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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1	8339
145340	7590	02/04/2025		
Caldwell Intellectual Property Law 200 Clarendon Street 59th Floor Boston, MA 02116			EXAMINER ALEXANDER, WILLIAM R	
			ART UNIT 2872	PAPER NUMBER
			NOTIFICATION DATE 02/04/2025	DELIVERY MODE 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):

alexander@caldwellllaw.com
docketing@caldwellip.com
kelsey@caldwellllaw.com

APPLICATION NO.	ISSUE DATE	PATENT NO.
18/517,910	04-Feb-2025	12216339

Caldwell Intellectual Property Law
200 Clarendon Street
Boston, MA 02116

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>



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/517,910	02/04/2025	12216339	1537-003USC1	8339

145340 7590 01/15/2025
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

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 0 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):

Ernesto Carlos Martinez Villalpando, Shrewsbury, MA;
Chiu Ming So, Hong Kong, HONG KONG;
Kwok Wah Law, Hong Kong, HONG KONG;
Wai Kuen Cheung, Hong Kong, HONG KONG;

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

Solos Technology Limited, Hong Kong, HONG KONG

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	18517910
Filing Date	2023-11-22
First Named Inventor	Ernesto Carlos Martinez Villalpando
Art Unit	--
Examiner Name	--
Attorney Docket Number	1537-003USC1

Change(s) applied to document, /M.E.G./ 10/4/2024	27	20180088340	A1	2018-03-29	~~Magio Loop Inc~~ Amayeh et al.	
	28	20160299569	A1	2016-10-13	~~Eyecam LLC~~ Fisher et al.	

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

FOREIGN PATENT DOCUMENTS

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	2020206775	WO	A1	2020-10-15	Shenzhen Guangyang Technology Co., Ltd., Shenzhen		☐
	2	2020038479	WO	A1	2020-02-27	Shenzhen Shaoyin Technology Co., Ltd.		☐

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

NON-PATENT LITERATURE DOCUMENTS

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	/WILLIAM R ALEXANDER/	Date Considered	09/19/2024
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*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)

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Art Unit	--
Examiner Name	--
Attorney Docket Number	1537-003USC1

Change(s) applied to document, /M.E.G./ 10/4/2024	16	20170032646	A1	2017-02-02	~~Motorola Mobility LLC~~	Alameh et al.
	17	20150126845	A1	2015-05-07	~~Research Foundation of State University of New York~~	Jin et al.
	18	20190158946	A1	2019-05-23	~~SNIK LLC~~	Honeycutt
	19	20170108715	A1	2017-04-20	Eddie Bauer	
	20	20180124497	A1	2018-05-03	~~Bragi GmbH~~	Boesen
	21	20180103139	A1	2018-04-12	Kevin Griffin	
	22	20070030442	A1	2007-02-08	~~Ingeniospec LLC~~	Howell et al.
	23	20160246059	A1	2016-08-25	~~Kopin Corp~~	Halpin et al.
	24	20130250232	A1	2013-09-26	~~Oakley Inc~~	Belbey et al.
	25	20170078883	A1	2017-03-16	~~Digimarc Corp~~	Rodriguez
	26	20180234847	A1	2018-08-16	~~Digimarc Corp~~	Rodriguez

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

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Art Unit	--
Examiner Name	--
Attorney Docket Number	1537-003USC1

	5	20220107202	A1	2022-04-07	Tirosh et al.	
	6	20170176778	A1	2017-06-22	Ushakov	
	7	20220113562	A1	2022-04-14	Anderson et al.	
	8	20190187492	A1	2019-06-20	Howell et al.	
	9	20190278110	A1	2019-09-12	Howell et al.	
Change(s) applied to document, /M.E.G./ 10/4/2024	10	20120237075	A1	09/2012 ~~2014-09-23~~	East et al. ~~Google LLC~~	
	11	20190101977	A1	04/2019 ~~2020-10-20~~	Apple Inc Armstrong-Muntner et al	
	12	20180242064	A1	08/2018 ~~2021-03-10~~	Honeycutt ~~SNIK LLC~~	
	13	20180097920	A1	04/2018 ~~2019-05-20~~	Apple Inc Hoellwarth et al.	
	14	20150248026	A1	2015-09-03	Carl Zeiss Vision International GmbH	Willey et al.
	15	20190297701	A1	2019-09-26	~~Logitech Europe SA~~	Cao et al.

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Examiner Name	--
Attorney Docket Number	1537-003USC1

Change(s) applied to document. /M.E.G./ 10/4/2024	42	10345625	B2	2019-07-09	Howell et al. ~~Ingeniospec LLC~~	
	43	10359311	B2	2019-07-23	Howell et al. ~~Ingeniospec LLC~~	
	44	10539459	B2	2020-01-21	Howell et al. ~~Ingeniospec LLC~~	
	45	10777048	B2	2020-09-15	Howell et al. ~~Ipventure Inc.~~	
	46	11042045	B2	2021-06-22	Chao et al. ~~Ingeniospec LLC~~	

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	20150172434	A1	2015-06-18	Kawagishi	
	2	20190097328	A1	2019-03-28	Yong et al.	
	3	20140347265	A1	2014-11-27	Aimone et al.	
	4	20140268008	A1	2014-09-18	Howell et al.	

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Examiner Name	--
Attorney Docket Number	1537-003USC1

Change(s) applied to document. /M.E.G./ 10/4/2024	31	8770742	B2	2014-07-08	Howell et al. ~~Ingeniospec LLC~~	
	32	8905542	B2	2014-12-09	Howell et al. ~~Ingeniospec LLC~~	
	33	9033493	B2	2015-05-19	Howell et al. ~~Ingeniospec LLC~~	
	34	9488520	B2	2016-11-08	Howell et al. ~~Ingeniospec LLC~~	
	35	9547184	B2	2017-01-17	Howell et al. ~~Ingeniospec LLC~~	
	36	9690121	B2	2017-06-27	Howell et al. ~~Ingeniospec LLC~~	
	37	10042186	B2	2018-08-07	Sweis et al. ~~Ingeniospec LLC~~	
	38	10060790	B2	2018-08-28	Howell et al. ~~Ingeniospec LLC~~	
	39	10061144	B2	2018-08-28	Howell et al. ~~Ingeniospec LLC~~	
	40	10310296	B2	2019-06-04	Howell et al. ~~Ingeniospec LLC~~	
	41	10330956	B2	2019-06-25	Howell et al. ~~Ingeniospec LLC~~	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Examiner Name	--
Attorney Docket Number	1537-003USC1

	20	7760896	B2	2010-07-20	Gabor Medveczky	
Change(s) applied to document, /M.E.G./ 10/4/2024	21	7771046	B2	2010-08-10	Howell et al. ~~Ip Venture Inc Ingeniospec LLC~~	
	22	7792552	B2	2010-09-07	Thomas et al. ~~Ingeniospec LLC~~	
	23	7806525	B2	2010-10-05	Howell et al. ~~Ingeniospec LLC~~	
	24	7922321	B2	2011-04-12	Howell et al. ~~Ingeniospec LLC~~	
	25	8109629	B2	2012-02-07	Howell et al. ~~Ingeniospec LLC~~	
	26	8337013	B2	2012-12-25	Howell et al. ~~Ip Venture Inc~~	
	27	8430507	B2	2013-04-30	Thomas A. HowellDavid ChaoC. Douglass ThomasPeter	
	28	8434863	B2	2013-05-07	Thomas A. HowellDavid ChaoC. Douglass ThomasPeter	
	29	8465151	B2	2013-06-18	Howell et al. ~~Ingeniospec LLC~~	
	30	8500271	B2	2013-08-06	Howell et al. ~~Ip Venture Inc~~	

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

Application Number	18517910
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Art Unit	--
Examiner Name	--
Attorney Docket Number	1537-003USC1

Change(s) applied to document, /M.E.G./ 10/4/2024	9	7192136	B2	2007-03-20	Howell et al. ~~Ingeniospec LLC~~	
	10	7255437	B2	2007-08-14	Howell et al. ~~Ingeniospec LLC~~	
	11	7380936	B2	2008-06-03	Howell et al. ~~Ingeniospec LLC~~	
	12	7401918	B2	2008-07-22	Howell et al. ~~Ingeniospec LLC~~	
	13	7438410	B1	2008-10-21	Howell et al. ~~Ingeniospec LLC~~	
	14	7481531	B2	2009-01-27	Howell et al. ~~Ingeniospec LLC~~	
	15	7500746	B1	2009-03-10	Howell et al. ~~Ingeniospec LLC~~	
	16	7500747	B2	2009-03-10	Howell et al. ~~Ingeniospec LLC~~	
	17	7581833	B2	2009-09-01	Howell et al. ~~Ingeniospec LLC~~	
	18	7621634	B2	2009-11-24	Howell et al. ~~Ingeniospec LLC~~	
	19	7677723	B2	2010-03-16	Howell et al. ~~Ingeniospec LLC~~	

Doc code: IDS

PTO/SB/08a (01-22)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 05/31/2024. 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		18517910
	Filing Date		2023-11-22
	First Named Inventor	Ernesto Carlos Martinez Villalpando	
	Art Unit	--	
	Examiner Name	--	
	Attorney Docket Number	1537-003USC1	

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
Change(s) applied to document, /M.E.G./ 10/4/2024	1	11086147	B2	2021-08-10	Howell et al. ~~Ingeniospec LLC~~	
	2	11204512	B2	2021-12-21	Howell et al. ~~Ingeniospec LLC~~	
	3	11243416	B2	2022-02-08	Howell et al. ~~Ingeniospec LLC~~	
	4	11326941	B2	2022-05-10	Howell et al. ~~Ingeniospec LLC~~	
	5	11513371	B2	2022-11-29	Howell et al. ~~Ingeniospec LLC~~	
	6	11630331	B2	2023-04-18	Howell et al. ~~Ingeniospec LLC~~	
	7	11644361	B2	2023-05-09	Howell et al. ~~Ingeniospec LLC~~	
	8	11644693	B2	2023-05-09	Howell et al. ~~Ingeniospec LLC~~	



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ELECTRONIC PAYMENT RECEIPT

APPLICATION # 18/517,910	RECEIPT DATE / TIME 12/23/2024 02:05:25 PM Z ET	ATTORNEY DOCKET # 1537-003USC1
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Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8339	FILED BY	KELSEY DEMELLO
PATENT CENTER #	68493483	AUTHORIZED BY	Princess Onwuzuligbo
CUSTOMER #	145340	FILING DATE	11/22/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Ernesto Carlos Martinez Villalpando

Payment Information

PAYMENT METHOD CARD / 2227	PAYMENT TRANSACTION ID E2024BME05376677	PAYMENT AUTHORIZED BY KELSEY DEMELLO
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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

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 ACKNOWLEDGEMENT RECEIPT

APPLICATION # 18/517,910	RECEIPT DATE / TIME 12/23/2024 02:05:25 PM Z ET	ATTORNEY DOCKET # 1537-003USC1
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Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

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CONFIRMATION #	8339	FILED BY	KELSEY DEMELLO
PATENT CENTER #	68493483	FILING DATE	11/22/2023
CUSTOMER #	145340	FIRST NAMED INVENTOR	Ernesto Carlos Martinez Villalpando
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Princess Onwuzuligbo

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1537-003USC1 - Issue Fee.pdf	1	Issue Fee Payment (PTO-85B)	160 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
1537-003USC1 - Issue Fee.pdf	6364219056EA7E1BB6B61B5F9D67541741F5D4018442B7509B 415526A008BF87411E4C3C9938FF64400879EA21C632BF883A 7CE9F5AF4BCE93F8696D1EA845D2

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.

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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.

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)

145340 7590 09/25/2024
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

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.

Kelsey DeMello	(Typed or printed name)
/KELSEY DEMELLO/	(Signature)
2024-12-23	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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18/517,910

11/22/2023

Ernesto Carlos Martinez Villalpando

1537-003USC1

8339

TITLE OF INVENTION: EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

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	12/26/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
ALEXANDER, WILLIAM R	2872	351-158000

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. Caldwell Intellectual Property Law

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

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

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 /PRINCESS ONWUZULIGBO/

Date 2024-12-23

Typed or printed name Princess Onwuzuligbo

Registration No. 80,000

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	EYEWEAR SYSTEMS, APPARATUSES, AND METHODS FOR PROVIDING ASSISTANCE TO A USER
--------------------	--

As the below named inventor, I hereby declare that:

This declaration is directed to: ☒ The attached application, or ☐ United States application or PCT international application number _____ filed on _____.

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.

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 (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identify theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: KWOK WAH LAW Date (Optional): 7th Jan., 2020

Signature: *K.W. Law*

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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

Privacy Act Statement

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LEGAL NAME OF INVENTOR	
Inventor: <u>WAI KUEN CHEUNG</u> Date (Optional): <u>7 Jan, 2020</u>	
Signature: 	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.	

