloses wherein the analog input block accepts input from an existing vehicle wiring harness (Flasher unit version C includes signal conditioning bias resistors and protective diodes (analog input block) for inputs FRONT LEFT TURN LAMP, SPD4, and FRONT RIGHT TURN LAMP, SPD8, (vehicle wiring harness; figure 6, paragraph [0083]).

Claim 4 lacks an inventive step under PCT Article 33(3) as being obvious over DE YOUNG in view of US US2015/061492 A1 to Vision Works IP Corporation (hereinafter "VWorks").

-***-Continued Within the Next Supplemental Box-***-

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

-***-Continued from Previous Supplemental Box-***-

As per claim 4, DE YOUNG discloses the system of claim 1. However, DE YOUNG fails to disclose wherein the interface and the strobing circuit are an integrated component that replaces an existing vehicle flasher module. VWORKS discloses wherein the interface and the strobing circuit are an integrated component that replaces an existing vehicle flasher module (the control device (strobing circuit) receives input from the vehicle speed sensor or the brake pedal (interface) and the lamps are flashed. The system can be implemented in a module (integrated component) used to retrofit older vehicles (replaces an existing vehicle flasher module); paragraphs [0069], [0082], [0113]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method disclosed in DE YOUNG to include wherein the interface and the strobing circuit are an integrated component that replaces an existing vehicle flasher module, as taught by VWORKS, for the benefit of establishing a low-cost and efficient retrofit capability for the strobing system.

Claim 14 lacks an inventive step under PCT Article 33(3) as being obvious over DE YOUNG in view of US 5374920 A to Evens, H. (hereinafter "EVENS"), and in further view of US 5043699 A to Hayden, R. (hereinafter "HAYDEN"), and in further view of US 6026512 A to Schropp, R. et al. (hereinafter "SCHROPP").

As per claim 14, DE YOUNG discloses the vehicle safety device of claim 9. However, DE YOUNG fails to disclose wherein the analog input block is configured to interface with at least 2, 3, 4, 5, and 8 pin flasher relay systems. EVENS discloses wherein the analog input block is configured to interface with at least 3, 4, and 5 pin flasher relay systems (resistors 14-18 (analog input block) protect the inputs to the blink sender, which has five contact terminals (5 pin flasher relay) but is adaptable to existing wiring systems employing only 4 (4 pin flasher relay) or 3 contacts (3 pin flasher relay); figures 1, 3 and 5, column 5, lines 40-43, column 8, lines 7-10 and 21-24, column 9, lines 30-35 and 50-51). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method disclosed in DE YOUNG to include wherein the analog input block is configured to interface with at least 3, 4, and 5 pin flasher relay systems, as taught by EVENS, for the benefit of making the vehicle safety device adaptable to most common vehicle flasher relay systems. HAYDEN discloses wherein the analog input block is configured to interface with at least 2 pin flasher relay systems (an automotive flasher switch with two terminal pins (2 pin flasher relay) has resistors 10 and 13, capacitors 22 and 24 and diodes 30 and 32 (analog input block); abstract, figure 1, column 3, lines 4-6, 26-29 and 67-68, column 4 lines 1-20). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method disclosed in DE YOUNG to include wherein the analog input block is configured to interface with at least 2 pin flasher relay systems, as taught by HAYDEN, for the benefit of making the vehicle safety device adaptable to most common vehicle flasher relay systems. SCHROPP discloses wherein the analog input block is configured to interface with at least 8 pin flasher relay systems (the electronic blinker circuit is implemented in an eight terminal package (8 pin flasher relay) and has an analog relay control section 24 (analog input block); abstract, figure 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method disclosed in DE YOUNG to include wherein the analog input block is configured to interface with at least 8 pin flasher relay systems, as taught by SCHROPP, for the benefit of making the vehicle safety device adaptable to most common vehicle flasher relay systems.

Claims 15-17 lack an inventive step under PCT Article 33(3) as being obvious over DE YOUNG in view of US 5646385 A to Bogovican, D. et al. (hereinafter "BOGOVICAN").

As per claim 15, DE YOUNG discloses a vehicle lighting safety device comprising: at least one hazard input communicatively coupled to a driver accessible hazard light switch inside the vehicle (the standard hazard flash switch (hazard light switch inside the vehicle) is activated by the driver (driver accessible) causing a signal to the STDSwIn input (hazard input) of the microprocessor (communicatively coupled); paragraphs [0025], [0079], [0080]); a microcontroller communicatively coupled to the at least one hazard input (the microprocessor (microcontroller) has standard hazard flash switch input, STDSwIn (communicatively coupled and hazard input); paragraph [0075]); and an output communicatively coupled to the microcontroller and capable of driving a plurality of vehicle mounted light emitting diodes (the microprocessor (microcontroller) has output pin LFrontInOut (output communicatively coupled) that drives all LED light arrays (plurality of vehicle mounted light emitting diodes) through D4, D5, D8 and D9 diodes; figure 6, paragraphs [0075], [0080], [0083]), at least some of which are selectively operative as turn signal lights based upon manipulation of a turn signal switch (when the turn signal switch is closed (manipulation) to the left signal position, the flasher unit produces a turn signal driving the LED light arrays (turn signal lights and selectively operative); paragraphs [0067], [0083]); and wherein the microcontroller operates both the plurality of light emitting diodes in a strobing manner in response to receiving a signal on the at least one hazard input (if the standard hazard flash switch (hazard input) is activated (receiving a signal), the flasher unit microprocessor (microcontroller) produces the standard hazard flash (strobing manner) to all LED light arrays (plurality of light emitting diodes); paragraphs [0076], [0079], [0080]). However, DE YOUNG fails to disclose wherein the turn signal switch is a signal light stalk mounted to a vehicle steering column. BOGOVICAN discloses wherein the turn signal switch is a signal light stalk mounted to a vehicle steering column (a turn signal stalk switch assembly mounted on the steering column; abstract, figure 1, column 1, lines 37-39). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method disclosed in DE YOUNG to include wherein the turn signal switch is a signal light stalk mounted to a vehicle steering column, as taught by BOGOVICAN, for the benefit of accommodating the most common standard turn signal design within the scope of the strobing system.

As per claim 16, a combination of DE YOUNG and BOGOVICAN discloses the device of claim 15. DE YOUNG further discloses wherein the microcontroller comprises a body control module (the flasher unit version C microprocessor (microcontroller) is the sole flasher (body control module) for the vehicle; paragraphs [0045], [0076]).

As per claim 17, a combination of DE YOUNG and BOGOVICAN discloses the device of claim 15. DE YOUNG further discloses wherein the microcontroller receives the hazard input via a body control module (flasher unit version D microprocessor (microcontroller) receives input from the existing standard flasher (vehicle body control module); figure 7, paragraphs [0086], [0093]).

Claims 1-17 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

Electronic Acknowledgement Receipt

EFS ID:	40530668
Application Number:	16991595
International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
Filer Authorized By:	David Gene Woodral
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Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS_2020_09_11_part1.pdf	1010006 ee92ad9b979f0e089cceb042465c3ad2553dc8f8	no	12

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31	Non Patent Literature	FlashingBrakeLightsMakeADifference.pdf	686399 f7d8c5206f33cd163da56d8285366b3a4580bf7d	no	3
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PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16991595
Filing Date	2020-08-12
First Named Inventor	TUCKER
Art Unit	
Examiner Name	
Attorney Docket Number	012644_00013_PRV_UTL

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	Art Unit	
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	15	CHRISTIANSON ET AL, "Workzone Safety Improvements through Enhanced Warning Signal Devices", "https://escholarship.org/content/qt6nm2g4tg/qt6nm2g4tg.pdf", , Publisher: Univerisity of California, Berkeley 2008, Published in: US	
	16	ISA/US, "INTERNATIONAL SEARCH REPORT FOR PCT/US2016/054489", 12/29/2016	
	17	PCT/ISA/US, "PCT International Search Report for PCT/US2016/015125", 03/31/2016	
	18	, "10 Car Options the Law Won't Let You Have: Strobe Brake Lights", , Publisher: http://www.popularmechanics.com/cars/news/industry/10-car-options-the-law-wont-let-you-have-4#slide-4	
	19	, "Vehicle Brake Light Flasher Module Safety Flash Light Alert", , Publisher: http://www.amazon.com/Vehicle-Flasher-Module-Safety-Universal/dp/B00FADDOL4	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16991595
	Filing Date	2020-08-12
	First Named Inventor	TUCKER
	Art Unit	
	Examiner Name	
	Attorney Docket Number	012644_00013_PRV_UTL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/david g. woodral/	Date (YYYY-MM-DD)	2020-09-11
Name/Print	Woodral, David G.	Registration Number	57277

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/991,595

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	40 minus 20 =	* 20	x 50 =	1000	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	1785		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/991,595	08/12/2020	DAVID M. TUCKER	012644_00013_PRV_UTL

CONFIRMATION NO. 6990

28827
GABLE & GOTWALS
100 WEST FIFTH STREET, 10TH FLOOR
TULSA, OK 74103

FORMALITIES LETTER

OC000000119313182

Date Mailed: 08/19/2020

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given **TWO MONTHS** from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The drawings must be reasonably free from erasures and must be free from alterations, overwriting, interlineations, folds, and copy marks. See Figure(s) 1, 4.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  DAVID M. TUCKER
  STEPHEN T. POWERS
  MIKE INCORVAIA
  AUSTIN REECE TUCKER

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/ptnguyen/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/991,595	08/12/2020		1865	012644_00013_PRV_UTL	40	3

CONFIRMATION NO. 6990

28827
GABLE & GOTWALS
100 WEST FIFTH STREET, 10TH FLOOR
TULSA, OK 74103

FILING RECEIPT

OC000000119313181

Date Mailed: 08/19/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

DAVID M. TUCKER, Katy, TX;
STEPHEN T. POWERS, Houston, TX;
MIKE INCORVAIA, Hendersonville, TN;
AUSTIN REECE TUCKER, Katy, TX;

Applicant(s)

ESS-HELP, INC., Houston, TX;

Power of Attorney: The patent practitioners associated with Customer Number 28827

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/885,659 08/12/2019

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 08/18/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/991,595**

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PTO/AIA/80 (07-17)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒ Practitioners associated with the Customer Number: **28827**

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☒ The address associated with Customer Number: **28827**

OR

☐ Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

ESS-HELP, INC.
6922 Blandford Ln.
Houston, TX 77055

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on the behalf of the assignee

Signature	David M. Tucker	Date 6-20-19
Name	David M. Tucker	Telephone
Title		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CRF 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Filer:	David Gene Woodral/Michelle Kimball
Attorney Docket Number:	012644_00013_PRV_UTL

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	20	50	1000
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1865**

Electronic Acknowledgement Receipt

EFS ID:	40263142
Application Number:	16991595
International Application Number:	
Confirmation Number:	6990
Title of Invention:	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS
First Named Inventor/Applicant Name:	DAVID M. TUCKER
Customer Number:	28827
Filer:	David Gene Woodral/Michelle Kimball
Filer Authorized By:	David Gene Woodral
Attorney Docket Number:	012644_00013_PRV_UTL
Receipt Date:	12-AUG-2020
Filing Date:	
Time Stamp:	15:50:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1865
RAM confirmation Number	E20208BF50579684
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ADS.pdf	1793011 e74cda52cd154689befe3719de33234c35d98723	no	9
Warnings:					
Information:					
2		Specification.pdf	198907 6fa87a88e416b716952c5c435a2aa231b5aab323	yes	39

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Sequence Listing	1	30
	Claims	31	38
	Abstract	39	39

Warnings:					
Information:					
3	Drawings-only black and white line drawings	Figures.pdf	1403940 3283dcfc774df9eaac87424306990adc8041d122	no	5
Warnings:					
Information:					
4	Power of Attorney	POA_Prosecute_Apps.pdf	75557 c163c5375049fdab1123c62291f54e1acfbb969f	no	1
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	38419 3bdb1fd766e338360ce4bed50f7b879e915e21c0	no	2

Warnings:	
Information:	
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	012644_00013_PRV_UTL
	Application Number	
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	DAVID	M.	TUCKER	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Katy	TX	US

Mailing Address of Inventor:

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Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	STEPHEN	T.	POWERS	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

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City	Houston
State/Province	TX
Postal Code	77055
Country	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	MIKE		INCORVAIA	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	012644_00013_PRV_UTL
	Application Number	
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	

City	Hendersonville	State/Province	TN	Country of Residence	US

Mailing Address of Inventor:

Address 1	103 Bayshore Court
Address 2	

City	Hendersonville	State/Province	TN
Postal Code	37075	Country	US

Inventor 4 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	AUSTIN	REECE	TUCKER	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Katy	State/Province	TX	Country of Residence	US

Mailing Address of Inventor:

Address 1	20110 Kingsland Blvd.
Address 2	

City	Katy	State/Province	TX
Postal Code	77450	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	28827		
Email Address	iplaw@gablelaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS		
Attorney Docket Number	012644_00013_PRV_UTL	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	5	Suggested Figure for Publication (if any)	

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	Application Number	
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	28827		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62885659	2019-08-12

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	012644_00013_PRV_UTL
	Application Number	
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	012644_00013_PRV_UTL
	Application Number	
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	012644_00013_PRV_UTL
	Application Number	
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	ESS-HELP, INC.		
Mailing Address Information For Applicant:			
Address 1	6922 Blandford Lane		
Address 2			
City	Houston	**State/Province**	TX
Country	US	Postal Code	77055
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	012644_00013_PRV_UTL
	Application Number	
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/david g. woodral/			Date (YYYY-MM-DD)	2020-08-12
First Name	David	Last Name	Woodral	Registration Number	57277

Additional Signature may be generated within this form by selecting the Add button. Add

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	012644_00013_PRV_UTL
	Application Number	
Title of Invention	SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

FOR

SYSTEM FOR COMMUNICATION OF HAZARDOUS VEHICLE AND ROAD CONDITIONS

CROSS-REFERENCE TO RELATED CASES

[0001] This application claims the benefit of U.S. provisional patent application Serial No. 62/885,659, filed on August 12, 2019, and incorporates such provisional application by reference into this disclosure as if fully set out at this point.

FIELD OF THE INVENTION

[0002] This disclosure relates to communication of emergency conditions with respect to vehicles generally and, more specifically, to automated and electronic communication of emergencies, hazards, and other events between vehicles, or between vehicles and other receivers.

BACKGROUND OF THE INVENTION

[0003] Systems exist that provide enhanced visual communications systems for vehicles that are in distressed, breakdown, or emergency states. Enhanced visual communications systems may also be deployed when a vehicle has had an airbag activation or activation of traction control, ABS, or a similar automatic safety system. Enhanced visual communications systems may rely on increased flash rates (e.g., strobing) of vehicle signal lights or other lights that may include auxiliary lights or remote beacons. Various flashing patterns may be utilized in a manner designed

to attract attention or communicate more effectively than with older slow speed standard hazard flasher systems. Examples of such enhanced visual communication systems relying utilizing vehicle signal lamps are described in U.S. Patent No. 9,481,331 to Tucker et al. and U.S. Patent No. 9,616810 to Tucker et al.

[0004] Although enhanced visual communication systems relying only on strobing lights or other visual enhancements serve well to inform other drivers in proximity to the distressed vehicle that caution should be exercised, they are necessarily limited in their ability to inform drivers who may be too far away, behind other vehicles, around curves or bends in the road, or inhibited by other obstructions. Enhanced visual communication systems also still rely on at least some amount of attention being paid by other drivers, as well as their reaction time and ability to properly assess an emergency or distress visual communication, or to react appropriately.

[0005] Moreover, it would remain up to the individual driver to know how and when to deploy their own safety systems that may serve to mitigate the chance of further distress events (e.g., collisions) or to appropriately signal other traffic around them. It will occasionally be observed that a driver will activate his or her emergency flashers upon encountering another vehicle in distress or another emergency situation in order to pre-emptively alert drivers behind or near him or her. Although helpful, this is far from universal. Additionally, mere activation of hazard lights cannot provide information to drivers who are out of sight of the original event and do not know what is happening or how to respond. For example, in some cases it would be entirely appropriate to continue with increased caution (e.g., animals on the roadside), while in other cases the best response to an emergency would be to stop entirely (e.g., an overturned gasoline truck ahead).

[0006] Cars that are partially or completely self-driving are already a reality, and are predicted to become common place. Computer vision, radar, GPS and other technologies are deployed to make self-driving cars as aware of their surroundings as possible in order to safely drive on streets and highways. Statistically, self-driving cars may already be safer than human drivers. However, a self-driving car must still presently "see" or "hear" of a distress event of another car on the road in much the same manner as a human driver. They can "watch" for events that might be indicative of caution of distress, but they are limited by line of sight, other vehicles, obstructions, etc.

[0007] What is needed is a system and method for addressing the above and related concerns.

SUMMARY OF THE INVENTION

[0008] The invention of the present disclosure, in one aspect thereof, includes a system for signaling a hazard condition on a vehicle. The system has a microprocessor configured to receive an electronic signal from the vehicle that is indicative of a hazardous condition involving the vehicle, and a first radio transmitter in operative communication with the microprocessor. In response to receiving the signal indicative of a hazardous event, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition.

[0009] In some embodiments, the system includes or interfaces with a global positioning system unit that provides location data corresponding to the vehicle to the microprocessor and the first wireless signal includes the location data. A second radio transmitter may be in operative communication with a personal electronic device, the personal electronic device providing location data to the microprocessor that is included in the first wireless signal.

[0010] In some cases a radio receiver is also in operative communication with the microprocessor. The microprocessor may receive an indication of a hazard condition of another vehicle via the radio receiver and provides an indication of the same within the vehicle. The microprocessor may provide the indication of the hazard condition of another vehicle electronically to another system within the vehicle. The microprocessor may provide the indication of the hazard condition of another vehicle visually to an occupant of the vehicle. In some cases the microprocessor provides the indication of the hazard condition of another vehicle to a personal electronic device associated with an occupant of the vehicle. The system may include a a heads-up display such that the visual indication of the hazard condition of another vehicle is

provided to an occupant of the vehicle using the heads-up display. The microprocessor may also provide the indication of the hazard condition of another vehicle audibly to an occupant of the vehicle.

[0011] Some embodiments have the microprocessor configured to detect an indication from another vehicle that the other vehicle in in a hazardous condition, and to transmit a second wireless signal via the first radio transmitter that indicates the other vehicle is in the hazardous condition. The indication from the other vehicle may be a line of sight communication or a visual indication from a forward-looking sensor communicatively coupled to the microprocessor. In some cases the forward-looking sensor comprises a camera.

[0012] The invention of the present disclosure, in another aspect thereof, comprises an emergency vehicle safety system having a microprocessor that receives notification of a hazardous condition involving the vehicle, a visual indicator visible from an exterior of the vehicle and operatively coupled to the microprocessor, a radio transmitter operatively coupled to the microprocessor. The microprocessor provides a high conspicuity visual signal on the visual indicator upon receipt of the notification of a hazardous condition involving the vehicle, provides a first radio communication via the radio transmitter upon receipt of the notification of a hazardous condition involving the vehicle.