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LEGAL NAME OF INVENTOR Inventor: <u>CHIU MING SO</u> Date (Optional): <u>7 Jan 2020</u> Signature: <u><i>Chiu Ming So</i></u>	
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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 #
18/517,910	12/23/2024 02:00:03 PM Z ET	1537-003USC1

Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8339	FILED BY	KELSEY DEMELLO
PATENT CENTER #	68493071	FILING DATE	11/22/2023
CUSTOMER #	145340	FIRST NAMED INVENTOR	Ernesto Carlos Martinez Villalpando
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Princess Onwuzuligbo

Documents

TOTAL DOCUMENTS: 4

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1537-OATH4.pdf	2	Oath or Declaration filed	1938 KB
1537-OATH2.pdf	2	Oath or Declaration filed	2017 KB
1537-OATH1.pdf	2	Oath or Declaration filed	2018 KB
1537-OATH3.pdf	2	Oath or Declaration filed	2007 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
1537-OATH4.pdf	46B3F778E4A2696C0B6A5BB9805DF5368F2100DB3C988FC60 4EC6FE057C32108AEE540D294D950A709AC7388031C867F3A 89D474536DCAEF674AC54525C8C1B0

1537-OATH2.pdf	B5E91F911A7C3CCF4B354835D21864E6B954846ED4E597D3C 64B8925B9604C62B8381B3B96806E148569192D533726D0C7D 3D7B417DA61C058BA6FC4ED581C26
1537-OATH1.pdf	6F661AE0CA967CA62035AB5D5B97C6D75485E1D1003F764AE 2C474F4779290DDD2E6D20FF5A18745A4F217EE8467E88882 387B25378A7662758F8A11E0D3068A
1537-OATH3.pdf	149B1B3025C2F3231A7E052904F8DEC0E559E045E1B122DDC 2116D95888AFF497568E7D400AD16F84EEDFF18FA57F56912 A24595648E350D9AE44611DFEEF956

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.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

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This declaration
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LEGAL NAME OF INVENTOR

Inventor: ERNESTO CARLOS MARTINEZ VILLALPANDO

Date (Optional): JAN/06/2020

Signature: _____

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SCW



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1	8339
7590 10/01/2024 Caldwell Intellectual Property Law 200 Clarendon Street 59th Floor Boston, MA 02116			EXAMINER ALEXANDER, WILLIAM R	
			ART UNIT	PAPER NUMBER
			2872	
			NOTIFICATION DATE	DELIVERY MODE
			10/01/2024	ELECTRONIC

NOTICE REQUIRING INVENTOR'S OATH OR DECLARATION

☒ An inventor's oath or declaration in compliance with 37 CFR 1.63 or substitute statement in compliance with 37 CFR 1.64 executed by or with respect to each inventor has not yet been submitted.

The inventor's oath or declaration or substitute statement dated _____ is defective. The inventor's oath or declaration does not comply with 37 CFR 1.63 or the substitute statement does not comply with 37 CFR 1.64 because it:

- ☐ does not include a statement that the person executing the oath or declaration or substitute statement believes the named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application for which the oath or declaration is being submitted.
- ☐ does not state that the application was made or was authorized to be made by the person executing the oath or declaration or substitute statement.
- ☐ does not acknowledge that any willful false statement made in such oath or declaration or substitute statement is punishable under section 1001 of title 18 by fine or imprisonment of not more than 5 years, or both.
- ☐ does not identify the person executing the oath or declaration or substitute statement by his or her legal name.
- ☐ does not identify the application to which the oath or declaration or substitute statement is directed.
- ☐ Other: _____

The substitute statement dated _____ does not comply with 37 CFR 1.64 because it:

- ☐ does not identify the inventor with respect to whom the statement applies.
- ☐ does not identify the relationship to the non-signing inventor.
- ☐ does not identify the circumstances permitting execution of the statement.
- ☐ was signed by someone other than the applicant.
- ☐ Other: _____

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 inventor **MUST** be filed **no later than the date on which the issue fee is paid**. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application. This period for reply is not extendable under 37 CFR 1.136(a).

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.



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

145340 7590 09/25/2024
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

EXAMINER

ALEXANDER, WILLIAM R

ART UNIT PAPER NUMBER

2872

DATE MAILED: 09/25/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1	8339

TITLE OF INVENTION: EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

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	12/26/2024

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)

145340 7590 09/25/2024

Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

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.
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1	8339

TITLE OF INVENTION: EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

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	12/26/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
ALEXANDER, WILLIAM R	2872	351-158000

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

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

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.
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1	8339
145340	7590	09/25/2024	EXAMINER	
Caldwell Intellectual Property Law			ALEXANDER, WILLIAM R	
200 Clarendon Street			ART UNIT	
59th Floor			PAPER NUMBER	
Boston, MA 02116			2872	

DATE MAILED: 09/25/2024

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. 18/517,910	Applicant(s) Villalpando et al.	
	Examiner WILLIAM R ALEXANDER	Art Unit 2872	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 9/12/2024.
☐ 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 1,3-6,8-11,13,15-19 and 21. 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)	5. ☐ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date ____	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material ____	7. ☐ Other ____
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date ____	

/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	
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DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Terminal Disclaimer

The terminal disclaimer filed on 9/12/2024 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of **US 11,935,798** has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Amendments/Arguments

Applicant's arguments (filed 9/12/2024, pages 6-8) have been fully considered and are persuasive. Examiner withdraws the 102 rejection of claims 1-6, 8-13, 15-19, and 21, the double patenting rejection of claim 1, as well as the claim objection of claims 12-14, 16, 20, and 21

Allowable Subject Matter

Claims 1, 3-6, 8-11, 13, 15-19, and 21 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: with respect to the allowable subject matter, none of the prior art either alone or in combination disclose or teach of the claimed combination of limitations to warrant a rejection under 35 USC 102 or 103.

Specifically, regarding the allowability of amended independent claim 1: The prior art of record does not disclose or suggest a method comprising "... receiving second data from a second sensor, wherein the second sensor is an external sensor; ...

wherein the analyzing uses the first data and the second data; determining a context of the user, wherein determining uses the first data and the second data ...”, along with other claim limitations. Claims 3-6 are allowable due to pendency on amended independent claim 1.

Specifically, regarding the allowability of amended independent claim 8: The prior art of record does not disclose or suggest a storage medium comprising “... receiving second data from a second sensor, wherein the second sensor is an external sensor; ... wherein the determining uses the first data and the second data ...”, along with other claim limitations. Claims 9-11 and 13 are allowable due to pendency on amended independent claim 8.

Specifically, regarding the allowability of amended independent claim 15: The prior art of record does not disclose or suggest a system comprising “... receiving second data from a second sensor, wherein the second sensor is an external sensor; determining a context of the user, wherein determining uses the first data and the second data ... analyzing a state of the user, wherein the analyzing uses the first data and the second data ...”, along with other claim limitations. Claims 16-19 and 21 are allowable due to pendency on amended independent claim 15.

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 WILLIAM R ALEXANDER whose telephone number is (571)270-7656. The examiner can normally be reached M-F 8:30 AM- 4:00 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, Pinping Sun can be reached on (571) 270-1284. 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.

/WILLIAM R ALEXANDER/
Primary Examiner, Art Unit 2872

<i>Search Notes</i> 	Application/Control No. 18/517,910	Applicant(s)/Patent Under Reexamination Villalpando et al.
	Examiner WILLIAM R ALEXANDER	Art Unit 2872

CPC - Searched*		
Symbol	Date	Examiner
G02C5/001,126,14	06/07/2024	WA
G02C11/10,06	06/07/2024	WA
G06F3/167	06/07/2024	WA
H04W4/026,38	06/07/2024	WA
G02C2200/08,16,02	06/07/2024	WA
G02C3/006	06/07/2024	WA
Updated	09/19/2024	WA

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
351	158	06/07/2024	WA
	Updated	09/19/2024	WA

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

/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	
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<i>Search Notes</i> 	Application/Control No. 18/517,910	Applicant(s)/Patent Under Reexamination Villalpando et al.
	Examiner WILLIAM R ALEXANDER	Art Unit 2872

Search Notes		
Search Notes	Date	Examiner
CPC:G02C5/001,126,14,G02C11/10,06,G06F3/167,H04W4/026,38,G02C2200/08,16,02,G02C3/006,USPC: 351/158, USPC/CPC combined with Text Search. See search history Printout.	06/07/2024	WA
PE2E Search-Text Search. See Search History Printout.Inventor Search-PE2E Search. See Search History Printout.Applicant Search-PE2E Search. See Search History Printout.	06/07/2024	WA
Global Dossier	06/07/2024	WA
Updated	09/19/2024	WA

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	PGPub/USPAT. East Search-Claim Text Search. See Interference Search Printout.	06/07/2024	WA
	Updated	09/19/2024	WA

/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	
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Issue Classification 	Application/Control No. 18/517,910	Applicant(s)/Patent Under Reexamination Villalpando et al.
	Examiner WILLIAM R ALEXANDER	Art Unit 2872

CPC						
Symbol					Type	Version
G02C	/	5	/	001	F	2013-01-01
H04W	/	4	/	38	I	2018-02-01
G02C	/	11	/	10	I	2013-01-01
G06F	/	3	/	167	I	2013-01-01
H04W	/	4	/	026	I	2013-01-01
G02C	/	2200	/	08	A	2013-01-01

CPC Combination Sets					
Symbol				Type	Version
	/		/		

Use images from artifact folder? ☒ Yes ☐ No			
NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	19 September 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	24

Issue Classification 	Application/Control No. 18/517,910	Applicant(s)/Patent Under Reexamination Villalpando et al.
	Examiner WILLIAM R ALEXANDER	Art Unit 2872

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G02C		5		00
NON-CLAIMED				
				

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
351	158

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

Use images from artifact folder? ☒ Yes ☐ No			
NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	19 September 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	24

Issue Classification 	Application/Control No. 18/517,910	Applicant(s)/Patent Under Reexamination Villalpando et al.
	Examiner WILLIAM R ALEXANDER	Art Unit 2872

☐ 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	1	8	10	15	19										
	2	9	11		20										
2	3		12	16	21										
3	4	10	13												
4	5		14												
5	6	11	15												
	7	12	16												
6	8	13	17												
7	9	14	18												

Use images from artifact folder? ☒ Yes ☐ No			
NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	19 September 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	24

Bibliographic Data

Application No: 18/517,910

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged:

/WILLIAM R ALEXANDER/

Examiner's Signature

Initials

Title:

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/22/2023	351	2872	1537-003USC1
RULE			

APPLICANTS

Solos Technology Limited, Hong Kong, HONG KONG

INVENTORS

Ernesto Carlos Martinez Villalpando, Shrewsbury, MA, UNITED STATES

Chiu Ming So, Hong Kong, HONG KONG

Kwok Wah Law, Hong Kong, HONG KONG

Wai Kuen Cheung, Hong Kong, HONG KONG

CONTINUING DATA

This application is a CON of 16736593 01/07/2020 PAT 11835798

16736593 is a CIP of 16711340 12/11/2019 PAT 11796833

16711340 has PRO of 62873889 07/13/2019

16736593 has PRO of 62873889 07/13/2019

16736593 has PRO of 62789818 01/08/2019

16711340 has PRO of 62778709 12/12/2018

FOREIGN APPLICATIONS

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12/06/2023

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Receipt date: 09/12/2024

18/517,910 -- GAU: 2872

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)

Approved for use through 05/31/2024. 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		18517910
	Filing Date		2023-11-22
	First Named Inventor	Ernesto Carlos Martinez Villalpando	
	Art Unit	--	
	Examiner Name	--	
	Attorney Docket Number	1537-003USC1	

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	11086147	B2	2021-08-10	Ingeniospec LLC		
	2	11204512	B2	2021-12-21	Ingeniospec LLC		
	3	11243416	B2	2022-02-08	Ingeniospec LLC		
	4	11326941	B2	2022-05-10	Ingeniospec LLC		
	5	11513371	B2	2022-11-29	Ingeniospec LLC		
	6	11630331	B2	2023-04-18	Ingeniospec LLC		
	7	11644361	B2	2023-05-09	Ingeniospec LLC		
	8	11644693	B2	2023-05-09	Ingeniospec LLC		

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	9	7192136	B2	2007-03-20	Ingeniospec LLC	
	10	7255437	B2	2007-08-14	Ingeniospec LLC	
	11	7380936	B2	2008-06-03	Ingeniospec LLC	
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	17	7581833	B2	2009-09-01	Ingeniospec LLC	
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Examiner Name	--
Attorney Docket Number	1537-003USC1

	20	7760896	B2	2010-07-20	Gabor Medveczky	
	21	7771046	B2	2010-08-10	I p Venture Inc Ingeniospec LLC	
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	27	8430507	B2	2013-04-30	Thomas A. HowellDavid ChaoC. Douglass ThomasPeter	
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	31	8770742	B2	2014-07-08	Ingeniospec LLC	
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Examiner Name	--
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	42	10345625	B2	2019-07-09	Ingeniospec LLC	
	43	10359311	B2	2019-07-23	Ingeniospec LLC	
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	46	11042045	B2	2021-06-22	Ingeniospec LLC	

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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	20150172434	A1	2015-06-18	Kawagishi	
	2	20190097328	A1	2019-03-28	Yong et al.	
	3	20140347265	A1	2014-11-27	Aimone et al.	
	4	20140268008	A1	2014-09-18	Howell et al.	

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5	20220107202	A1	2022-04-07	Tirosh et al.	
6	20170176778	A1	2017-06-22	Ushakov	
7	20220113562	A1	2022-04-14	Anderson et al.	
8	20190187492	A1	2019-06-20	Howell et al.	
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15	20190297701	A1	2019-09-26	Logitech Europe SA	

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	16	20170032646	A1	2017-02-02	Motorola Mobility LLC	
	17	20150126845	A1	2015-05-07	Research Foundation of State University of New Yor	
	18	20190158946	A1	2019-05-23	SNIK LLC	
	19	20170108715	A1	2017-04-20	Eddie Bauer	
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	22	20070030442	A1	2007-02-08	Ingeniospec LLC	
	23	20160246059	A1	2016-08-25	Kopin Corp	
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	25	20170078883	A1	2017-03-16	Digimarc Corp	
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	27	20180088340	A1	2018-03-29	Magic Leap Inc	
	28	20160299569	A1	2016-10-13	Eyecam LLC	

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	1	2020206775	WO	A1	2020-10-15	Shenzhen Guangyang Technology Co., Ltd., Shenzhen		☐
	2	2020038479	WO	A1	2020-02-27	Shenzhen Shaoyin Technology Co., Ltd.		☐

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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	/WILLIAM R ALEXANDER/	Date Considered	09/19/2024
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Attorney Docket Number	1537-003USC1

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Examiner Name	--
Attorney Docket Number	1537-003USC1

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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	/SHIXIONG WANG/	Date (YYYY-MM-DD)	2024-09-12
Name/Print	Shixiong Wang	Registration Number	72,864

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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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	"18517910"	(US-PGPUB)	OR	ON	ON	2024/06/06 01:46 PM
L2	1	"20170032646"	(US-PGPUB)	OR	ON	ON	2024/06/06 02:29 PM
L3	9	("2017/0032646").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/06/06 02:30 PM
L4	34	(Artificial Intelligence) More like doc: US-20170032646-A1 Text: (EP-3125208-B1 OR EP-3125208-A1 OR US-10896591-B2 OR JP-6414711-B2 OR JP-2017032992-A OR US-20160350553-A1 OR US-9842224-B2 OR US-9635156-B2 OR US-20160344856-A1 OR US-20170201620-A1 OR US-10257343-B2 OR EP-2929424-B1 OR EP-2929424-A1 OR US-20210034384-A1 OR US-11093262-B2 OR US-11301553-B2 OR US-20200184058-A1 OR US-20190258785-A1 OR US-10657237-B2 OR US-20180113317-A1).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 02:30 PM
L5	1	"20170108715"	(US-PGPUB)	OR	ON	ON	2024/06/06 02:30 PM
L6	9	("2017/0108715").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/06/06 02:30 PM
L7	35	(Artificial Intelligence) More like doc: US-20170108715-A1 Text: (US-9946098-B2 OR GB-2593999-A OR EP-2973533-A2 OR IT-UB200159744-A1 OR JP-2022512232-A OR KR-20170009658-A OR JP-2021090518-A OR US-20210263343-A1	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK,	OR	ON	ON	2024/06/06 02:30 PM

		OR CA-3103521-A1 OR CN-108431680-A OR KR-20090010616-A OR EP-3893043-A1 OR KR-100893185-B1 OR US-20090135003-A1 OR US-7834759-B2 OR WO-2019238982-A1 OR IL-286178-B2 OR WO-2017108981-A1 OR EP-3394666-A1 OR US-20190004338-A1).did.	TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	87	L3 L4 L6 L7	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 02:31 PM
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L11	17	L9 AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 OR gyroscope\$ OR magnet\$7 OR proximity)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 02:51 PM
L12	31200	(EYE\$WEAR OR SPECTACLES OR EYE\$GLASSES OR SUN\$GLASSES OR GOGGLES) AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO,	OR	ON	ON	2024/06/06 02:59 PM

		gyroscope\$ OR magnet\$7 OR proximity)	RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L13	15097	(EYE\$WEAR OR SPECTACLES OR EYE\$GLASSES OR SUN\$GLASSES OR GOGGLES) AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 AND gyroscope\$ AND magnet\$7 AND proximity)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 02:59 PM
L14	180478	(G02C5/001 OR G02C11/10 OR G06F3/167 OR H04W4/026 OR H04W4/38 OR G02C2200/08 OR G02C2200/16 OR G02C3/006 OR G02C5/126 OR G02C5/14 OR G02C11/06 OR G02C2200/02).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 03:11 PM
L15	1459	351/158.CCLS.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:12 PM
L16	42754	L14 L15	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:12 PM
L17	182216	L14 OR (351/158.CCLS.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2024/06/06 03:14 PM

			IBM_TDB)				
L18	2086	L13 AND L17	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 03:14 PM
L19	1261	L13 AND L17	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:18 PM
L20	15	"10307085"	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:26 PM
L21	1	"10307085".PN.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:26 PM
L22	1	"20160066847".PN.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:28 PM
L23	670	((("VILLALPANDO") near3 ("Ernesto")) OR (("SO") near3 ("Chiu")) OR ("LAW") near3 ("Kwok")) OR (("CHEUNG") near3 ("Wai"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/06/06 04:28 PM
L24	24	((("SOLOS") near3 ("TECHNOLOGY") near3 ("LIMITED"))).AS,AAN M.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:29 PM
L25	39	((("SOLOS") near3 ("TECHNOLOGY") near3 ("LIMITED"))).AS,AAN M.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 04:29 PM
L26	2136	L23 L25	(US-PGPUB; USPAT;	OR	ON	ON	2024/06/06

			USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				04:29 PM
L27	20	L26 AND eyewear AND orientation AND communication	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 04:30 PM
L28	15	L26 AND eyewear AND orientation AND communication	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:30 PM
L29	3	L26 AND eyewear AND orientation AND communication AND (first ADJ data)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:31 PM
L30	3	L26 AND eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:31 PM
L31	2	(eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data) AND (computer ADJ readable)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:36 PM
L32	1	"20160066847".pn.	(US-PGPUB)	OR	ON	ON	2024/06/06 04:59 PM
L33	521	L19 AND (external near8 sensor\$)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 05:30 PM
L34	30	L15 AND (external	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06

		near8 sensor\$)					05:59 PM
L37	1	"11835798".pn.	(USPAT)	OR	ON	ON	2024/06/07 04:41 PM
L38	1	"18517910"	(US-PGPUB)	OR	ON	ON	2024/09/19 03:35 PM
L39	1	"20170032646"	(US-PGPUB)	OR	ON	ON	2024/09/19 03:35 PM
L40	9	("2017/0032646").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/09/19 03:35 PM
L41	34	(Artificial Intelligence) More like doc: US-20170032646-A1 Text: (EP-3125208-B1 OR EP-3125208-A1 OR US-10896591-B2 OR US-10896591-A1 OR JP-6414711-B2 OR JP- 2017032992-A OR US- 20160350553-A1 OR US-9842224-B2 OR US-9635156-B2 OR US-20160344856-A1 OR US-20170201620- A1 OR US-10257343- B2 OR EP-2929424-B1 OR JP-2016507802-A OR JP-6522510-B2 OR EP-2929424-A1 OR US-20210034384-A1 OR KR-20150091322-A OR US-9016857-B2 OR US-11093262-B2 OR US-11301553-B2).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/09/19 03:35 PM
L42	1	"20170108715"	(US-PGPUB)	OR	ON	ON	2024/09/19 03:35 PM
L43	9	("2017/0108715").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/09/19 03:35 PM
L44	37	(Artificial Intelligence) More like doc: US-20170108715-A1 Text: (US-9946098-B2 OR GB-2593999-A OR US- 20200292843-A1 OR CN-113196147-A OR US-11796833-B2 OR JP-7208398-B2 OR IT- UB200159744-A1 OR CN-116338983-A OR JP-2022512232-A OR KR-20170009658-A OR JP-2021090518-A OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2024/09/19 03:35 PM

		CA-3103521-A1 OR CN-108431680-A OR EP-3893043-A1 OR US-20090135003-A1 OR WO-2017108981- A1 OR EP-3394666-A1 OR US-20190004338- A1 OR US-10877299- B2 OR CN-110412777- A).did.	IBM_TDB)				
L45	87	L3 L4 L6 L7	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/09/19 03:35 PM
L46	37	L3 L4 L6 L7	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L47	17	L9 AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L48	17	L9 AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 OR gyroscope\$ OR magnet\$7 OR proximity)	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L49	32866	(EYE\$WEAR OR SPECTACLES OR EYE\$GLASSES OR SUN\$GLASSES OR GOGGLES) AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 OR gyroscope\$ OR magnet\$7 OR proximity)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO;	OR	ON	ON	2024/09/19 03:35 PM

			JPO; DERWENT; IBM_TDB)				
L50	15992	(EYE\$WEAR OR SPECTACLES OR EYE\$GLASSES OR SUN\$GLASSES OR GOGGLES) AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 AND gyroscope\$ AND magnet\$7 AND proximity)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/09/19 03:35 PM
L51	185203	(G02C5/001 OR G02C11/10 OR G06F3/167 OR H04W4/026 OR H04W4/38 OR G02C2200/08 OR G02C2200/16 OR G02C3/006 OR G02C5/126 OR G02C5/14 OR G02C11/06 OR G02C2200/02).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/09/19 03:35 PM
L52	1459	351/158.CCLS.	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L53	44020	L14 L15	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L54	186941	L14 OR (351/158.CCLS.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/09/19 03:35 PM
L55	2196	L13 AND L17	(US-PGPUB; USPAT;	OR	ON	ON	2024/09/19

			USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				03:35 PM
L56	1316	L13 AND L17	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L57	15	"10307085"	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L58	1	"10307085".PN.	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L59	1	"20160066847".PN.	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L60	681	((("VILLALPANDO") near3 ("Ernesto")) OR ((("SO") near3 ("Chiu")) OR ((("LAW") near3 ("Kwok")) OR ((("CHEUNG") near3 ("Wai")))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/09/19 03:35 PM
L61	29	((("SOLOS") near3 ("TECHNOLOGY") near3 ("LIMITED"))).AS,AAN M.	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L62	45	((("SOLOS") near3 ("TECHNOLOGY") near3 ("LIMITED"))).AS,AAN M.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/09/19 03:35 PM
L63	2153	L23 L25	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY,	OR	ON	ON	2024/09/19 03:35 PM

			CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L64	21	L26 AND eyewear AND orientation AND communication	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/09/19 03:35 PM
L65	16	L26 AND eyewear AND orientation AND communication	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L66	4	L26 AND eyewear AND orientation AND communication AND (first ADJ data)	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L67	4	L26 AND eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data)	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L68	2	(eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data) AND (computer ADJ readable)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L69	1	"20160066847".pn.	(US-PGPUB)	OR	ON	ON	2024/09/19 03:35 PM
L70	536	L19 AND (external near8 sensor\$)	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L71	30	L15 AND (external near8 sensor\$)	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:35 PM

L72	1	"11835798".pn.	(USPAT)	OR	ON	ON	2024/09/19 03:35 PM
L73	74	("10042186" "10060790 "10061144" "1031029 6" "10330956" "103456 25" "10359311" "10539 459" "10777048" "1104 2045" "11086147" "112 04512" "11243416" "11 326941" "11513371" "1 1630331" "11644361" " 11644693" "200700304 42" "20120237075" "20 130250232" "20140268 008" "20140347265" "2 0150126845" "2015017 2434" "20150248026" " 20160246059" "201602 99569" "20170032646" " "20170078883" "20170 108715" "20170176778 " "20180088340" "2018 0097920" "2018010313 9" "20180124497" "201 80234847" "201802420 64" "20190097328" "20 190101977" "20190158 946" "20190187492" "2 0190278110" "2019029 7701" "20220107202" " 20220113562" "719213 6" "7255437" "7380936" "7401918" "7438410" " 7481531" "7500746" "7 500747" "7581833" "76 21634" "7677723" "776 0896" "7771046" "7792 552" "7806525" "79223 21" "8109629" "833701 3" "8430507" "8434863" "8465151" "8500271" " 8770742" "8905542" "9 033493" "9488520" "95 47184" "9690121").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:36 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	2	(eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data) AND (computer ADJ readable)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:37 PM

N4	2	(eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data) AND (computer ADJ readable)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/09/19 03:36 PM
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Application Number * 18/517,910 *	Application/Control No. 18/517,910	Applicant(s)/Patent under Reexamination Villalpando et al.	
	Examiner ALEXANDER, WILLIAM R	Art Unit 2872	
Document Code - DISQ		Internal Document - DO NOT MAIL	

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed: <u>12 September 2024</u>	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:
 /PAMELA A YOUNG/ Technology Center: <u>OPLC</u> Telephone: <u>(571)272-3622</u> _____



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ELECTRONIC PAYMENT RECEIPT

APPLICATION # 18/517,910	RECEIPT DATE / TIME 09/12/2024 04:16:35 PM Z ET	ATTORNEY DOCKET # 1537-003USC1
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Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8339	FILED BY	KELSEY DEMELLO
PATENT CENTER #	67153823	AUTHORIZED BY	Shixiong Wang
CUSTOMER #	145340	FILING DATE	11/22/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Ernesto Carlos Martinez Villalpando

Payment Information

PAYMENT METHOD CARD / 2227	PAYMENT TRANSACTION ID E20249BG17027513	PAYMENT AUTHORIZED BY KELSEY DEMELLO
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FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	104.00	1	104.00
2814	STATUTORY DISCLAIMER, INCLUDING TERMINAL DISCLAIMER	170.00	1	170.00
TOTAL AMOUNT:				\$274.00

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

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.