[0013] In some embodiments the radio transmitter provides the first radio communication to a cellular phone tower. The radio transmitter may provide the first radio communication to a receiver of another vehicle or to a satellite system.

[0014] The visual indicator may comprises a set of lights operative as hazard flashers and turn indicator lights. The high conspicuity visual signal may comprises a signal having a flash rate in excess of a flash rate associated with the use of the set of lights as hazard flashers and in excess of a flash rate associated with the use of the set of lights as turn indicator lights. In some cases, the microprocessor does not provide the first radio signal via the radio transmitter when the visual indicator is used as hazard flashers or as turn indicators.

[0015] The microprocessor may receive notification of a hazardous condition involving the vehicle from a user operated switch inside the vehicle, from a vehicle safety subsystem, and/or from a personal electronic device. The microprocessor may receive location data for the vehicle from a global position system unit, and provide the location data in the first radio communication. In some cases, the global positioning system unit is provided, in part, by a personal electronic device.

[0016] The invention of the present disclosure, in another aspect thereof, comprises a system for providing real time indication of a hazardous vehicle condition. The system includes a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a signal from the first vehicle indicating a hazardous condition. The server receives the indication of the hazardous condition from the first microprocessor and provides the indication to a second vehicle.

[0017] In some cases the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle. The first microprocessor may in communication with a global positioning system associated with the first vehicle and includes location data

therefrom in the signal indicating a hazardous condition. The second vehicle may be equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a roadway path of the second vehicle.

[0018] The second vehicle may be equipped with a high conspicuity external visual indicator that is activated when the alert is provided. The second vehicle may be equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a threshold distance of the second vehicle. The alert may comprise a visual indication, possibly provided on a heads-up display. The alert may also comprise an audio alert.

[0019] The second vehicle may also be equipped with a high conspicuity external visual indicator that is activated when the alert is provided. The high conspicuity external visual indicator may be activated with the operator of the second vehicle decelerates as the second vehicle approaches the location of the first vehicle. The high conspicuity visual indicator may be activated as strobing lights at a rear of the second vehicle.

[0020] In another case, the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a roadway path and within a threshold distance of the second vehicle. In some cases, the second microprocessor only provides the alert when the second vehicle is on a course to intercept the first

vehicle. Again, the second vehicle may be equipped with a high conspicuity external visual indicator that is activated when the alert is provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Figure 1 is a schematic diagram of a vehicle emergency communication system according to aspects of the present disclosure.

[0022] Figure 2 is a communication link diagram of a one embodiment of vehicle emergency communication system according to aspects of the present disclosure.

[0023] Figure 3 is communication link diagram of another embodiment of an emergency communication system link diagram according to aspects of the present disclosure.

[0024] Figure 4 is a diagram illustrating potential relationships between driving and disabled vehicles on a road network

[0025] Figure 5 is a flow chart corresponding to one method of operation of an emergency vehicle communication system according to aspects of the present disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] According to the present disclosure, various methods and systems are provided that enable vehicles to communicate with other vehicles, operators of those vehicles (whether human or computer), or others, such as emergency services, vehicle monitoring and control systems and the like, that a hazardous situation exists on the roadway. Systems of the present disclosure may also communication other information relating to the vehicle, other vehicles, or other conditions or information. In the case of communication to/from another vehicle, the systems may be referred to as vehicle-to-vehicle communication systems (e.g., V2V). However, communications may be sent or received from devices and systems apart from vehicles – for example, emergency services, traffic monitoring systems, streetlights, toll collection systems, and others. Such systems may be referred to as vehicle-to-everything or vehicle-to-environment systems (e.g., V2X).

[0027] It should be understood that the term vehicle, car, automobile and similar are intended to refer to any conveyance operating on a roadway. This includes, without limitation, cars, trucks, vans, SUVs, tractor/trailers, buses, and motorcycles, whether auto piloted or manually driven and whether carrying passengers, or goods, or being empty. It should also be understood that, for purposes of the present disclosure, a wireless signal or communication may be an intermittent or an ongoing/continuous signal or communication. It may represent an analog or digital communication. If digital, any one wireless communication or signal may comprise a number of smaller digital communications or signals that are broken down for transmission and reassembled by the receiver to complete the original communication or signal.

[0028] Figure 1 is an exemplary system according to the present disclosure. Figure 1 illustrates a simplified schematic diagram of a system **100** that can deploy high conspicuity visual

indicators on a vehicle while also communicating the presence of such a deployment to other vehicles or systems. It should be understood that systems of the present disclosure can relay the presence or activation of traditional hazard flasher lights as well as high conspicuity visual indicators – it is not necessarily dependent on the specific light or hazard/warning system actually deployed. For purposes of the present disclosure, a high conspicuity visual indicator is a lamp or light visible on the exterior of a vehicle that is differentiable from headlamps, marker lights, parking lights, brake lights, signal lights, or traditional hazard flashers based on a variable or increased flash rate, a variable or increased contrast, a variable or increased brightness, an altered or variable color, and/or a combination of these.

[0029] Traditional hazard flashers and signal lights that have been installed on vehicles for decades generally have a flash rate of up to about two cycles per second, or 2 Hz. This was originally owing in part to the incandescent type lighting and analog circuitry that was state of the art when these system were developed. This cycle rate has been carried into modern times until recently even where the vehicle lighting system is entirely controlled by a body control module (BCM) or other microcontroller. However, modern light emitting diodes (LEDs) as operated by microcontrollers, for example, are capable of a much wider range of operations in terms of cycle rate, intensity, and other parameters. For purposes of the present disclosure a hazard flasher is considered to be a lighting system operating according to a slow flash rate as would be supported by older incandescent bulbs and analog circuitry (e.g., around 2 Hz), even if the lighting system is actually LED and/or microcontroller based.

[0030] In some embodiments, the system **100** is microprocessor **102** based. It may have control routines encoded for execution on the microprocessor **102**. In other embodiments "hard

coded" silicone chips may be used that are not programmable or reprogrammable. In some embodiments, the microprocessor **102** may be considered a microcontroller and include its own memory, I/O controllers, A/D, D/A, etc. The microprocessor **102** (and the entire system **100**) may be a standalone device installed as original equipment (e.g., at the time of a vehicle's manufacture), as dealer installed system, in the aftermarket by a third party, or in any other manner. The system **100** may also be a subcomponent of a larger, more comprehensive system (such as a vehicle safety suite).

[0031] The microprocessor **102** may be a component or subcomponent of a BCM installed when a vehicle is constructed. In some cases the functions of the microprocessor may be encapsulated as a BCM that is a component of a vehicle when first manufactured. In such cases, BCM **106** and microprocessor **102** as shown in Figure 1 would be combined a single component with all illustrated connections (and possibly more). Although a BCM may typically be microprocessor/microcontroller based, application specific integrated circuits (ASICS), field programmable gate arrays (FPGAs) or other logic devices capable of implementing the required controls and routines may be utilized.

[0032] In one embodiment, the microprocessor **102** receives a signal from a hazard switch **104**. This may be a user accessible hazard light switch used to a activate a hazard flasher or a high conspicuity lighting device. In other embodiments, the switch **104** is a dedicated or auxiliary switch used specifically to begin a vehicle to vehicle signaling routine. In some embodiments, the switch **104** is a "soft switch" activated on a vehicle multi-purpose display or menu system **116**. As explained further herein, the switch **104** is merely one way to activate the system **100** for various functionality as described herein. In some embodiments, deployment may be automatic

instead of, or in addition to, use of the switch **104**. It should also be understood that the display **116** may comprise an OEM component of a vehicle, an aftermarket device, or a device associated with a personal electronic device. For purposes of the present disclosure, a personal electronic device may include a phone, tablet, laptop, or any other device that is not necessarily an integral component with the vehicle but can nevertheless provide effective communication to the vehicle via wired or wireless interface.

[0033] Voice activation provides an additional method by which the system **100** may be controlled. To that end a microphone **119** may be provided. The microphone **119** may be dedicated to the microprocessor **102** or may be a part of an existing system such as a hands-free navigation system or even a cell phone or other personal electronic device communicating by Bluetooth of otherwise. Thus, the system **100** is useful even if the user is not fully capable or is partially incapacitated. It is also known that certain vehicles today are capable by camera or other means to determine that a driver's focus has shifted from the appropriate task at hand (e.g., driving). Thus, the system **100** may be activated to signal a hazardous condition even if the driver does not explicitly do so, and even if the associated car has not yet deployed any other safety systems (e.g., traction control, airbags, etc.).

[0034] The microprocessor **102** may provide communication to an associated body control module ("BCM") to activate one or more sets of lights **108** associated with a vehicle in a flashing, strobing, or other communicative pattern. The lights **108** may comprise a set of OEM signal lamps. These may be used as hazard flashers, or as a high conspicuity visual indicators based on control by the microprocessor **102** and/or BCM **106**.

[0035] It should be understood that, in some embodiments, the microcontroller **102** comprises the BCM **106** itself. In other words, it may replace a previously-known BCM or it may comprise functionality that is added to an existing BCM via hardware or software. It should be understood that such additions and modifications include both OEM and after-market configurations.