Google Patents

2020038479

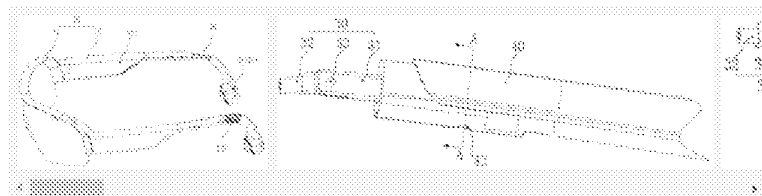


Spectacles

Abstract

Disclosed is a type of spectacles, comprising: a spectacle frame (10), the spectacle frame (10) comprising spectacle rims (11) and two spectacle legs (12), and the two spectacle legs (12) being rotatably connected to the spectacle rims (11) respectively; two loudspeaker assemblies (21), with the two loudspeaker assemblies (21) respectively comprising an earphone core, the two loudspeaker assemblies (21) being respectively connected to the two spectacle legs (12) via hinge assemblies (122) on the two spectacle legs (12), and the hinge assemblies (122) being rotatable to change the positions of the loudspeaker assemblies (21) with respect to the spectacle legs (12) connected thereto; and control circuits or batteries accommodated in the spectacle leg (12), with the control circuits or batteries driving the earphone cores to vibrate to generate sound comprising two harmonic peaks.

Images (29)



Classifications

■ G02G5/2218 Resilient hinges

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Landscapes

Physics & Mathematics



Health & Medical Sciences



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Claims (20)

[Hide dependent ▲](#)

1. A pair of glasses, characterized in that the glasses include:

A spectacle frame, which includes a spectacle frame and two spectacle legs, and the two spectacle legs are respectively rotatably connected to the spectacle frame;

Two speaker components, the two speaker components including a headphone core, the two speaker components are respectively connected to the two temples through a hinge component on the two temples, and the hinge component can rotate to change the position of each speaker component relative to the temples to which it is connected;

A control circuit or a battery is contained in the temple, and the control circuit or battery drives the earphone core to vibrate to generate sound, and the sound includes at least two resonance peaks.

2. The spectacles according to claim 1, wherein the hinge assembly comprises a hinge, a rod-like member, and a fixing member; and the hinge comprises:

Hinge arm

A hinge arm, the hinge arm and the hinge base are rotationally connected through a rotating shaft, and the hinge arm can rotate relative to the hinge base when an external force is applied to change the position of the speaker assembly relative to the temple;

A support member movably disposed on the hinge base,

An elastic member for elastically biasing the support member toward the hinge arm, so that the support member can elastically abut against the hinge arm.

3. The spectacles according to claim 2, wherein:

The hinge arm includes a first support surface and a second support surface connected to each other;

The support includes a third support surface;

When the elastic member elastically biases the support member toward the hinge arm, the third support surface can be elastically abuted on the first support surface and the second support surface, respectively;

When the hinge arm is rotated relative to the hinge base by an external force, the support is pushed by the connection between the first support surface and the second support surface to overcome the elastic bias of the elastic member. Reverse movement, so that the third support surface is switched from elastic contact with one of the first support surface and the second support surface to the first support surface and the second support surface. The other one abuts elastically.

4. The spectacles according to claim 3, wherein in a cross section perpendicular to the central axis of the rotation axis, the maximum distance from the rotation axis to the connection and the shortest distance from the rotation axis to the first support surface. The ratio between distances is between 1.1 and 1.5.
5. The spectacles according to claim 3, wherein when the third supporting surface is switched from elastic contact with the first supporting surface to elastic contact with the second supporting surface, the hinge seat and The included angle between the hinge arms becomes smaller.
6. The spectacles according to claim 3, wherein an external force required when the third supporting surface is switched from elastic contact with the first supporting surface to elastic contact with the second supporting surface is different from that. The third support surface is switched from an elastic contact with the second support surface to an external force required when the third support surface is elastically contacted with the first support surface.
7. The spectacles according to claim 3, wherein in a cross section perpendicular to a central axis of the rotation axis, the connection is arranged in an arc shape.
8. The spectacles according to claim 7, wherein the connection is arranged in an arc, and the curvature of the arc is between 5 and 35.
9. The spectacles according to claim 3, wherein an angle between the first support surface and the second support surface is an obtuse angle in a cross section perpendicular to a central axis of the rotation axis.
10. The glasses according to claim 3, wherein

The hinge seat includes a seat body and first and second lugs protruding from the seat body and spaced from each other;

The hinge arm includes an arm body and a third lug protruding from the arm body. The third lug is inserted into a space between the first lug and the second lug and passes through the space. The rotating shaft is rotatably connected with the first lug and the second lug.

11. The glasses according to claim 10, wherein

The support is at least partially disposed in the interval region and is located on a side of the third lug facing the seat body;

An accommodating cavity communicating with the interval region is provided on the seat body, the elastic member is disposed in the accommodating cavity, and the support member is elastically biased toward the third lug.

12. The glasses according to claim 1, further comprising an earphone housing for accommodating an earphone core;

The earphone core includes at least a composite vibration device composed of a vibration plate and a second vibration transmitting plate, and the composite vibration device generates the two resonance peaks.

13. The glasses according to claim 12, wherein the earphone core further comprises at least one voice coil and at least one magnetic circuit system, the voice coil is physically connected to the vibration plate, and the magnetic circuit system is in communication with the vibration plate. The second diaphragm is physically connected.
 14. The spectacles according to claim 12, wherein a stiffness coefficient of the vibration plate is greater than a stiffness coefficient of the second vibration transmitting plate.
 15. The glasses according to claim 12, wherein the earphone core further comprises a first vibration transmitting sheet;
- The first vibration transmitting plate and the composite vibration device are physically connected;
- The first vibration transmitting sheet is physically connected to the earphone housing;
- The first vibration transmitting plate can generate another resonance peak.
16. The spectacles according to claim 15, wherein the at least two resonance peaks are within a sound frequency range audible by a human ear.
 17. The glasses according to claim 12, wherein at least a part of the earphone housing is provided with at least one sound introduction hole, and the at least one sound introduction hole guides out sound waves in the earphone housing and vibrates with the earphone housing. The generated sound leakage sound waves are superimposed to reduce the sound leakage.
 18. The glasses according to claim 1, wherein the speaker assembly further comprises a voice control system for receiving and executing voice control instructions.
 19. The glasses according to claim 12, further comprising a key module;
- The key module is located on the earphone housing or the temple, and is used for controlling the speaker component.
20. The glasses according to claim 12, further comprising an indicator light;
- The indicator light is located on the earphone housing or the temple of the glasses, and is used to display the status of the speaker component.

Glasses

Priority information

This application claims priority from Chinese application CN201810975515.1, filed on August 24, 2018, the entire contents of which are incorporated herein by reference.

Technical field

The present application relates to the field of eyeglasses, and in particular, to eyeglasses with hinge components.

Background technique

People often wear glasses in daily life, such as short-sighted glasses, far-sighted glasses, sunglasses, VR glasses, massage glasses and so on. However, these glasses have a single function and cannot meet the multiple needs of people at the same time. For example, people often wear sunglasses when going out for sports or traveling, but if they want to listen to music at the same time, they need to prepare additional headphones, which is not convenient to carry and store. Therefore, glasses with a headset function bring great convenience to the user.

Summary of the invention

An embodiment of the present specification provides glasses. The glasses include: a spectacle frame. The spectacle frame includes a spectacle frame and two spectacle legs. The two spectacle legs are rotatably connected to the spectacle frame. Two speaker components. The two speaker components include a headphone core, and the two speaker components are connected to the two temples through hinge components on the two temples, respectively, and the hinge components can be rotated to change each The position of the speaker component relative to the temples to which it is connected; the temples contain a control circuit or battery that drives the headphone core to vibrate to produce sound, and the sound includes at least two resonance peaks.

BRIEF DESCRIPTION OF THE DRAWINGS

This application will be further explained by way of exemplary embodiments, which will be described in detail with reference to the accompanying drawings. These embodiments are not restrictive. In these embodiments, the same numbers represent the same structures, where:

FIG. 1 is a schematic structural diagram of glasses provided according to some embodiments of the present application; FIG.

FIG. 2 is a schematic structural diagram of a hinge assembly according to some embodiments in the present application; FIG.

3 is a schematic diagram of an explosion structure according to some embodiments in the present application;

4 is a sectional view of the hinge assembly of FIG. 2 along the A-A axis;

5 is a schematic structural diagram of a hinge assembly according to some embodiments of the present application;

FIG. 6 is an original state diagram of a protective sleeve according to some embodiments in the present application; FIG.

7 is a partial cross-sectional view of an original state of a protective sleeve of a hinge assembly according to some embodiments of the present application;

8 is a bending state diagram of a protective sleeve of a hinge assembly according to some embodiments of the present application;

9 is a partial cross-sectional view of a folded state of a protection sleeve of a hinge assembly according to some embodiments of the present application;

10 is a partial cross-sectional view of glasses provided according to some embodiments of the present application;

11 is an enlarged view of a portion A in FIG. 10;

12 is an enlarged view of a portion B in FIG. 11;

13 is a partial cross-sectional view of glasses provided according to some embodiments of the present application;

14 is an enlarged view of a portion C in FIG. 13;

15 is an exploded structural view of glasses provided according to some embodiments of the present application;

FIG. 16 is a schematic flowchart of a voice control system according to some embodiments in the present application; FIG.

17 is an equivalent model of a vibration generating and transmitting system of a speaker assembly according to some embodiments in the present application;

18 is a structural diagram of a composite vibration device of a speaker assembly provided according to some embodiments of the present application;

19 is a structural diagram of a speaker assembly composite vibration device provided according to some embodiments of the present application;

20 is a frequency response curve of a speaker component provided according to some embodiments of the present application;

21 is a structural diagram of a speaker assembly and a composite vibration device thereof provided according to some embodiments of the present application;

22 is a vibration response curve of a speaker assembly provided according to some embodiments of the present application;

23 is a structural diagram of a vibration generating portion of a speaker assembly provided according to some embodiments of the present application;

24 is a vibration response curve of a vibration generating portion of a speaker assembly provided according to some embodiments of the present application;

25 is a vibration response curve of a vibration generating part of a speaker assembly provided according to some embodiments of the present application;

26A is a schematic structural diagram of a speaker assembly provided according to some embodiments in the present application;

26B is a schematic structural diagram of a speaker assembly provided according to some embodiments in the present application; and

27 is a noise suppression effect diagram of the speaker assembly provided in FIGS. 26A and 26B; and

FIG. 28 is a schematic diagram of transmitting sound by air conduction in the present application.

detailed description

In order to more clearly illustrate the technical solutions of the embodiments of the present application, the drawings used in the description of the embodiments will be briefly introduced below. Obviously, the drawings in the following description are just some examples or embodiments of the present application. For those of ordinary skill in the art, the present application can also be applied to these drawings without creative efforts. Other similar scenarios. It should be understood that these exemplary embodiments are given only to enable those skilled in the relevant art to better understand and implement the present invention, and not to limit the scope of the present invention in any way. Unless obvious from a locale or otherwise stated, the same reference numerals in the figures represent the same structure or operation.

As shown in this application and the claims, the words "a", "an", "one" and "the" do not specifically refer to the singular, but may include the plural unless the context clearly indicates an exception. In general, the terms "including" and "comprising" are only meant to include clearly identified steps and elements, and these steps and elements do not constitute an exclusive list, and the method or device may also include other steps or elements. The term "based on" is "based at least in part on." The term "one embodiment" means "at least one embodiment"; the term "another embodiment" means "at least one other embodiment". Related definitions of other terms will be given in the description below. In the following, without loss of generality, in the description of the conduction-related technology in the present invention, the description of "glasses" or "sunglasses" will be used. This description is just a form of conduction application. For those of ordinary skill in the art, "glasses" or "sunglasses" can also be replaced with other similar words, such as "eye protection device", "eye wearable device", etc. In fact, the various implementations of the present invention can be easily applied to other non-speaking component hearing devices. For example, for a person skilled in the art, after understanding the basic principles of glasses, various modifications and changes in the form and details of the specific methods and steps of implementing glasses may be made without departing from this principle. In particular, the environmental sound pickup and processing function is added to the glasses, so that the glasses can realize the function of a hearing aid. For example, a microphone such as a microphone can pick up the sound of the surroundings of the user / wearer, and send the processed (or generated electrical signal) sound to the speaker component under a certain algorithm. That is, the glasses can be modified to include the function of picking up ambient sounds, and after certain signal processing, the sound is transmitted to the user / wearer through the speaker component part, thereby realizing the function of the hearing aid. As an example, the algorithms mentioned here may include noise cancellation, automatic gain control, acoustic feedback suppression, wide dynamic range compression, active environment recognition, active noise reduction, directional processing, tinnitus processing, multi-channel wide dynamic range compression, and active howling. A combination of one or more of suppression, volume control, etc.

Please refer to FIG. 1, which is a schematic structural diagram of an embodiment of glasses according to the present application. In this embodiment, the glasses include: a spectacle frame 10 and a functional component 20.

In some embodiments, the spectacle frame 10 in the present application may include spectacle frames of various glasses such as nearsightedness, farsightedness, sunglasses, 3D glasses, etc., which is not limited herein.

The functional component 20 may be connected with the spectacle frame 10 so that the spectacles further have some other functions or components. For example, the functional component 20 may be a speaker assembly, and may include a bone conduction speaker assembly, an air conduction speaker assembly, and the like. Specifically, the functional component 20 may be a bone conduction speaker assembly 21, so that the glasses also have the function of the bone conduction speaker assembly 21. Of course, the functional component 20 may also be other components, such as a positioning device, which is not limited herein.

In some embodiments, the spectacle frame 10 may include a spectacle frame 11 and two spectacle legs 12. The spectacle main body 121 and the hinge assembly 122 may be rotatably connected to the spectacle frame 11, and the speaker assembly 21 may pass the hinge assembly 122. Attached to the temple 12.

FIG. 2 is a schematic structural diagram of an embodiment of a hinge assembly of the present application, and FIG. 3 is an exploded structural schematic diagram of an embodiment of a hinge assembly of the present application. In some embodiments, the hinge assembly 122 of the present application may be used in glasses in the embodiments of the present application.

In the present application, the hinge assembly 122 includes a hinge 30, which is a structure for connecting two solid bodies and allowing relative rotation between the two solid bodies.

Specifically, when the hinge assembly 122 in this embodiment is used in the above-mentioned glasses embodiment, the hinge assembly 122 is disposed at an end of the temple main body 121 away from the eyeglass frame 11, and further connects the functional member 20 to the minor through the hinge 30. The leg body 121 is far from the end of the eyeglass frame 11.

In some embodiments, the hinge assembly 122 may further include a rod 40 and a fixing member 50. In some embodiments, the hinge 30 may include a hinge base 31 and a hinge arm 32. In some embodiments, the hinge arm 32 is rotatably connected to the hinge base 31 through a rotation shaft 33. It is easy to understand that the hinge base 31 and the hinge arm 32 may be respectively connected to two components that need to be rotationally connected, so that the two components are rotationally connected together through the rotation shaft 33 of the hinge 30.

In some embodiments, the hinge seat 31 of the hinge 30 is connected to the rod-shaped member 40. In some embodiments, the rod-shaped member 40 may be a partial structure or an overall structure of one of the two members rotationally connected through the hinge 30, or may be one of the two members that need to be rotationally connected to be connected to the hinge 30. Connection structure. When the hinge assembly 122 in this embodiment is used for glasses, the rod-shaped member 40 may be at least a part of the temple main body 121 of the glasses, for example, may be all of the temple main body 121 or the temple main body 121 is far away from the eyeglass frame 11. A part of one end is further provided with the hinge main body 121 through this part of the temple main body 121 at the end of the temple main body 121 away from the eyeglass frame 11.

Specifically, the rod-like member 40 is provided along the length direction with a hinge cavity 41 communicating with the end surface of the rod-like member 40. A side wall of the rod-like member 40 is provided with a first insertion hole 42 communicating with the hinge cavity 41 and a hinge seat. An end of 31 which is remote from the hinge arm 32 is inserted into the hinge cavity 41 from an end surface of the rod-shaped member 40, and is fixed in the hinge cavity 41 by a fixing member 50 inserted in the first insertion hole 42.

In this embodiment, the hinge cavity 41 communicates with the end surface of the temple main body 121 away from the end of the spectacle frame 11, so that the hinge base 31 is inserted into the hinge cavity 41 to connect the hinge 30 with the temple main body 121.

In some embodiments, the hinge cavity 41 may be formed during the molding process of the rod-shaped member 40. For example, the material of the rod-shaped member 40 may be rubber or plastic. At this time, the hinge cavity 41 may be formed by injection molding. The shape of the hinge cavity 41 is matched with the hinge base 31 so that the hinge base 31 can be accommodated in the hinge cavity 41. In this embodiment, the temple main body 121 may be a long straight rod along the length direction. Correspondingly, the rod 40 may be a straight rod along the length direction. The hinge cavity 41 is provided in the straight rod. Further, the hinge The

seat 31 is matched with the hinge cavity 41 to be accommodated in the hinge cavity 41 so as to realize the installation of the hinge 30. Of course, in other embodiments, the rod-shaped member 40 may have other shapes such as an arc-shaped rod.

In addition, the first insertion hole 42 may also be formed during the molding process of the rod-shaped member 40, or may be further formed on the side wall of the rod-shaped member by a method such as drilling after the molding. Specifically, in this embodiment, the shape of the first insertion hole 42 may be circular, and in other embodiments, it may be square, triangular, or other shapes. The shape of the fixing member 50 is matched with the first insertion hole 42 so that the fixing member 50 can be inserted into the first insertion hole 42 from the outside of the rod-like member 40, and further by abutting the side wall of the hinge base 31, or further penetrate the outer wall of the hinge base 31 to fix the hinge base 31 in the hinge cavity 41 by plugging in or the like. Specifically, matching threads may be provided on the inner wall of the first insertion hole 42 and the outer wall of the fixing member 50 so that the fixing member 50 can be connected to the first insertion hole 42 by screwing to further connect the hinge seat 31. It is fixed in the hinge cavity 41. Of course, it may also be connected in other ways, for example, through an interference fit between the first insertion hole 42 and the fixing member 50.

Further, the hinge arm 32 can also be connected with other components, so that the component can be connected with the rod-shaped member 40 or with the rod-shaped member 40 by mounting the hinge seat 31 in the hinge cavity 41 of the rod-shaped member 40 after the hinge arm 32 is connected. The other members connected to the rod-shaped member 40 can rotate around the rotation shaft 33. For example, when the hinge assembly 122 is used in the above-mentioned glasses, the functional member 20 (such as the speaker assembly 21) is connected to the end of the hinge arm 32 away from the hinge base 31, and is connected to the temple main body 121 away from the eyeglass frame 11 through the hinge 30. Ends.

In the above manner, the rod-like member 40 is provided with a hinge cavity 41 communicating with the end surface of the rod-like member 40. The hinge 30 receives the hinge seat 31 in the hinge cavity 41, and further passes the fixing member 50 through the first insertion hole 42. The insertion hole 42 penetrates the side wall of the rod-shaped member 40 to fix the hinge seat 31 accommodated in the hinge cavity 41 in the hinge cavity 41, so that the hinge 30 can be detached from the rod-shaped member 40 for convenience. Replacement of the hinge 30 or the rod 40. When applied to the glasses in the above-mentioned glasses embodiment of the present application, the hinge 30 and the functional member 20 can be detached from the temple main body 121, so that when the functional member 20 or the spectacle frame 11, the temple main body 121 and the like are damaged For easy replacement.

Further, please refer to FIG. 3. In one embodiment, the hinge seat 31 is provided with a second insertion hole 311 corresponding to the first insertion hole 42, and the fixing member 50 is further inserted into the second insertion hole 311. Inside.

Specifically, the shape of the second insertion hole 311 matches the shape of the fixing member 50, so that after the fixing member 50 passes through the first insertion hole 42, it is further inserted into the second insertion hole 311 to fix the hinge base 31, so that the sway of the hinge base 31 in the hinge cavity 41 is reduced, so that the hinge 30 is fixed more firmly. Specifically, similar to the connection manner of the first insertion hole 42 and the fixing member 50, the inner wall of the second insertion hole 311 may be provided with matching threads on the outer wall corresponding to the fixing member 50, so that the fixing member 50 And the hinge base 31 is screwed together, or, the outer wall at the position where the inner wall of the second insertion hole 311 and the fixing member 50 correspond to each other is a smooth surface, and the fixing member 50 and the second insertion hole 311 are in interference. The cooperation is not specifically limited here.

Further, the second insertion hole 311 can also be provided through both sides of the hinge base 31, so that the fixing member 50 can further penetrate the entire hinge base 31, so as to fix the hinge base 31 more firmly in the hinge cavity 41.

Please refer to FIG. 4, which is a cross-sectional view of the hinge assembly 122 along the A-A axis in FIG. 2. In this embodiment, the cross-sectional shape of the hinge base 31 and the cross-sectional shape of the hinge cavity 41 are matched in a cross section perpendicular to the longitudinal direction of the rod 40 so that the hinge base 31 and the rod 40 are inserted after insertion. Forms a tight fit.

In some embodiments, in the cross-section shown in FIG. 4, the cross-sectional shape of the hinge base 31 and the cross-sectional shape of the hinge cavity 41 may be any shape, as long as the hinge base 31 can be separated from the rod 40 away from the hinge arm 32. The end surface can be inserted into the hinge cavity 41. Further, the first insertion hole 42 is provided on a side wall of the hinge cavity 41 and communicates with the hinge cavity 41 through the side wall of the hinge cavity 41.

In an application scenario, the cross-sectional shape of the hinge base 31 and the cross-sectional shape of the hinge cavity 41 are both rectangular, and the first insertion hole 42 is perpendicular to one side of the rectangle.

Specifically, in this application scenario, the corners of the outer wall of the hinge base 31 or the corners of the inner wall of the hinge cavity 41 may be further rounded, so that the contact between the hinge base 31 and the hinge cavity 41 is more smooth, so that the hinge base 31 Can be smoothly inserted into the hinge cavity 41.

It should be further pointed out that before the hinge 30 is assembled, a certain amount of gas is stored in the hinge cavity 41. Therefore, if the hinge cavity 41 is only a cavity with one end open, it will be difficult due to the gas in the hinge cavity 41 during assembly. Discharging is not conducive to the insertion of the hinge seat 31, thereby affecting assembly. The first insertion hole 42 in this embodiment penetrates the side wall of the hinge cavity 41 and communicates with the hinge cavity 41, which can assist in exhausting the internal gas from the first insertion hole 42 through the hinge cavity 41 during the assembly process. Facilitates normal assembly of the hinge 30.

Please refer to FIG. 5, which is a schematic structural diagram of an embodiment of a hinge assembly of the present application. In the implementation of the hinge assembly 122 in the present application, the hinge assembly 122 further includes a connecting wire 60 disposed outside the hinge 30.

In some embodiments, the connection line 60 may be a connection line 60 having an electrical connection function and / or a mechanical connection function. When applied to the spectacles in the above-mentioned spectacles implementation of the present application, the hinge assembly 122 is used to connect the functional element 20 to the end of the temple main body 121 away from the eyeglass frame 11, and a control circuit or the like related to the functional element 20 may be provided in the temple main body 121, at this time, a connecting wire 60 is required to electrically connect the functional component 20 and a control circuit in the temple main body 121 together. Specifically, the connecting wire 60 may be located on one side of the hinge base 31 and the hinge arm 32, and is disposed in the same accommodation space as the hinge 30.

Further, the hinge base 31 includes a first end surface 312, and the hinge arm 32 has a second end surface 321 disposed opposite the first end surface 312. It is easy to understand that there is a certain gap between the first end surface 312 and the second end surface 321. The hinge base 31 and the hinge arm 32 can be relatively rotated around the rotation shaft 33. In this embodiment, during the relative rotation of the hinge arm 32 and the hinge base 31, the relative position between the first end surface 312 and the second end surface 321 changes accordingly, so that the gap between the two becomes larger or Get smaller.

In this embodiment, the gap between the first end surface 312 and the second end surface 321 is always kept larger or smaller than the diameter of the connecting line 60, so that the connecting line 60 located outside the hinge 30 cannot fall between the hinge base 31 and the hinge arm. During the relative rotation of 32, it is clamped into the gap between the first end surface 312 and the second end surface 321, thereby reducing the damage of the connecting line 60 by the hinge. Specifically, the ratio of the gap between the first end surface 312 and the second end surface 321 to the diameter of the connecting wire 60 during the relative rotation of the hinge arm 32.

and the hinge base 31 can always be kept greater than 1.5 or less than 0.8, such as greater than 1.5, 1.7, 1.9, 2.0, etc., or less than 0.8, 0.6, 0.4, 0.2, etc., which are not specifically limited here.

Please refer to FIG. 2, FIG. 6 to FIG. 9 together, FIG. 6 is an original state diagram of the protective sleeve in one embodiment of the hinge assembly of the present application, and FIG. 7 is an original state diagram of the protective sleeve in one embodiment of the hinge assembly of the present application. FIG. 8 is a partial cross-sectional view of a bending state of a protective sleeve in an embodiment of the hinge assembly of the present application, and FIG. 9 is a partial cross-sectional view of a bending state of the protective sleeve in an embodiment of the hinge assembly of the present application. In this embodiment, the hinge assembly 122 may further include a protective sleeve 70.

Specifically, the protective sleeve 70 is sleeved on the periphery of the hinge 30 and is bent along with the hinge 30. In some embodiments, the protective sleeve 70 may include a plurality of annular ridge portions 71 disposed at intervals along the length direction of the protective sleeve 70 and two annular ridge portions 71 disposed between the annular ridge portions 71 and used to connect two adjacent ones. In some embodiments, the thickness of the pipe wall of the annular ridge portion 71 is greater than the thickness of the pipe wall of the annular connection portion 72.

In some embodiments, the length direction of the protective sleeve 70 may be consistent with the length direction of the hinge 30, and the protective sleeve 70 may be disposed along the length direction of the hinge base 31 and the hinge arm 32. The protective sleeve 70 may be made of a soft material, such as soft silicone, rubber, or the like.

The annular ridge portion 71 may be formed by protruding outwardly from the outer sidewall of the protective sleeve 70, and the shape of the inner sidewall of the protective sleeve 70 corresponding to the annular ridge portion 71 is not specifically limited herein. For example, the inner wall may be smooth, or a recess may be provided on the inner wall at a position corresponding to the annular ridge portion 71.

The ring-shaped connecting portion 72 is used to connect adjacent ring-shaped ridge portions 71, and is specifically connected to an edge region of the ring-shaped ridge portion 71 near the inside of the protective sleeve 70, so that the outer side of the protective sleeve 70 can be provided in a recessed manner with respect to the annular ridge portion 71.

Specifically, the number of the annular ridge portion 71 and the annular connection portion 72 may be determined according to actual use. For example, the number of the annular ridge portion 71 and the annular connection portion 72 may be determined by the length of the protective sleeve 70. The width of the protective sleeve 70 in the longitudinal direction is set.