[0036] A vehicle may also be placed into a hazard or distressed mode via an automated vehicle system represented here by microcontroller **110**. The microcontroller **110** may be a dedicated device or may be an ABS computer or sensor monitoring one or more wheels **112** for slippage, skidding, etc. It may also be a traction control computer. The microcontroller **110** may be an airbag controller or sensor for controlling one or more airbags **114**. The microcontroller may also comprise an accelerometer. In some embodiments, the microcontroller **110** comprises the microprocessor **102** and/or the BCM **106**. In further embodiments, one or more microcontrollers associated with a vehicle and/or systems of the present disclosure communicate via controller area network (CAN) bus or another network or protocol.

[0037] A forward-looking sensor (FLS) **120**, such as a camera, radar, sonar, or other detection system, is illustrated as a component that may gather information from the roadway or other location associated with a vehicle. The FLS **120** may be a component of a vehicle safety or automation system such as an automated cruise control system, a driver awareness system, or a self-driving system, for example. In some embodiments, the FLS **120** may feed information directly to the microprocessor **102** for analysis. However, the FLS **120** may also feed into the BCM **106** or to the associated vehicle safety system (e.g., self-drive) that then provides information to the microprocessor **102**. Such provided information may include, for example, that the vehicle

has left the lane or roadway, that a collision has occurred or is imminent, that an animal or obstacle is in the road, that another vehicle is in the road, or that a hazard is otherwise present. The ability to recognize such dangers is now known in the art. In various embodiments, the present disclosure provides systems and methods for communicating such hazards onward to outside systems and to vehicles and drivers that may not otherwise perceive such dangers.

[0038] In operation, if any of the hazards discussed above, or others are indicated, or if skidding, vehicle traction control, ABS activation, air bag deployment, or any other safety related event is detected as having occurred by the microprocessor **110**, this information may be relayed to microcontroller **102** and high conspicuity visual indicators activated. It should also be understood loss of tire pressure, loss of engine coolant, transmission overheating, low or empty fuel level, and other events may also be relied upon to place a vehicle into a distressed or hazard condition, resulting in high conspicuity visual indicators being activated. As illustrated, this may occur using lights **108**. However, a separate beacon or auxiliary lights could also be used.

[0039] As a result of any kind of activation of a high conspicuity visual indicator, as performed by or otherwise indicated to the microprocessor **102**, the system **100** may provide audible alerts to the driver that the system has been activated and what mode it is in. A speaker **119** may be provided, or audible cues may be provided through the vehicle audio system or another system. Similarly, visual cues may be provided via the display screen **116**, illumination of the switch **104**, a heads-up display **117**, or by other mechanisms. Various systems may be capable of multiple modes of high conspicuity visual indication as well as traditional hazard modes. Thus, the particular high conspicuity visual indicator or hazard mode deployed may be accessible and even alterable by the user (e.g., via voice command, display panel **116**, switch **104** or other gear).

[0040] In addition to providing indication or feedback to the user or driver of the vehicle, the system **100** may communicate the hazardous, distressed, or emergency condition to other vehicles or receivers electronically. The onward communication of the distress/hazard/emergency condition may occur automatically. In some embodiments, the user can initiate such communication or can prevent its communication outside the vehicle. For example, flashers (e.g., lights **108**) may be activated for testing purposes or for visual effect not related to a true distress or emergency, and it may be desirable to repress such communication to avoid false signals being propagated to other vehicles.

[0041] An antenna **118** may be provided for outbound communication. The antenna may be dedicated to use by the system **100** or may be a diversity antenna capable of more than one use. The antenna may be an OEM or after-market item. It should also be understood that more than one type of antenna may be employed. For example, as needed, the system **100** may include a wi-fi, antenna, a cellular network antenna, a Bluetooth antenna, or others.

[0042] The microprocessor **102** may have access to GPS data for use in providing data about the vehicle in which it is installed, or for purposes of mapping a received signal to the location of the vehicle in which it is installed. A GPS unit **125** is shown in communication with the microprocessor **102** for purposes of illustration. The GPS unit **125** may be dedicated for use by the system **100**, a separate vehicle subsystem or component of a subsystem, or could even represent GPS data or an "app" from a user's or occupant's personal electronic device.

[0043] Communication of the emergency event may be a simple indication to anyone with an appropriate receiver that a vehicle in the area is under distress. However, additional useful information may also be communicated. Information that may be communicated via the system

100 includes, but is not limited to, the vehicle system that signaled the emergency (ABS, traction, airbag, manual activation, etc.), location of the vehicle (e.g., via GPS), speed, mechanical state of the vehicle (operational or not), orientation of the vehicle (overturned or otherwise), deployment of airbags, and apparent state of the driver (engaging with controls or otherwise). In some embodiments, it may be possible to communicate the number of occupants of the vehicle, seat belt status, and so forth if such information is available to the microprocessor **102** via cameras or other sensors. The system could use such data, and in particular GPS location data, to calculate when a vehicle equipped with the system that such vehicle is proceeding on an intercept course with the emergency condition and only notify operators of vehicles that are likely to encounter the vehicle that has signaled an emergency condition to minimize unnecessary warnings to vehicles nearby that are on non-intercept courses. In some embodiments, the notification to other system-equipment vehicles may be an audio or visual indication system either that is either incorporated into the system or via an interface to the vehicle entertainment system. In addition, if the vehicle is equipped with a heads-up display, a visual indication may be projected. Using GPS information, the system could also display the location of the vehicle in distress on a GPS map display in the vehicle.

[0044] In some embodiments, the system **100** may be able to receive communications wirelessly (via antenna **118** or another antenna) that may be related to an emergency or hazard status of another vehicle. Thus, the microprocessor **102** may have or be communicatively couple to both a transmitter and receiver. This allows the system **100** to inform the occupants that a vehicle nearby may be in a hazardous condition even if they cannot visually observe the vehicle (e.g. due to terrain, traffic, buildings, weather conditions etc.). This may also allow the vehicle to

be informed that an EMS, fire, police, etc. vehicle is on the roadway such that the driver can take precautions or prepare to stop or yield. The system **100** may also allow greater information to be provided to police or emergency personnel (e.g., number of occupants) than to other vehicles nearby identified only as normal civilian traffic. Of course, privacy concerns may have to be taken into account with any such system.

[0045] With reference now to Figure 2, various examples of mechanisms of communication between vehicles utilizing a system such as those of the present disclosure are shown. Here, a vehicle **202** is shown a distance apart on a roadway **204** from a second vehicle **206**. It should be understood that the vehicles may be much further away than shown and that terrain, obstacles, and other cars may interpose the two exemplary vehicles shown. The vehicles **202**/**206** are also presumed to be equipped with a communicating hazard or safety system such as the system **100** or similar.

[0046] In the present example, vehicle **202** has encountered a hazard, breakdown, collision, or other event that has caused the vehicle to be placed in a state of hazard, emergency, or distress. A high conspicuity visual indicator may be deployed. In this case the high conspicuity visual indicator comprises front signal lights **222** and rear signal lights **224**, and both may be strobing at a high rate, and/or providing a directional strobe (e.g., right to left). This may occur manually by the driver or another occupant, or automatically by one or more automatic vehicle systems. In other to provide advance warning to other drivers, or to summon emergency services, or for other reasons, the hazard state may be communicated wirelessly.

[0047] In the example shown, the vehicle **202** communicates the hazard condition to vehicle **206** thus allowing vehicle **206**, either automatically or because of control by its driver, to

be prepared for an emergency ahead that may not be visible from the car's **206** location. In some embodiments, radio communication **208** may occur directly, vehicle to vehicle. The signal communicated in this direct fashion could be a digital or analog signal occurring on a dedicated radio frequency set aside for such purpose. However, it may also occur via a network system having a built-out infrastructure such as, but not limited to, a mobile phone network or a satellite-based network.

[0048] It should be understood that more than one car may receive indication of the emergency from vehicle **202**. For example, more than one vehicle may receive a locally broadcast signal. Additionally, in some embodiments, the vehicle **206** may automatically further relay the received information in a daisy-chain like fashion. In some embodiments, there may be a limit to the number of times or the distance that the emergency indication or hazard may be relayed. For example, there may be little or no benefit to relaying a message to a vehicle several miles up the road that may not encounter the hazard at all, or not within any reasonable time frame. The distance a receiving vehicle is from an originally transmitting vehicle may be based on available GPS data, cell tower data, or other information available to the microprocessor **102**.

[0049] It is contemplated that the direct, wireless, vehicle-to-vehicle communication by systems of the present disclosure may take place by any known wireless radiofrequency protocol. It should also be understood that vehicle-to-vehicle communication may take place via visual light signaling (e.g., vehicle **206** monitoring for high frequency strobing of lights on vehicle **202**, such as by camera **120**), via infrared (with IR transceivers integrated with the associated vehicles) or via other light-based communication methods.

[0050] As illustrated, the vehicle **202** communicate the present hazard condition to a wireless phone or data network (e.g., cellular) represented here by tower **210** as shown by communication link **212**. The network **210** may comprise a phone and data network such as a 3G/4G/5G or other network. Systems and methods of the present disclosure are intended for operation with any known network. The network **210** may communicate the emergency or hazard to other vehicles in the area as shown by link **214**. Here again, not every vehicle in the area is necessarily impacted by the particular hazard being encountered by vehicle **202**. Systems on-board the alerted vehicles may discriminate between hazards affecting or not affecting the alerted vehicle based on location and type of emergency (if provided). For example, a hazard on an adjacent street would not necessarily cause an alarm or any other action on a vehicle receiving indication of the hazard from network **210**.

[0051] In another embodiment, the presence of the hazard may be relayed to relevant vehicles and other devices via a satellite network **216**. In such case, the vehicle **202** may convey the emergency or hazard and the associated relevant data to satellite network **216**. Such information may be relayed then to vehicle **206** or other vehicles by the network **216**. It should be understood that the satellite network **215** may provide more than a single satellite. Systems and methods of the present disclosure are not intended to be limited to any particular satellite system implementation.