Further, the pipe wall thicknesses of the annular ridge portion 71 and the annular connection portion 72 refer to the thickness between the inner wall and the outer wall of the protective sleeve 70 corresponding to the annular ridge portion 71 and the annular connection portion 72, respectively. In the present embodiment, the tube wall thickness of the annular ridge portion 71 is greater than the tube wall thickness of the annular connection portion 72.

It is easy to understand that when the hinge base 31 and the hinge arm 32 of the hinge 30 are relatively rotated around the rotation shaft 33, the angle between the hinge base 31 and the hinge arm 32 changes, so that the protective sleeve 70 is bent, as shown in the figure 8 and 9 are shown. Specifically, when the protective sleeve 70 is bent with the hinge 30, the annular ridge portion 71 and the annular connecting portion 72 located in the outer region of the bent shape formed by the protective sleeve 70 are in a stretched state and are located in the annular ridge portion 71 and the annular connection portion 72 in the inner region of the bent shape are in a squeezed state.

In this embodiment, the thickness of the tube wall of the annular ridge portion 71 is greater than the thickness of the tube wall of the annular connection portion 72, so that the annular ridge portion 71 is harder than the annular connection portion 72, thereby protecting the sleeve 70. When in the bent state, the protective sleeve 70 on the outer side of the bent shape is in a stretched state, and the annular ridge portion 71 can provide a certain strength support for the protective sleeve 70; at the same time, the inside of the bent state The area of the protective sleeve 70 on one side is squeezed, and the annular ridge 71 can also withstand a certain pressing force, thereby protecting the protective sleeve 70, improving the stability of the protective sleeve 70, and extending the protective sleeve. The life of the tube 70.

Further, it should be noted that the shape of the protective sleeve 70 is consistent with the state where the hinge 30 is located. In one application scenario, both sides of the protective sleeve 70 along the length direction and rotating around the rotation axis may be stretched or squeezed. In another application scenario, the hinge base 31 and the hinge arm 32 of the hinge 30 can only rotate within a range of less than or equal to 180° about the rotation axis 33, that is, the protective sleeve 70 can only be bent toward one side. Then one side of the two sides of the protective sleeve 70 in the length direction may be squeezed and the other side may be stretched. At this time, the protective sleeve may be changed according to the different forces on the two sides of the protective sleeve 70. The two sides of the tube 70 with different forces are provided with different structures.

In one embodiment, when the protective sleeve 70 is in a bent state, the annular ridge portion 71 has a width in the longitudinal direction of the protective sleeve 70 that is greater than the direction of the bending when the protective sleeve 70 is formed on the outer side of the bent shape. The width of the inner side of the shape along the length of the protective sleeve 70.

In some embodiments, increasing the width of the annular ridge 71 in the length direction of the protective sleeve 70 can further increase the strength of the protective sleeve. Meanwhile, in this embodiment, the angle of the initial included angle between the hinge base 31 and the hinge arm 32 is less than 180°. At this time, if the annular ridge portion 71 of the protective sleeve 70 is uniformly disposed, the protective sleeve will be made 70 was squeezed in its original state. In this embodiment, the width of the annular ridge portion 71 corresponding to the side of the outer region of the bent shape in the bent state is large, so that the length of the side protective sleeve 70 can be enlarged, and the protective sleeve can be improved. At the same time, the strength of 70 also reduces the degree of stretching on the stretching side to a certain extent when the protective sleeve 70 is bent; at the same time, the annular ridge portion 71 faces the bend when the protective sleeve 70 is in a bent state. The width of the inner side of the folded shape along the length of the protective sleeve 70 is small, which can increase the space of the extruded ring-shaped connecting portion 72 in the length direction of the protective sleeve 70, thereby alleviating the squeeze to a certain extent Press on the side.

Further, in an application scenario, the width of the annular ridge portion 71 gradually decreases from the side of the outer region facing the bent shape to the side of the inner region facing the bent shape, so that the protective sleeve 70 is in a bent shape. In the folded state, the width toward the outer region side of the bent shape formed by the protective sleeve 70 is greater than the width toward the inner region side of the bent shape.

It is easily understood that the annular convex ridge portion 71 is provided around the periphery of the protective sleeve 70. In the length direction of the protective sleeve 70, one side corresponds to the stretched side, and the other side corresponds to the squeezed side. In this embodiment, the width of the annular ridge portion 71 gradually decreases from the side of the outer region facing the bent shape to the side of the inner region facing the bent shape, so that the width is more uniform and can be increased to a certain extent. Protects the stability of the sleeve 70.

In one embodiment, the annular ridge portion 71 is provided with an inner annular surface inside the protective sleeve 70 facing the outer region side of the bent shape formed by the protective sleeve 70 when the protective sleeve 70 is in a bent state. Groove 711.

Specifically, the groove 711 in this embodiment is provided along a length direction perpendicular to the protective sleeve 70, so that the corresponding annular ridge portion 71 can be appropriately adjusted when the protective sleeve 70 is stretched in the length direction, stretch.

As described above, when the protective sleeve 70 is in a bent state, the protective sleeve 70 facing the outer side of the bent shape formed by the protective sleeve 70 is in a stretched state. In this embodiment, the protective sleeve 70 is further in a corresponding loop shape. A groove 711 is provided on the inner ring surface inside the protective sleeve 70 corresponding to the ridge portion 71, so that when the side protective sleeve is stretched, the annular ridge portion 71 corresponding to the groove 711 can be appropriately extended to take part Stretching, thereby reducing the tensile force experienced by the side protective sleeve, thereby protecting the protective sleeve 70.

It should be noted that when the protective sleeve 70 is in a bent state, the annular ridge portion 71 on the side facing the inner region of the bent shape may not be provided with a groove 711 on the inner side wall of the corresponding protective sleeve 70. In one embodiment, the width of the groove 71 along the longitudinal direction of the protective sleeve 70 is gradually reduced from the side of the outer region facing the bent shape to the side of the inner region facing the bent shape, so that The inner side wall of the protective sleeve 70 corresponding to the annular ridge 71 on the inner side of the inner region is not provided with a groove 711.

Specifically, when the hinge assembly 122 in this embodiment is applied to the spectacles in the spectacles embodiment of the present application, the protective sleeve 70 may be different from the temple main body 121 provided on both sides of the protective sleeve 70 in the length direction. And the functional pieces 20 are connected together. In an application scenario, the protective sleeve 70 can also be integrally formed for other structures in the glasses, such as the protective cover of some components, so that the glasses are more closed and integrated.

It should be pointed out that the hinge assembly 122 in the embodiment of the hinge assembly in the present application can be used not only for the glasses in the embodiment of the glasses of the present application, but also in other devices, and the hinge assembly 122 can also include a rod shape Other components other than the member 40, the fixing member 50, the connecting wire 60, the protective sleeve 70, and the like are associated with the hinge 30 to achieve the corresponding functions.

Specifically, please refer to FIGS. 10 to 14 together. FIG. 10 is a partial cross-sectional view of an embodiment of the hinge of the present application, FIG. 11 is an enlarged view of part A in FIG. 10, and FIG. 12 is part B in FIG. An enlarged view when the first support surface and the third support surface abut to the second support surface and the third support surface and the connection between the first support surface and the second support surface makes initial contact with the third support surface, FIG. 13 is a partial cross-sectional view of an embodiment of the hinge of the present application, and FIG. 14 is an enlarged view of a portion C in FIG. 13. It should be noted that the hinge 30 in the hinge embodiment of the present application can be used in the glasses in the glasses embodiment of the present application, and can also be used in the hinge assembly 122 in the hinge assembly embodiment of the present application. It can also be used in other devices. No specific restrictions are made here

In this embodiment, the hinge arm 32 of the hinge 30 has a first support surface 322 and a second support surface 323 connected to each other.

The hinge 30 further includes a support member 34 and an elastic member 35. The support member 34 is movably disposed on the hinge base 31 and has a third support surface 341. The elastic member 35 is used for elastically biasing the support member 34 toward the hinge arm 32, so that the third support surfaces 341 can be elastically abutted respectively. On the first support surface 322 and the second support surface 323.

In some embodiments, when the hinge arm 32 is rotated relative to the hinge base 31 by an external force, the support member 34 is pushed by the connection point 324 of the first support surface 322 and the second support surface 323 to overcome the elastic bias of the elastic member 35. The reverse movement causes the third support surface 341 to switch from one of the first support surface 322 and the second support surface 323 to the other of the first support surface 322 and the second support surface 323. Those flexibly abut.

In one application scenario, the support member 34 is connected to the end of the elastic member 35 facing the hinge arm 32, and the third support surface 341 faces the side of the hinge arm 32. The hinge arm 32 is exposed to external forces around the rotation axis 33 relative to the hinge base. During the rotation of 31, the third supporting surface 341 can be pushed so that the supporting member 34 presses the elastic member 35, and further elastically biases under the action of the elastic member 35. Of course, the support member 34 may not be connected to the elastic member 35 but only abuts on one side of the support member 34 as long as the support member 34 can achieve the above-mentioned elastic bias.

In some embodiments, the first support surface 322 and the second support surface 323 are respectively two sides of the hinge arm 32 adjacent to each other and at least partially parallel to the central axis of the rotating shaft 33, or part of the two sides. When the hinge arm 32 rotates relative to the hinge base 31, the first support surface 322 and the second support surface 323 rotate with the hinge arm 32 about the rotation axis 33, so that different sides of the hinge arm 32 face the hinge base 31, and thus the hinge arm 32 faces each other. The hinge base 31 can have different relative positional relationships.

In addition, the elastic member 35 is a member capable of providing elastic force and being capable of being compressed in the direction of the elastic force to provide a certain compression space. For example, the elastic member 35 may be a spring, and one end of the spring abuts the support member 34. When the third support surface 341 of the support member 34 is pushed toward the elastic member 35, the elastic member 35 resists the support member 34 and compresses so that Provide space in the direction of the third support surface 341 of the support member 34, so that when the relative position of the rotation shaft 33 is not changed, there is still enough space for the different sides of the hinge arm 32 to rotate to the rotation shaft 33 and the third support surface Between 341.

Specifically, when the hinge arm 32 rotates relative to the hinge base 31, the relative position of the rotating shaft 33 does not change, and the contact position of the hinge arm 32 and the third support surface 341 of the hinge base 31 changes. The distance from the position to the rotation axis 33 is different. Therefore, when the different positions of the hinge arm 32 such as the first support surface 322 and the second support surface 323 are in contact with the third support surface 341, the required rotation axis 33 to The space between the contact points of the hinge arm 32 and the third support surface 341 is different. However, due to the limitation of the elastic force and the space, the space provided by the compression of the elastic member 35 may be limited. Therefore, during the rotation of the hinge arm 32 relative to the hinge base 31, if a certain position on the hinge arm 32 and the rotation axis 33 is too large in a cross section perpendicular to the central axis of the rotation axis 33, the position will be changed during the rotation. It will be locked in another position on the third supporting surface and cannot continue to rotate the hinge arm 32, so that the hinge arm 32 and the hinge base 31 can only rotate relatively within a certain range. In an application scenario, during the relative rotation between the hinge arm 32 and the hinge base 31 about the rotation axis 33, there are only the first support surface 322 and the second support surface 323 and the first support surface 322 and the second support surface 323. The area corresponding to the connection point 324 can abut the third support surface 341.

Further, in this embodiment, the first support surface 322 and the second support surface 323 may both be planes, and the distance from the rotation shaft 33 to the connection point 324 of the two is greater than the distance from the rotation shaft 33 to the first support surface 322 and to the first support surface 322. For the distance between the two supporting surfaces 323, the hinge 30 may have two relatively stable states: the third supporting surface 341 abuts against the first supporting surface 322, and the third supporting surface 341 abuts against the second supporting surface 323.

Of course, in this embodiment, the first support surface 322 and the second support surface 323 may also be curved surfaces with a certain radius, or may even include different sub-support surfaces, as long as the distance between the hinge arm 32 and the hinge base 31 can be made. It suffices that the positional relationship of at least two corresponding relatively stable states is not specifically limited here. In addition, the hinge arm 32 may be provided with other support surfaces so that when the hinge arm 32 receives an external force and rotates relative to the rotation axis 33 and the hinge base 31, different support surfaces on the hinge arm 32 and the third support surface 341 are elastically abutted, so that the hinge arm 32 and the hinge base 31 have different relative positional relationships, which are not specifically limited herein.

Specifically, the initial state is an example where the first support surface 322 abuts the third support surface 341 of the support member 34 as shown in FIG. 11 and FIG. 12. At this time, the elastic member 35 may have elastic compression deformation, or may be in an original natural state, which is not limited herein. When the hinge 30 is subjected to an external force to cause the hinge arm 32 to rotate relative to the hinge shaft 33 and the hinge base 31 so that the second support surface 323 gradually approaches the third support surface 341, the connection between the first support surface 322 and the second support surface 323. The position 324 is in contact with the third support surface 341. Since the distance from the connection point 324 to the rotation shaft 33 is greater than the distance from the first support surface 322 to the rotation shaft 33, the connection point 324 abuts the support member 34 and pushes the support member 34 to move toward the elastic member. The movement of the direction of 35 causes the elastic member 35 to overcome the thrust and generate compression. And when the hinge arm 32 is further stressed, the connection point 324 gradually approaches the area between the rotation shaft 33 and the third support surface 341. In the process, the distance between the rotation shaft 33 and the third support surface 341 gradually increases; it is easy to understand that when the connecting line of the connection point 324 and the rotation shaft 33 is perpendicular to the third support surface 341, the distance from the rotation shaft 33 to the third support surface 341 is equal to the rotation shaft 33 to the connection on a cross section perpendicular to the center axis of the rotation shaft 33. Distance 324 at this time, the rotation axis 33 is farthest from the third support surface 341 at this time; if at this time, if the hinge 30 continues to be forced, the distance from the rotation axis 33 to the third support surface 341 will gradually decrease, so that the required compression space of the elastic member 35 is reduced, and then the elastic member 35 gradually releases the elastic force and recovers, until the connection point 324 leaves the third support surface 341 and the second support surface 323 abuts against the third support surface 341, thereby switching from abutting the first support surface 322 and the third support surface 341 to the second support surface 323 and the third support surface 341 is realized.

Similarly, in the initial state, the second support surface 323 is in contact with the third support surface 341 of the support member 34, and the first support surface 322 is in contact with the third support surface 341 of the support member 34. 13 and 14) are similar to the above process.

It should be noted that the hinge 30 in this embodiment can be applied to the hinge assembly 122 in the glasses embodiment of the present application. When the third support surface 341 is switched from elastic contact with one of the first support surface 322 and the second support surface 323 to elastic contact with the other of the first support surface 322 and the second support surface 323, the hinge assembly 122 drives the speaker assembly 21 to switch between a first relatively fixed position and a second relatively fixed position relative to the temple main body 121, and can be fitted to the user when the speaker assembly 21 is in the first relatively fixed position. Back of the pinna. Among them, the auricle is a part of the external ear and is mainly composed of cartilage. In some embodiments, the speaker assembly 21 may be a bone conduction speaker assembly. By attaching the speaker assembly to the back of the auricle, the cartilage of the auricle can be used to transmit bone conduction sound / vibration. Placing the bone conduction speaker components on the back of the auricle can improve the sound quality and reduce the impact on the ear canal during sound transmission.

It should be noted that the distance between the rotation shaft 33 and the connection point 324 is greater than the vertical distance from the first support surface 322 and the second support surface 323, so that the third support surface 341 is separated from the first support surface 322 and the second support surface 323. The state of the hinge 30 jumps to a certain degree during the process of one of the surfaces 323 being elastically abutted to the other of the first supporting surface 322 and the second supporting surface 323.

Taking the elastic contact of the first support surface 322 and the third support surface 341 to the elastic contact of the second support surface 323 and the third support surface 341 as an example, the maximum distance h1 between the rotation shaft 33 and the connection point 324 and the rotation shaft 33 to the first support surface 322 is different, the degree of jumps generated during the switching process is different.

In an embodiment, the ratio between the maximum distance h1 of the rotation shaft 33 to the connection 324 and the shortest distance h2 of the rotation shaft 33 to the first support surface 322 in a cross section perpendicular to the central axis of the rotation shaft 33 is between 1.1 and 1.5. between.

Specifically, the maximum distance h1 between the rotation shaft 33 and the connection point 324 may be greater than that of the rotation shaft 33 to the first support surface 322 by disposing the rotation shaft 33 away from the second support surface 323 and close to one side of the hinge arm 32 opposite to the second support surface 323. The shortest distance h2 of the support surface 322 further satisfies the above ratio.

It should be noted that when the ratio between h1 and h2 is too large, the jump is obvious, but it may take a large amount of force to be able to switch the first support surface 322 and the third support surface 341 to the second support surface 323 elastically. The surface 323 and the third support surface 341 elastically abut, which inconveniences the use to a certain extent; and the ratio between h1 and h2 is too small. Although the state switching is relatively easy, the degree of transition may be small, such as When the user pulls the hinge 30, there is no obvious tactile sensation, which may cause inconvenience. In this embodiment, setting the ratio of h1 to h2 to be between 1.1 and 1.5 can enable the third support surface 341 to switch from elastic contact with the first support surface 322 to elastic contact with the second support surface 323. The hinge 30 has a relatively obvious jump, so that during use, the user has a relatively obvious feel when pulling the hinge 30, and at the same time, the jump state is not too abrupt, making it difficult for the user to switch the state of the hinge 30.

In an application scenario, the ratio of h1 to h2 may also be between 1.2 and 1.4. Specifically, the ratio of h1 to h2 may also be 1.1, 1.2, 1.3, 1.4, 1.5, etc., which is not specifically limited here.

In addition, the position of the first support surface 322 and the second support surface 323 on the hinge arm 32 will affect the hinge arm when the third support surface 341 is in contact with one of the first support surface 322 or the second support surface 323. The angle of the included angle between 32 and the hinge base 31, therefore, the positions of the first support surface 322 and the second support surface 323 on the hinge arm 32 can be set differently according to specific usage requirements. In some embodiments, the angle between the hinge arm 32 and the hinge base 31 is as shown in FIG. 9 and FIG. 12. α_1 is the hinge arm 32 and the hinge base 31 when the third support surface 341 is in contact with the first support surface 322. The angle α_2 between 31 is the angle between the hinge arm 32 and the hinge base 31 when the third support surface 341 and the second support surface 323 abut. In one embodiment, the hinge arm 32 and the hinge base 31 each have a certain length. The hinge arm 32 is provided on an end side in the length direction of the hinge base 31. The first support surface 322 is provided in the length direction of the hinge arm 32. Close to the end of the hinge base 31, the second support surface 323 is disposed at one end in the width direction of the hinge arm 32 and is disposed parallel to the central axis of the rotation shaft 33. At this time, when the third supporting surface 341 and the first supporting surface 322 elastically abut, the angle between the hinge arm 32 and the hinge base 31 is the largest, and the third supporting surface 341 and the second supporting surface 323 elastically abut. At this time, the angle between the hinge arm 32 and the hinge base 31 is the smallest, so that when the third support surface 341 is switched from elastic contact with the first

support surface 322 to elastic contact with the second support surface 323, the hinge base 31 and The included angle between the hinge arms 32 decreases from ω_1 to ω_2 .

It needs to be further pointed out that if the third support surface 341 is switched from elastic contact with the first support surface 322 to elastic contact with the second support surface 323, the direction of the force applied to the hinge arm 32 and the hinge arm 32 itself The direction of gravity is the same, then switching in this state will make the included angle between the hinge base 31 and the hinge arm 32 small. In this embodiment, the setting of the ratio between h_1 and h_2 can also make the third support surface When 341 and the first support surface 322 elastically abut, the hinge arm 32 will not or hardly reduce the angle between the hinge arm 32 and the hinge base 31 spontaneously due to its own gravity.

In an embodiment of the hinge of the present application, please refer to FIG. 12. In a cross section perpendicular to the central axis of the rotation shaft 33, the angle ω_3 between the first support surface 322 and the second support surface 323 is an obtuse angle.

In some embodiments, when the hinge 30 is switched from a state where the first support surface 322 and the third support surface 341 are elastically abutted to a state where the second support surface 323 and the third support surface 341 are elastically abutted, the first support surface The smaller the angle ω_3 between 322 and the second support surface 323, the larger the relative rotation angle between the hinge base 31 and the hinge arm 32 when the state is switched, that is, when the hinge base 31 is fixed, The user needs to move the hinge arm 32 by a relatively large angle to be able to switch the state of the hinge 30, so that the user is laborious to use and brings inconvenience to the user.

Since the hinge arm 32 has a certain length, and the first support surface 322 is disposed at one end in the length direction of the hinge arm 32, and the second support surface 323 is disposed adjacent to the first support surface 322 in the width direction of the hinge arm 32 on. Generally, the first support surface 322 and the second support surface 323 are vertically arranged. At this time, when the hinge 30 is switched between the above two states, the hinge arm 32 and the hinge base 31 need to be pulled relative to each other by 90° .

In this embodiment, in a cross section perpendicular to the central axis of the rotating shaft 33, the angle ω_3 between the first support surface 322 and the second support surface 323 is an obtuse angle, so when the hinge 30 is switched between the two states The required relative pulling angle of the hinge arm 32 and the hinge base 31 is less than 90° , so as to provide convenience to users to a certain extent.

Specifically, when the hinge 30 in this embodiment is used in the glasses embodiment of the present application, the hinge 30 is used to connect the temple main body 121 and the speaker assembly 21. In some embodiments, the speaker assembly 21 may be a bone conduction speaker assembly. For example, when the hinge 30 is in the second state where the second support surface 323 and the third support surface 341 elastically abut, the speaker assembly 21 is in a first relatively fixed position to fit the back of the auricle of the user. When using the function of the speaker assembly 21 of the glasses, it is only necessary to rotate the speaker assembly 21 by an angle of less than 90° to fit it to the back of the user's auricle; in addition, the hinge 30 is on the first support surface 322 and the first In the first state where the three support surfaces 341 are elastically abutted, the hinge arm 32 and the connected bone conduction speaker assembly 21 form a certain angle, so that when the user wears glasses, the hinge arm 32 and the connected speaker assembly 21 can be located at the user It is set behind the ear and in the direction of the user's ear, so that it can play a certain blocking and fixing role on the glasses, and it is not easy to fall from the user's head

It should be noted that the specific angle of the angle ω_3 between the first support surface 322 and the second support surface 323 can be set according to actual needs. When the included angle is too large, the included angle between the hinge arm 32 and the function piece 20 connected to the end of the hinge arm 32 away from the hinge base 31 and the hinge base 31 will be small, so that when the user wears the hinge The arm 32 and the functional part 20 will be too close to the user's ear, which will cause pressure on the user's ear and reduce the user's comfort; if the included angle is too small, on the one hand, the user is pulling the bone conduction speaker assembly 21 to make it at When switching between the first relative position and the second relative position, the required angle is too large, which is inconvenient for the user. On the other hand, the formation between the temple main body 121 and the hinge 30 and the speaker assembly 21 The included angle is small and it is difficult to play a role of blocking and fixing the glasses, so that when the user wears the glasses, the glasses are easily dropped from the front side of the user's head. Specifically, the specific angle of the included angle between the first support surface 322 and the second support surface 323 may be set according to the head shape of the user.

Specifically, in an application scenario, the angle ω_3 between the first support surface 322 and the second support surface 323 is between 100° and 120° on a cross section perpendicular to the central axis of the rotating shaft 33. Specifically, it may be 100° , 110° , 120° , or the like. The setting of this angle enables the user to wear glasses and the speaker module 21 in the first relatively fixed position, so that the speaker module 21 is not too close to the user's ears to cause discomfort to the user's ears. There is no need to turn the hinge too much when switching the relative position, which is convenient for users.

In some embodiments, the third support surface 341 is switched from elastic contact with one of the first support surface 322 and the second support surface 323 to the other of the first support surface 322 and the second support surface 323. During the elastic abutment process, the connection point 324 between the first support surface 322 and the second support surface 323 abuts the third support surface 341, and pushes the support member 34 to move backwards against the elastic bias of the elastic member 35. Taking the third supporting surface 341 and the first supporting surface 322 elastically abutting before switching as an example, during the initial switching, while the first supporting surface 322 gradually moves away from the third supporting surface 341, the connection point 324 gradually abuts against the third supporting surface 341, and during the switching process, sliding from one side of the third support surface 341 to the other side of the third support surface 341, and finally further transitioning to elastic contact between the second support surface 323 and the third support surface 341. During the state switching process, the connection point 324 always abuts and interacts with the third support surface 341, and the shape of the connection point 324 will have a certain effect on the state switching process. For example, if the first support surface 322 and the second support surface 323 are connected in line, then the connection point 324 has a relatively sharp angle, so that when the user pulls the hinge base 31 and / or the hinge arm 32 to perform the state of the hinge 30 During the switching process, on the one hand, when the connection point 324 is in contact with the third support surface 341 and the connection point 324 is in contact with the first support surface 322 and the second support surface 323 for switching, the buffer is small, the switching is abrupt, and The feel of the movable hinge 30 is poor; on the other hand, the connection point 324 is relatively sharp, which will cause certain wear to the third support surface 341 during repeated switching processes.

In an embodiment of the present application, the connection point 324 is arc-shaped on a cross section perpendicular to the central axis of the rotating shaft 33. As a result, the connection between the first support surface 322 and the second support surface 323 is an arc surface connection, and during the state switching process of the hinge 30, the connection point 324 abutting the third support surface 341 is relatively smooth, so that the user can pull The hinge 30 has a better feel and can reduce damage to the third support surface 341 during repeated switching processes.

Specifically, in an embodiment, the connection point 324 is arc-shaped, and the curvature of the arc is different, and the effects brought by it are also different. The specific curvature value needs to be set in combination with the actual use situation. In this embodiment, the curvature of the arc is between 5 and 30, and may specifically be 5, 10, 15, 20, 25, 30, etc., which is not limited herein.

It should be noted that, when the hinge 30 in this embodiment is applied to the glasses in the glasses embodiment described above, the curvature of the connection point 324 provided by the arc can enable the user to pull the hinge 30 so that the bone conduction speaker component When switching between a relatively fixed position

and a second relatively fixed position, it has a better feel.

In an embodiment, the third support surface 341 is provided such that an external force required when the third support surface 341 is switched from being elastically abutted with the first support surface 322 to being elastically abutted with the second support surface 323 is different from that The three supporting surfaces 341 are switched from elastic contact with the second support surface 323 to external force required when elastic contact with the first support surface 322.

It should be pointed out that, in a specific use scenario, the hinge 30 corresponding to different states of the hinge 30 or the structure to which the hinge 30 is connected have different functions, or due to the position of the hinge 30, a certain state is caused. It is not convenient for the user to apply force when switching the other state, and when the user switches the state of the hinge 30, it is necessary to distinguish the strength of the hinge 30 to facilitate the user to apply force, or to distinguish the two types for the user. The hinge state provides an intuitive feel and more.