[0052] In addition to other vehicles, such as vehicle **206**, hazards may be communicated to emergency services **230**. This may be via any of the methods discussed herein. Emergency services may include, but is not limited to, fire, police, ambulance, and road-side assistance services. If the information provided by the vehicle signaling the hazard is sufficiently detailed,

time may be saved by dispatching the most relevant service to the distressed vehicle. For example, if the hazard or distress is only the result of a mechanical breakdown, roadside assistance and perhaps police may be signaled, but EMS or fire might not.

[0053] Referring now to Figure 3 a communication link diagram of another embodiment of an emergency communication system **300** according to aspects of the present disclosure. The system **300** shares the vehicle installed components with the system **100**, but not all are shown for purposes of clarity. Here, a particular vehicle **202** is shown as a logical boundary line. The high conspicuity visual indicators **222/224** are shown outside the boundary of the vehicle **202** to denote that they are visible outside the vehicle **202** (e.g., front and rear). The internal components of the system **100** are illustrated within the vehicle **202** with display screen **116** and option switchgear **302** being visible. If a heads-up display **117** is provided as original equipment or an aftermarket add-on, it may be communicative coupled to the system 100 for receiving and displaying warnings, messages, or other information. The antenna **118** is also shown external to vehicle **202** but it may actually be within the confines of the vehicle so long as it is able to establish a communication link with network **210**. Only a single vehicle **202** is shown schematically for clarity, but it should be understood that multiple vehicles may be equipped with the system **100** or similar such that they are able to participate in issuing and receiving warnings as described herein.

[0054] The network **210** may send and receive communications to and from the vehicle **202** and other vehicles as previously described. Here, however, the network **210** sends data via the internet **301**, using TCP/IP or another suitable protocol. Data may be encrypted or otherwise protected as is known in the art. Data from the vehicle **202** is ultimately provided to a data server **302**. The server **302** may track vehicles based upon GPS location or other data. Thus the server

302 may then discriminate as to which other vehicles any received hazard or emergency condition notification should be relayed to. The server **302** may also be connected to request EMS or other services automatically. GPS and other known data can be provided by the server **302** to the relevant services aid in faster response times. It should be understood that the server **302** may be any device capable of fulfilling the role of processing, analyzing, prioritizing, and distributing indications of hazard conditions and location data using software methods as are known in the art. The server **302** may comprise multiple redundant servers and may comprise a cloud-based services as known in the art.

[0055] Also shown in Figure 3 is an example of a personal electronic device, a phone **314**, in communication with the system **100**. Communications can occur via Bluetooth or another wireless protocol, or via a tethered/wired connection. In some cases, the phone **314** may provide interaction with the system **100** possibly providing occupant/user data and/or GPS information. The system **100** may be partially or completely controllable via the phone **100** via an app or another suitable interface. The system 100 may also be operable to interface with a phone **314** via well-known protocols such as Apple CarPlay®, Android Auto®, or others.

[0056] Referring now to Figure 4, a diagram **400** illustrating potential relationships between driving and disabled vehicles on a road network is shown. Diagram **400** is intended to illustrate at least some of the functionality of devices and systems according to the present disclosure as deployed in realistic scenarios. A roadway **402** is shown having a straight section **404** joining a curved section **406**. Where the straight section **404** joins the curved section 406 a clear view of the roadway **402** is blocked by a building **408** (but this could be any other obstacle including trees, terrain, guardrails, or even limited visibility due to weather conditions). A side

road **410** is also shown joining the roadway **402** on the straight section **404**. Various vehicles 420, **422**, **424**, **426** are shown at various locations for illustrative purposes.

[0057] In a basic example, if vehicle **422** has encountered a hazardous condition (such as, but not limited to, any of the examples provided above) and it is equipped with a system according to the present disclosure (e.g., system **100**) it may deploy a high conspicuity visual indicator (manually or automatically) resulting in a wireless signal being sent indicating the hazard. Presuming vehicle **420** is properly equipped, it may receive the signal (directly or from the network 210) and thus be alerted, perhaps long before the hazard is perceived by the driver. If the vehicle 420 has cruise control activated, it may be cancelled, braking may be activated, or any number of preliminary measures based on automated vehicle control systems.

[0058] If the vehicle **424** is also properly equipped, the hazard indication may be communicated to it as well (from vehicle **420** or network **210**). Thus even though vehicle **424** may have limited visibility down the road because of vehicle **420**, and may otherwise have no indication of any hazard apart from slowing or evasion of vehicle **420**, it can now be alerted and the driver or an auto drive system can take appropriate precautions. Any automatic steps taken, or the level of warning provided to a human driver (e.g., louder alarms, visible flashing lights, etc), can be increased based on the proximity of either vehicle **420**, **424** to the disabled or hazard-stricken vehicle **422** depending on proximity, speed, road condition, or other factors.

[0059] In some situations, a vehicle receiving an indication of a hazard condition from a nearby vehicle may automatically deploy its own high conspicuity visual indicators. For example, once vehicle **420** or **424** are near enough the hazard-stricken vehicle **422** not to provide a false signal where it is not needed, they may deploy their own high conspicuity visual indicators in the

interest of providing warning to vehicles that are not equipped with systems according to the present disclosure.

[0060] In another example, if vehicle **420** were disabled in the roadway, vehicle **424** may deploy its own high conspicuity visual indicators upon encountering the vehicle **420** and automatically send a signal indicative of a hazard condition to network **210** and/or via local broadcast since it is in a highly dangerous situation owning the limited view around building **408**. Such action may be taken by a system **100**, for example, deployed in vehicle **424**, even if the driver does not react. The microprocessor **102** may be informed based on GPS data, camera data, or other data that the vehicle **424** has become stopped in a roadway and it is not the result of a traffic jam or other relatively benign condition. Approaching vehicle **426** may therefore be alerted based on its own system (e.g., system **100**) and if it is not so equipped, the driver will at least have an improved chance at reacting in a timely and appropriate manner based on the increased conspicuity of vehicle **424**.

[0061] In another example, vehicle 428 is wrecked on side street 410 and occupies two lanes of traffic. If the vehicle 428 is so equipped, (e.g., with a system such as 100) it may automatically deploy high conspicuity visual indicators and a communication of its situation and GPS location locally, by direct broadcast, and/or via network **210**. Although vehicle 420 may be passing very near the disabled vehicle **428**, its own high conspicuity systems may not deploy as its own microprocessor 102 can compute that, based on GPS data, vehicle **420** will not necessarily encounter vehicle **428** at all. Thus, the signal corresponding to disabled vehicle **428** may not be improperly propagated potentially causing slowdowns or pile on collisions from vehicles **424**, **426**.

[0062] It should be understood that these examples are illustrative only, and that systems and methods of the present disclosure may have many other modes of operation and many other capabilities. It should also be understood that, in addition to direct, vehicle-to-vehicle communication and communication via network **210**, that the illustrated vehicles may communicate via satellite and/or a server-based system (e.g., **300**) or a combination of these.

[0063] Referring now to Figure 5, a flow chart **500** corresponding to one method of operation of an emergency vehicle communication system according to aspects of the present disclosure is shown. The chart **500** illustrates a potential flow of operations when a system according to the present disclosure (e.g., **100**, **300**) receives notification that another vehicle has encountered a hazardous condition. At step **502** the system 100 receives the hazard/emergency notification. In the present example, the system receives GPS coordinates from the original broadcasting data. At step **504** the system obtains its own GPS location data (e.g,. from GPS unit **125**). At step **508** the microprocessor may determine whether the GPS location of the broadcasting vehicle represents a location that is on its own road pathway. For purposes of this disclosure a road pathway would be the roadway the receiving vehicle is travelling on, considering the direction, or on a side road, turn, exit, etc. that the vehicle is likely to take.

[0064] If yes (the broadcasting vehicle is on the receiving vehicle's road pathway), the system may additionally determine if the broadcasting vehicle is within a threshold that requires warning the driver or vehicle immediately at step **510**. This determination may be based on speed limit, actual vehicle speed, time or day, road conditions, etc. For example, warning a driver of a received hazard broadcast from another vehicle with the receiving vehicle is already stopped, is

parked, or on an adjacent roadway may not be helpful. However, a low threshold waning could still be given (a non-emergency cautionary indication inside the car, for example).

[0065] If the broadcasting vehicle is within the threshold, an appropriate may be provided alert at step **512**. This may be both to the driver of the vehicle and to the vehicle itself (e.g., via CAN bus, or other connection). The alert may be used by auto control systems of the vehicle to stop cruise control or take other precautionary actions, or by self-driving systems to prepare to stop, reroute, etc.

[0066] A second threshold may be checked at step **514** to determine if the receiving vehicle itself is now in a hazardous state. This may be based on position in the roadway from GPS, camera, or other data, general conditions, proximity to the broadcasting vehicle and other factors. At step **514**, if the system **100** determines it is warranted, the receiving vehicle may activate its own high conspicuity visual display systems.

[0067] If the broadcasting vehicle is not on the receiving vehicle's road pathway (step **508**), and is not within the warning threshold (step **510**) or hazard threshold (step **514**) the system may nevertheless determine at step **518** if the broadcast warning was received from its own connected server (e.g., sever **302**). If not (e.g., the signal was received only directly from the broadcasting vehicle, wirelessly, via light sensors, etc.) the system may forward the hazardous condition alert to its own server at step **520**. Thus, the broadcast event becomes available to other vehicles interfaced with server **302**. If the system deploys its own high conspicuity visual display system, it may also report this to the server at step **302** as this is indicative the originally broadcast hazard condition may have expanded or propagated.

* * * *

[0068] It is to be understood that the terms "including", "comprising", and grammatical variants thereof do not preclude the addition of one or more components, features, steps, or integers or groups thereof and that the terms are to be construed as specifying components, features, steps or integers. It should also be understood that the illustrated and describe embodiments may have additional components that are not shown and are not intended to be excluded by their absence. However, other embodiments contain only those components explicitly references and other components and functions are therefore excluded. Not all components and steps that would easily be grasped and understood to be present by one of skill in the art are necessarily explicitly described or illustrated.

[0069] An operative connection, a communicative coupling, and similar terms indicate that appropriate structure may be present to provide the stated function.

[0070] If the specification or claims refer to "an additional" element, that does not preclude there being more than one of the additional element.

[0071] It is to be understood that where the claims or specification refer to "a" or "an" element, such reference is not be construed that there is only one of that element.

[0072] It is to be understood that where the specification states that a component, feature, structure, or characteristic "may", "might", "can" or "could" be included, that particular component, feature, structure, or characteristic is not required to be included.

[0073] Where applicable, although state diagrams, flow diagrams or both may be used to describe embodiments, the invention is not limited to those diagrams or to the corresponding

descriptions. For example, flow need not move through each illustrated box or state, or in exactly the same order as illustrated and described.

[0074] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks.

[0075] The term "method" may refer to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques and procedures either known to, or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs.

[0076] The term “at least” followed by a number is used herein to denote the start of a range beginning with that number (which may be a ranger having an upper limit or no upper limit, depending on the variable being defined). For example, “at least 1” means 1 or more than 1. The term “at most” followed by a number is used herein to denote the end of a range ending with that number (which may be a range having 1 or 0 as its lower limit, or a range having no lower limit, depending upon the variable being defined). For example, “at most 4” means 4 or less than 4, and “at most 40%” means 40% or less than 40%.

[0077] When, in this document, a range is given as “(a first number) to (a second number)” or “(a first number) – (a second number)”, this means a range whose lower limit is the first number and whose upper limit is the second number. For example, 25 to 100 should be interpreted to mean a range whose lower limit is 25 and whose upper limit is 100. Additionally, it should be noted that where a range is given, every possible subrange or interval within that range is also specifically intended unless the context indicates to the contrary. For example, if the specification indicates a range of 25 to 100 such range is also intended to include subranges such as 26 -100, 27-100, etc.,

25-99, 25-98, etc., as well as any other possible combination of lower and upper values within the stated range, e.g., 33-47, 60-97, 41-45, 28-96, etc. Note that integer range values have been used in this paragraph for purposes of illustration only and decimal and fractional values (e.g., 46.7 – 91.3) should also be understood to be intended as possible subrange endpoints unless specifically excluded.

[0078] It should be noted that where reference is made herein to a method comprising two or more defined steps, the defined steps can be carried out in any order or simultaneously (except where context excludes that possibility), and the method can also include one or more other steps which are carried out before any of the defined steps, between two of the defined steps, or after all of the defined steps (except where context excludes that possibility).

[0079] Further, it should be noted that terms of approximation (e.g., "about", "substantially", "approximately", etc.) are to be interpreted according to their ordinary and customary meanings as used in the associated art unless indicated otherwise herein. Absent a specific definition within this disclosure, and absent ordinary and customary usage in the associated art, such terms should be interpreted to be plus or minus 10% of the base value.

* * * * *

[0080] Thus, the present invention is well adapted to carry out the objects and attain the ends and advantages mentioned above as well as those inherent therein. While the inventive device has been described and illustrated herein by reference to certain preferred embodiments in relation to the drawings attached thereto, various changes and further modifications, apart from those shown or suggested herein, may be made therein by those of ordinary skill in the art, without

departing from the spirit of the inventive concept the scope of which is to be determined by the following claims.

CLAIMS

What is claimed is:

1. A system for signaling a hazard condition on a vehicle, comprising:

a microprocessor configured to receive an electronic signal from the vehicle that is indicative of a hazardous condition involving the vehicle; and

a first radio transmitter in operative communication with the microprocessor;

wherein, in response to receiving the signal indicative of a hazardous event, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition.

2. The system of claim 1, further comprising a global positioning system unit that provides location data corresponding to the vehicle to the microprocessor and the first wireless signal includes the location data.

3. The system of claim 1, further comprising a second radio transmitter in operative communication with a personal electronic device, the personal electronic device providing location data to the microprocessor that is included in the first wireless signal.

4. The system of claim 1, further comprising:

a radio receiver in operative communication with the microprocessor;

wherein the microprocessor receives an indication of a hazard condition of another vehicle via the radio receiver and provides an indication of the same within the vehicle.

5. The system of claim 4, wherein the microprocessor provides the indication of the hazard condition of another vehicle electronically to another system within the vehicle.

6. The system of claim 4, wherein the microprocessor provides the indication of the hazard condition of another vehicle visually to an occupant of the vehicle.

7. The system of claim 6, further comprising a heads-up display, and wherein the visual indication of the hazard condition of another vehicle is provided to an occupant of the vehicle using said heads-up display.

8. The system of claim 4, wherein the microprocessor provides the indication of the hazard condition of another vehicle audibly to an occupant of the vehicle.

9. The system of claim 4, wherein the microprocessor provides the indication of the hazard condition of another vehicle to a personal electronic device associated with an occupant of the vehicle.

10. The system of claim 1, wherein the microprocessor is configured to detect an indication from another vehicle that the other vehicle in in a hazardous condition, and transmits a second wireless signal via the first radio transmitter that indicates the other vehicle is in the hazardous condition.

11. The system of claim 10, wherein the indication from the other vehicle is a line of sight communication.

12. The system of claim 11, wherein the indication from the other vehicle is an indication from a forward-looking sensor communicatively coupled to the microprocessor.

13. The system of claim 12, wherein the forward-looking sensor comprises a camera.

14. An emergency vehicle safety system comprising:

a microprocessor that receives notification of a hazardous condition involving the vehicle;

a visual indicator visible from an exterior of the vehicle and operatively coupled to the microprocessor;

a radio transmitter operatively coupled to the microprocessor;

wherein the microprocessor provides a high conspicuity visual signal on the visual indicator upon receipt of the notification of a hazardous condition involving the vehicle; and

wherein the microprocessor provides a first radio communication via the radio transmitter upon receipt of the notification of a hazardous condition involving the vehicle.

15. The system of claim 14, wherein the radio transmitter provides the first radio communication to a cellular phone tower.

16. The system of claim 14, wherein the radio transmitter provides the first radio communication to a receiver of another vehicle.

17. The system of claim 14, wherein the radio transmitter provides the first radio communication to a satellite system.

18. The system of claim 14, wherein the visual indicator comprises a set of lights operative as hazard flashers and turn indicator lights.

19. The system of claim 18, wherein the high conspicuity visual signal comprises a signal having a flash rate in excess of a flash rate associated with the use of the set of lights as hazard flashers and in excess of a flash rate associated with the use of the set of lights as turn indicator lights.

20. The system of claim 19, wherein the microprocessor does not provide the first radio signal via the radio transmitter when the visual indicator is used as hazard flashers or as turn indicators.

21. The system of claim 14, wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a user operated switch inside the vehicle.

22. The system of claim 14, wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a vehicle safety subsystem.

23. The system of claim 14, wherein the microprocessor receives notification of a hazardous condition involving the vehicle from a personal electronic device.

24. The system of claim 14, wherein the microprocessor receives location data for the vehicle from a global position system unit and provides the location data in the first radio communication.

25. The system of claim 24, wherein the global positioning system unit is provided, in part, by a personal electronic device.

26. A system for providing real time indication of a hazardous vehicle condition comprising:

a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a signal from the first vehicle indicating a hazardous condition;

wherein the server receives the indication of the hazardous condition from the first microprocessor and provides the indication to a second vehicle.

27. The system of claim 26, wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle.

28. The system of claim 26, wherein the first microprocessor is in communication with a global positioning system associated with the first vehicle and includes location data therefrom in the signal indicating a hazardous condition.

29. The system of claim 28, wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a roadway path of the second vehicle.

30. The system of claim 29, wherein the alert to the occupant of the second vehicle is a visual indication.

31. The system of claim 30 wherein the visual indication is provided on a heads-up display.

32. The system of claim 29, wherein the alert to the occupant of the second vehicle is an audio alert.

33. The system of claim 29, wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided.

34. The system of claim 29, wherein the high conspicuity external visual indicator is activated when the operator of the second vehicle decelerates as the second vehicle approaches the location of the first vehicle.

35. The system of claim 29, wherein the high conspicuity external visual indicator is activated to strobe the lights at the rear of the second vehicle.

36. The system of claim 28, wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a threshold distance of the second vehicle.

37. The system of claim 36, wherein the second microprocessor only provides the alert when the second vehicle is on a course to intercept the first vehicle.

38. The system of claim 36, wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided.

39. The system of claim 38, wherein the second vehicle is equipped with a second microprocessor in communication with the server that receives the indication of the hazardous condition and provides an alert to an occupant of the second vehicle only when the first vehicle is located within a roadway path and within a threshold distance of the second vehicle.

40. The system of claim 39, wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided.

ABSTRACT OF THE DISCLOSURE

A system for signaling a hazard condition of a vehicle includes a microprocessor configured to receive an electronic signal from the vehicle that is indicative of a hazardous condition involving the vehicle, and a first radio transmitter in operative communication with the microprocessor. In response to receiving the signal indicative of a hazardous event, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition.

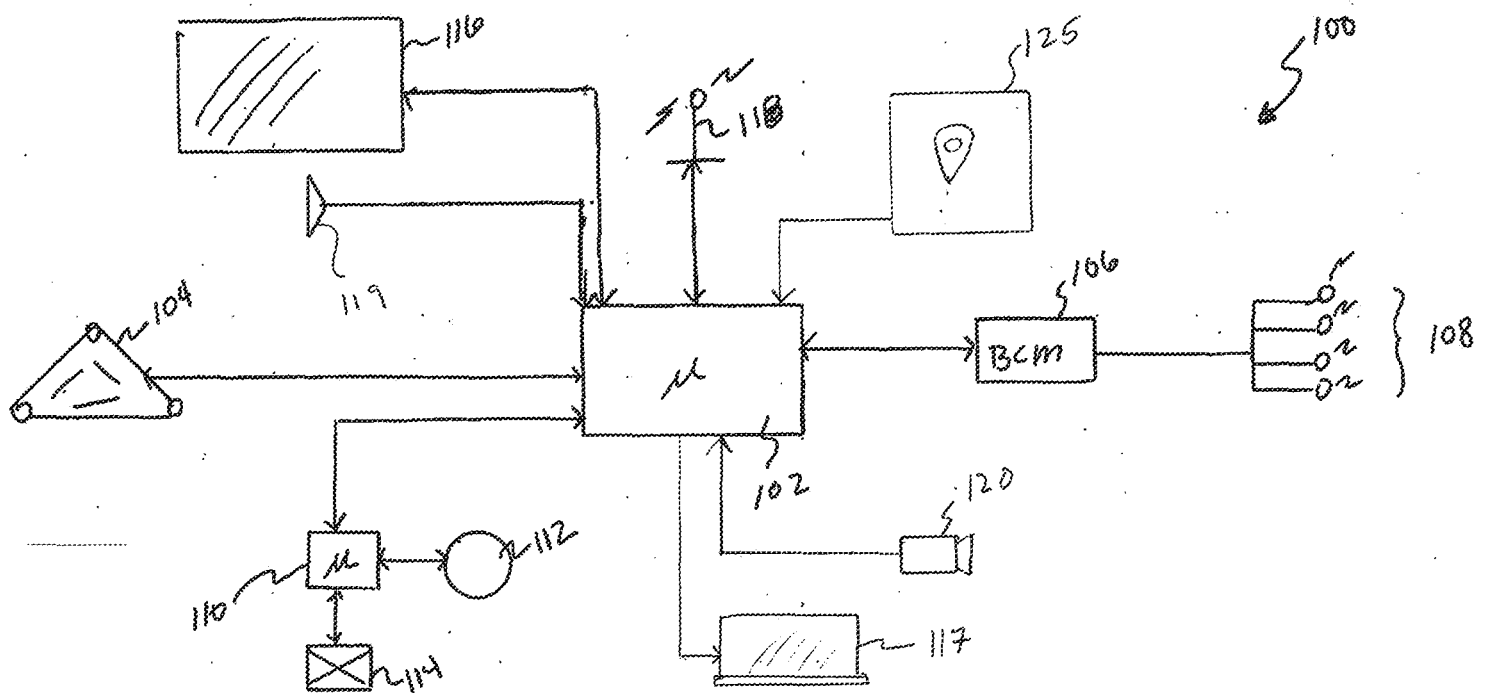


Figure 1

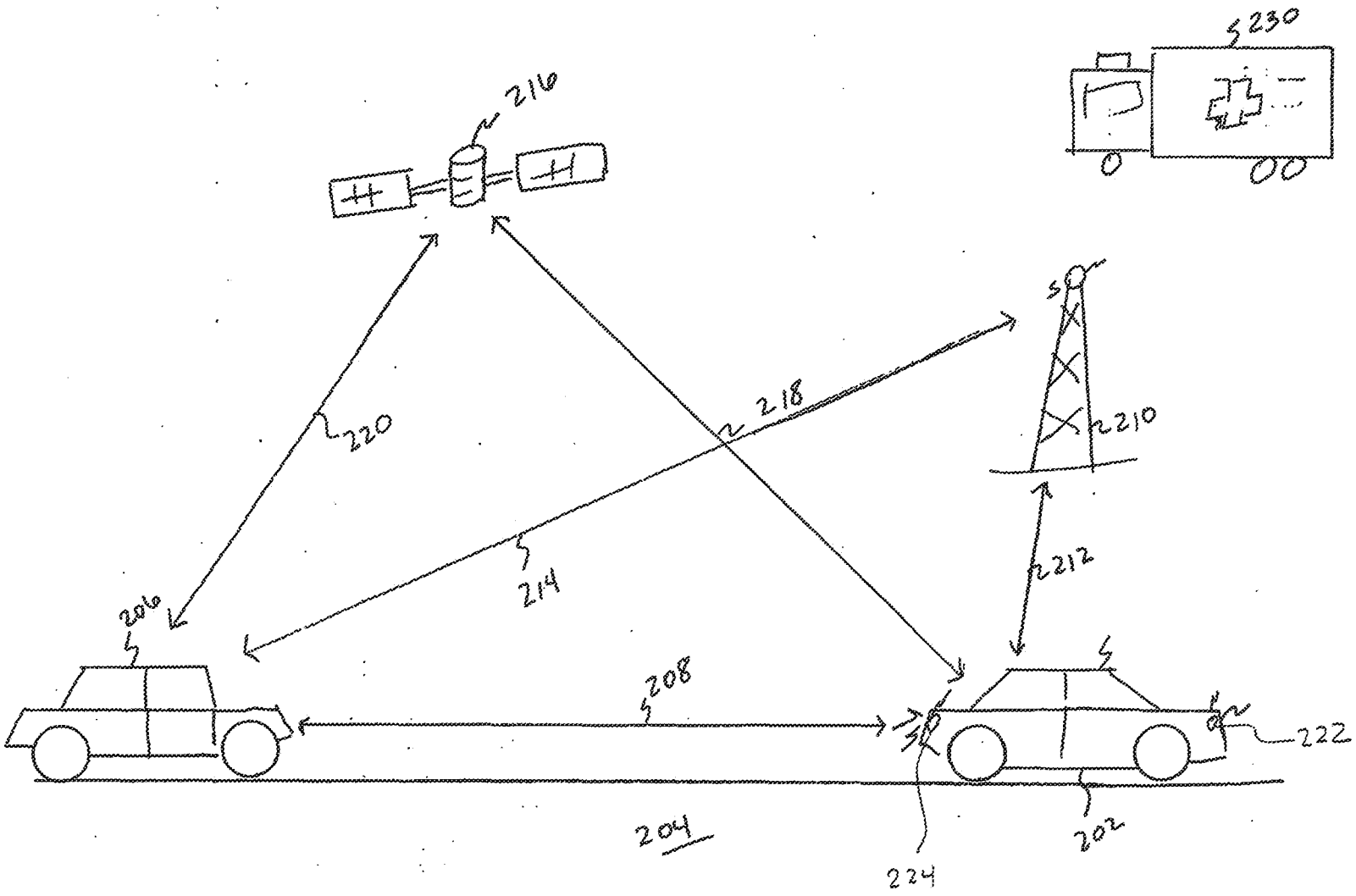


Figure 2

SPAETLER® No. 937 811E Engineer's Computation Pad

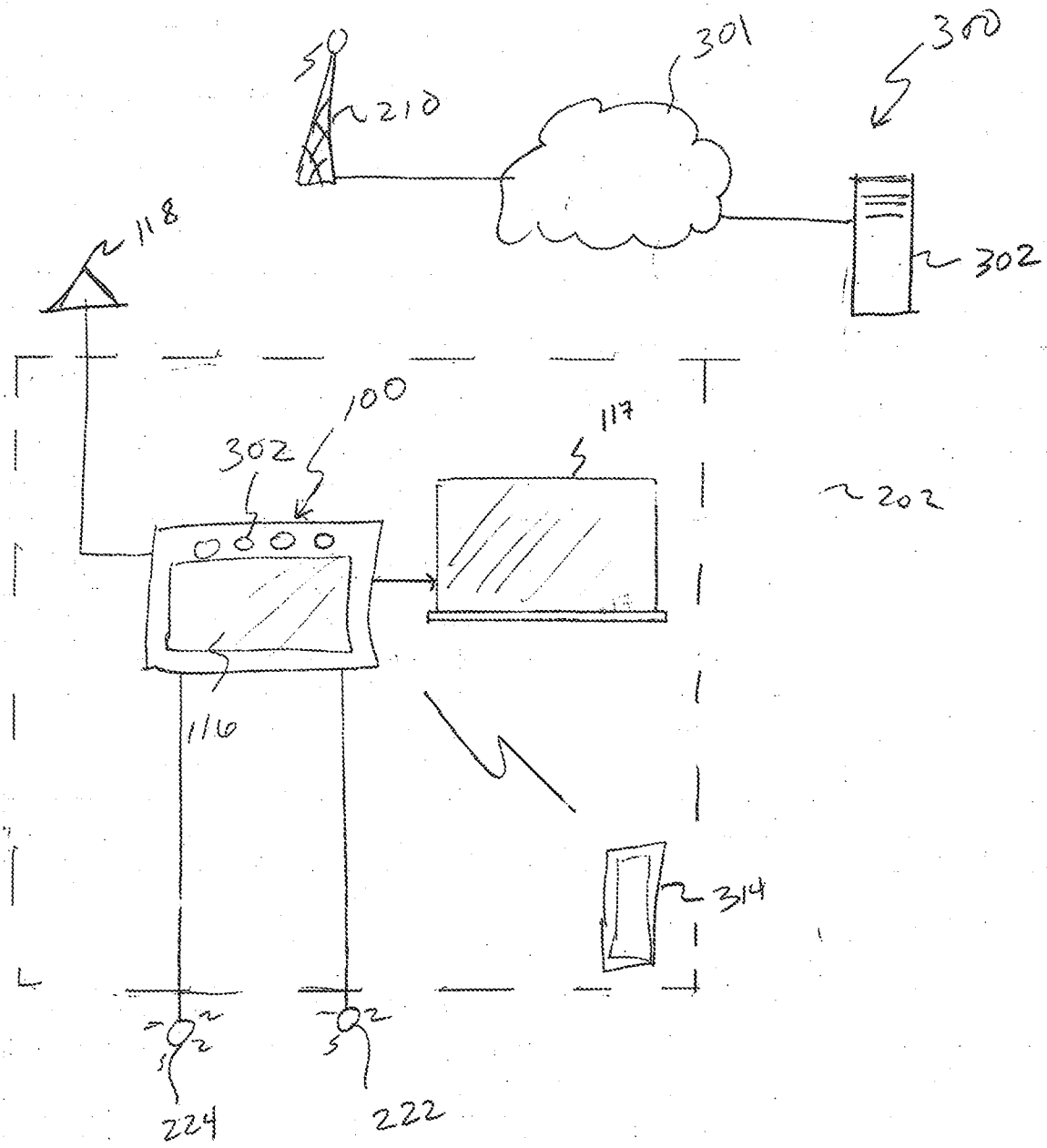


Fig. 3

STAEDTLER® No. 937 811E Engineer's Computation Pad

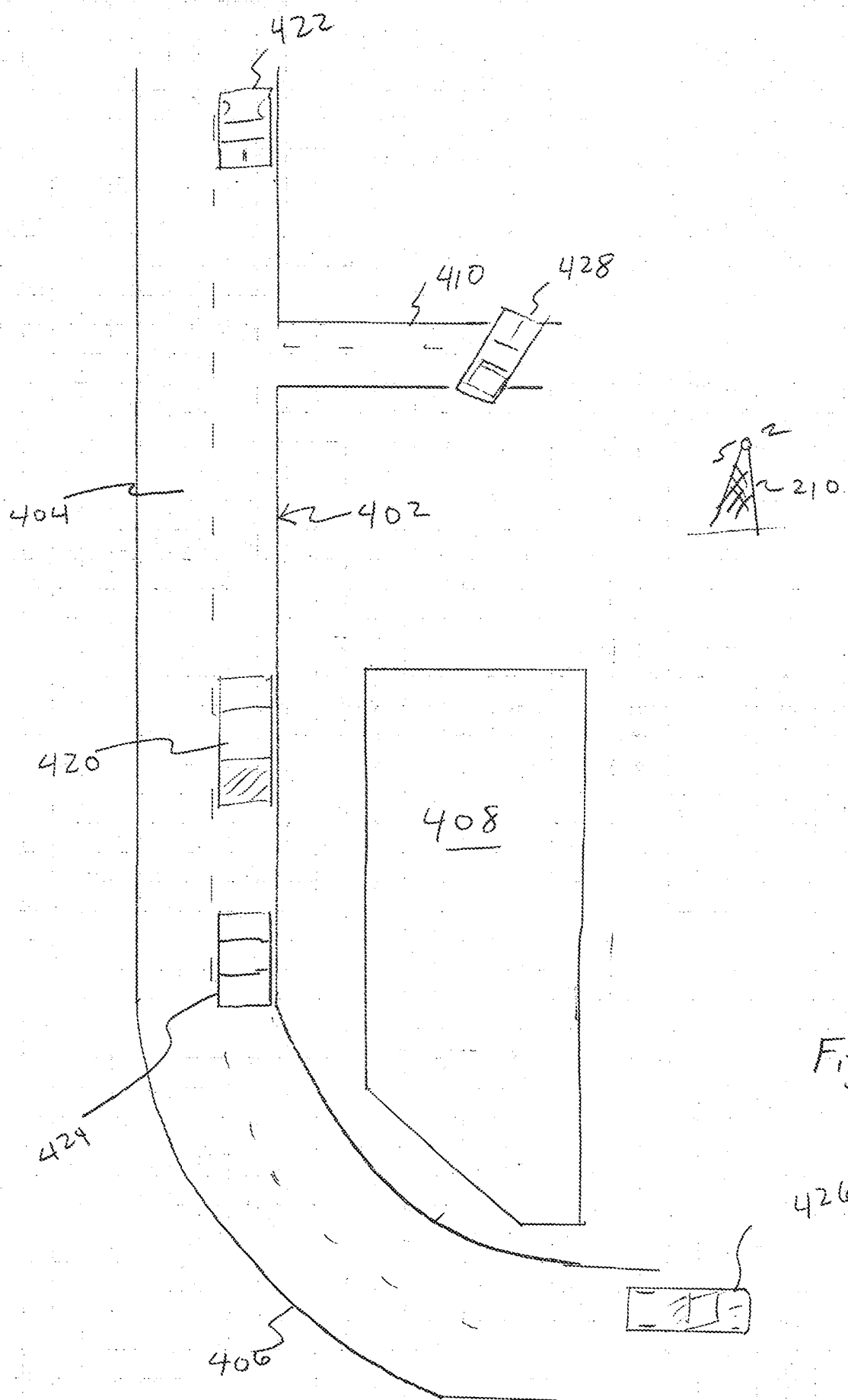


Fig. 4

SMEDTLER® No. 937 811E Engineer's Computation Pad

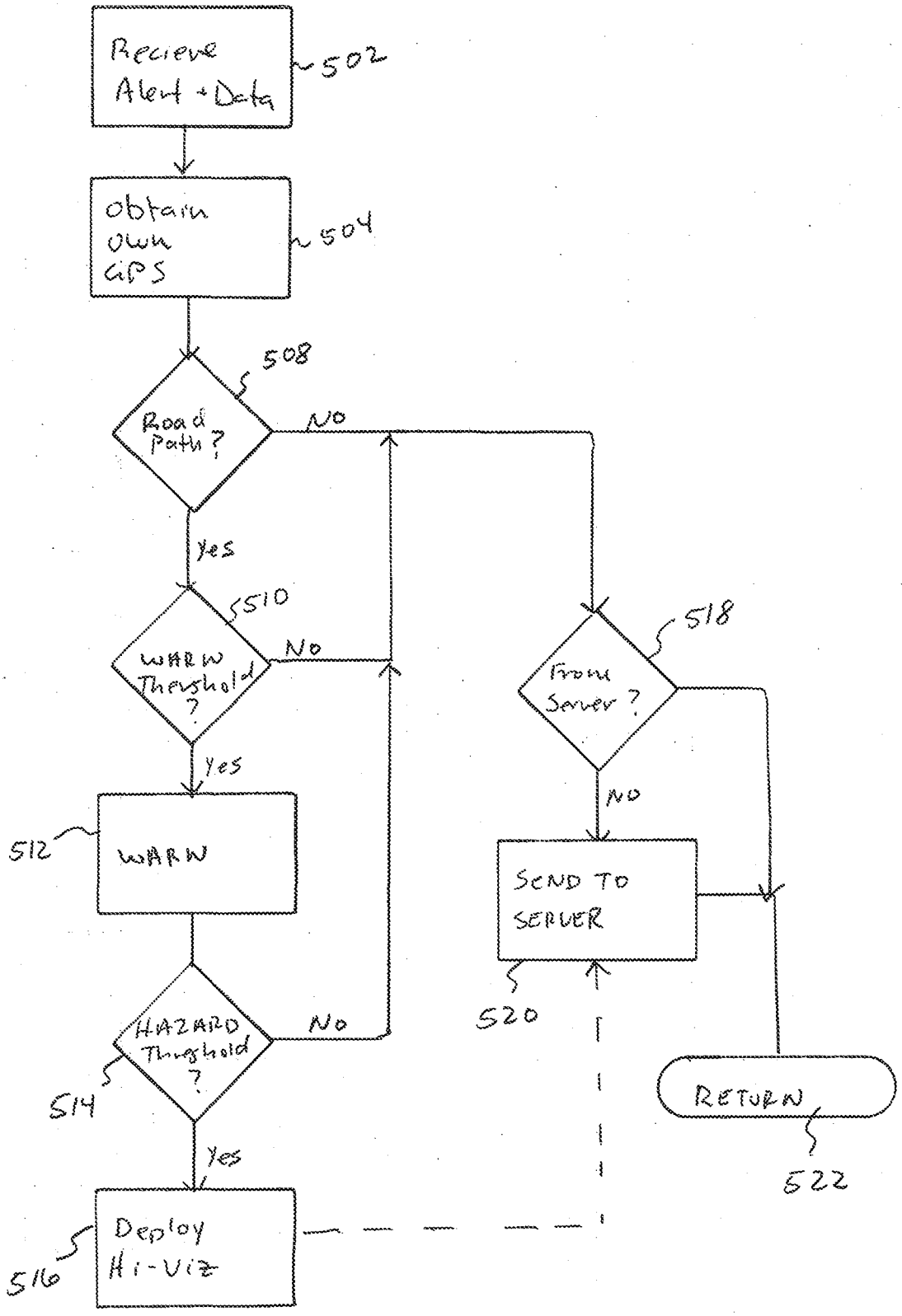


Fig. 5