Specifically, when the hinge 30 in this embodiment is applied to the glasses described above, the switching of the state of the hinge 30 will drive the speaker assembly 21 between the first relatively fixed position and the second relatively fixed position relative to the temple main body 121. Switch. Correspondingly, the two relatively fixed positions correspond to the two situations where the user uses the speaker assembly 21 and the user does not use the speaker assembly 21, and when the user wears glasses, the hand exerts force on the back of the head to switch between the two states. The degree of difficulty of the force is not the same. Therefore, correspondingly, the switching of different states is designed to require the application of different external forces, which can be used by the user.

Specifically, in an embodiment, when the third supporting surface 341 is switched from being elastically abutted with the first supporting surface 322 to being elastically abutting with the second supporting surface 323, it corresponds to relatively fixing the speaker assembly 21 by the second The position is moved to the first relatively fixed position so as to fit on the back of the auricle of the user.

Further, in this embodiment, the third support surface 341 is provided such that the external force required when the third support surface 341 is switched from the elastic abutment with the first support surface 322 to the second abutment surface 323 is less than The third support surface 341 is switched from an elastic contact with the second support surface 323 to an external force required when the third support surface 341 is elastically contacted with the first support surface 322.

It should be noted that when applying the above-mentioned glasses, when using the bone conduction speaker assembly 21, the third support surface 341 needs to be switched from elastic contact with the first support surface 322 to elastic contact with the second support surface 323 When the bone conduction speaker assembly 21 is not used, the third support surface 341 needs to be switched from elastic contact with the second support surface 323 to elastic contact with the third support surface 341. According to this embodiment, when the user uses The force to be applied when the bone conduction speaker assembly 21 is smaller than the force required to use the bone conduction speaker assembly 21, which can facilitate the user to use the function of the bone conduction speaker assembly 21 to a certain extent.

Specifically, please refer to FIG. 12 and FIG. 14 together, in an application scenario, when the third support surface 341 is switched from the elastic abutment with the first support surface 322 to the elastic abutment with the second support surface 323, the connection place 324 initially contacts the first position 3411 of the third support surface 341. When the third support surface 341 switches from elastic contact with the second support surface 323 to elastic contact with the first support surface 322, the connection point 324 initially contacts at The second position 3412 of the third support surface 341. In some embodiments, the distance d1 between the contact point of the first position 3411 with the elastic member 35 and the support member 34 along the elastic biasing direction of the elastic member 35 is smaller than the second position in a cross section perpendicular to the central axis of the rotating shaft 33. The distance d2 between 3412 and the contact point in the direction of the elastic bias.

It should be noted that when the third support surface 341 and the first support surface 322 elastically resist, the connection point 324 is located near one end of the third support surface 341, and the third support surface 341 and the second support surface 323 elastically resist. When connected, the connection point 324 is located near the other end of the third support surface 341. Therefore, the above-mentioned first position 3411 and second position 3412 are respectively located at two ends near the third support surface 341. That is, in this embodiment, the distances between the positions of the third support surface 341 of the support member 34 near the two ends and the contact points of the elastic member 35 and the support member 34 in the elastic biasing direction of the elastic member 35 are different. The distance corresponding to the second position 3412 is smaller than the distance corresponding to the first position 3411. At this time, when the third support surface 341 is switched from being elastically abutted with the first support surface 322 to being elastically abutted with the second support surface 323, the connection point 324 does not immediately abut the third support surface 341 and is received by the elastic member. The reaction force of 35 is gradually abutted against the third support surface 341 during the switching process and is subject to the reaction force of the elastic member 35; and the third support surface 341 is elastically abutted from the first support surface 322 to the second support surface 322. When the supporting surface 323 switches elastically, the connection point 324 initially abuts the third supporting surface 341 and receives the reaction force of the elastic member 35, or at least elastically abuts against the second supporting surface 323 with respect to the third supporting surface 341. The switching of the abutting contact with the first supporting surface 322 is to be received by the reaction force of the elastic member 35 early. Therefore, in this case, when the hinge 30 is switched from the elastic abutment with the first support surface 322 to the elastic abutment with the second support surface 323, the required force is small, so that the user can use the speaker assembly 21 when using the speaker assembly 21. The force required to actuate the bone conduction speaker assembly 21 is relatively small, which is convenient for users.

Further, the third support surface 341 includes a first sub-support surface 3413 and a second sub-support surface 3414. In some embodiments, the first position 3411 is provided at the first sub-support surface 3413, and the second position 3412 is provided at the second Support surface 3414. That is, the first sub-supporting surface 3413 and the second sub-supporting surface 3414 are respectively disposed at positions close to both ends of the third support surface 341.

In some embodiments, the second sub-support surface 3414 may be a flat surface. Specifically, when the first support surface 322 or the second support surface 323 and the third support surface 341 elastically abut, the second sub-support surface 3414 may be The first support surface 322 or the second support surface 323 is parallel. The first sub-support surface 3413 may be a flat surface or an arc surface, which is not limited herein.

Further, the first sub-supporting surface 3413 and the second sub-supporting surface 3414 are not located on the same plane, the first sub-supporting surface 3413 is inclined with respect to the second sub-supporting surface 3414, and the angle between the two may not be greater than 10°, for example, may be not more than 2°, 4°, 6°, 8°, 10°, and the like. Specifically, the first sub-supporting surface 3413 is disposed in a direction away from the hinge arm 32, so that the contact point of the first position 3411 with the elastic member 35 and the support member 34 is along the elastic member in a cross section perpendicular to the central axis of the rotation shaft 33. The distance in the elastically biased direction of 35 is smaller than the distance between the second position 3412 and the contact point in the elastically biased direction. In some embodiments, when the first sub-support surface 3413 is an arc surface and the second sub-support surface 3414 is a plane, the angle between the first sub-support surface 3413 and the second sub-support surface 3414 is between the two. The angle between the plane where the intersection is tangent to the first sub-support surface 3413 and the second sub-support surface 3414.

Please further refer to FIG. 15, which is an exploded structural view of an embodiment of the hinge of the present application. In this embodiment, the hinge base 31 includes a base body 313 and first and second lugs 314 and 315 protruding from the base body 313 and spaced apart from each other, and the hinge arm 32 includes an arm body 325 and a protrusion from the arm body 325 The third lug 326 is provided, and the third lug 326 is inserted into the space between the first lug 314 and the

second lug 315 and is rotatably connected to the first lug 314 and the second lug 315 through the rotating shaft 33. The first support surface 322 and the second support surface 323 are disposed on the third lug 326. The support member 34 is at least partially disposed in the interval region and is located on the side of the third lug 326 facing the seat body 313 on the seat body 313. An accommodating cavity 3121 is provided in communication with the interval region. The elastic member 35 is disposed in the accommodating cavity 3121 and elastically biases the support member 34 toward the third lug 326.

Specifically, the first lugs 314, the second lugs 315, and the third lugs 326 may be respectively provided with corresponding first through holes, second through holes, and third through holes in the same axial direction. The inner diameter of each through hole can be not less than the outer diameter of the rotating shaft 33, so that when the rotating shaft 33 passes through the corresponding through hole, the hinge base 31 where the first lug 314 and the second lug 315 are located can be connected to the third lug 326. The hinge arms 32 where 326 is located are rotationally connected together.

In some embodiments, the first support surface 322 and the second support surface 323 are both disposed on the third lug 326 and are parallel to the central axis of the rotation shaft 33, so that the hinge arm 32 surrounds the rotation shaft 33 relative to the hinge base 31. When rotating, both the first support surface 322 and the second support surface 323 may enter the space between the first lug 314 and the second lug 315.

Further, the supporting member 34 is located between the first lug 314 and the second lug 315 of the seat body 313, and the third supporting surface 341 of the supporting member 34 is disposed toward the third lug 326. In one application scenario, the elastic member 35 is completely disposed in the accommodating cavity 3121 and is in contact with the support member 34 on a side facing a spaced region between the first lug 314 and the second lug 315. When the elastic member 35 is in a natural state, an area of the support member 34 near the elastic member 35 is at least partially located in the accommodation cavity 3121. It should be noted that the shape of the portion of the support member 34 located in the accommodation cavity 3121 matches the shape of the accommodation cavity 3121, so that when the elastic member 35 elastically biases the support member 34, the support member 34 is located in the accommodation cavity 3121. A part can slide stably in the receiving cavity 3121.

In an application scenario, the cross-sectional area of the receiving cavity 3121 is smaller than the cross-sectional area of the space between the first lug 314 and the second lug 315 in a cross section perpendicular to the length direction of the hinge base 31. The support member 34 The shape of the area outside the accommodation cavity 3121 matches the space area, so that when the support member 34 moves toward the elastic member 35 side, it does not all enter the accommodation cavity 3121.

Of course, in other embodiments, the cross-sectional shape of the receiving cavity 3121 may be the same as the interval between the first lug 314 and the second lug 315 in a cross section perpendicular to the length direction of the hinge base 31. At this time, the support member 34 can be completely accommodated in the accommodation cavity 3121, so that when the support member 34 receives the pushing action, it slides in the entire accommodation cavity 3121.

Further, when the hinge 30 in the above embodiment is applied to the hinge assembly 122 in the embodiment of the hinge assembly of the present application, the first end surface 312 of the hinge base 31 is a hinge arm facing the first lug 314 and the second lug 315. An end surface of 32, a third lug 326 protruding toward the arm body 325 is located in a space between the first lug 314 and the second lug 315, so that the first lug 314 and the second lug 315. The first end surface 312 is disposed toward the arm body 325. In a cross-section in the center axis direction of the rotation shaft 33, the arm body 325 further protrudes from the third lug 326 to form a first end 321 and a second end surface 321 of the second lug 315 facing the hinge base 31.

In this embodiment, during the relative rotation of the hinge arm 32 and the hinge base 31, the gap between the first end surface 312 of the first and second lugs 314 and 315 and the second end surface 321 of the arm body 325 is always larger or smaller than the diameter of the connecting wire 60 so that the connecting wire 60 will not be caught between the first and second lugs 314 and 315 and the arm body 325 during the relative rotation of the hinge base 31 and the hinge arm 32, and further The damage to the connecting wire 60 by the hinge 30 is reduced.

In an application scenario, the gap between the second end surface 321 of the first and second lugs 314 and 315 and the first end surface 312 of the arm body 325 is always during the relative rotation of the hinge arm 32 and the hinge base 31. It is kept much larger or smaller than the diameter of the connecting wire 60, thereby further reducing the damage of the connecting wire 60 by the hinge 30.

It should be noted that, in this embodiment, the gap between the first end surface 312 and the second end surface 321 may be a uniform gap of the same size, so that they all meet the above conditions that are larger or smaller than the diameter of the connecting line 60; or in another In the embodiment, only the gaps at the positions where the two end faces are close to the connection line 60 may be greater than or smaller than the diameter of the connection wire 60, and the gaps at other positions on both end faces may not be required to satisfy the above conditions.

Specifically, in an application scenario, in a cross section perpendicular to the center axis of the rotating shaft 33, the end faces of the first and second lugs 314 and 315 facing the hinge arm 32 and the end faces of the arm body 325 facing the hinge base 31. At least one may be chamfered so that the position of the gap between the hinge arm 32 and the hinge base 31 near the connection line 60 is always kept larger than the diameter of the connection line 60 during relative rotation.

In some embodiments, the chamfer setting may be either a fillet or a direct chamfer.

In this application scenario, it is only necessary to chamfer at least one of the end face of the first lug 314 and the second lug 315 near the connecting line 60 toward the hinge arm 32 and the end face of the arm body 325 toward the hinge base 31. It is arranged so that the connecting wire 60 will not be clamped into the gap between the two end surfaces during the relative rotation of the hinge arm 32 and the hinge base 31.

The hinge in the above-mentioned hinge embodiment in the present application may be applied to the hinge assembly embodiment of the present application, but it is not limited. In other embodiments, it may also be applied to other hinge assemblies, or two components to be connected in rotation. direct connection.

It should be noted that the above description of the hinge assembly of the glasses is only a specific example, and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principle of the hinge assembly of glasses, it is possible to form and detail the specific ways and steps of implementing the hinge assembly of the glasses without departing from this principle. Various modifications and changes, but these modifications and changes are still within the scope described above. For example, the cross-sectional shapes of the hinge base 31 and the hinge cavity 41 may be circular, oval, trapezoidal, or the like. Such deformations are all within the protection scope of this application.

In some embodiments, the glasses may further include a key module. In some embodiments, the key module may include a power key, a function shortcut key, and a menu shortcut key. In some embodiments, the function shortcut keys may include a volume up key and a volume down key for adjusting the sound size, a fast forward key and a fast backward key for adjusting the progress of the sound file, and a control for connecting the glasses to an external device (for example, Bluetooth connection). In some embodiments, the key module may include two types of physical keys and virtual keys. For example, when the key module exists in the form of a physical key, the key may be disposed on the temple 12, the frame 11, or the temple main body 121. When the user wears the glasses in this embodiment, the key module is not in contact with human skin and is exposed on the outside to facilitate the user's wearing and operation of each key. In some embodiments, an end surface of each key in the key module may be provided with an identifier corresponding to its function. The identification may specifically include text (for example, Chinese and

English), symbols (for example, the volume plus key is marked with "+", and the volume minus key is marked with "-"). In some embodiments, the logo may be provided on the button by means of laser printing, screen printing, pad printing, laser filler, thermal sublimation, hollowed out text, or the like. In some embodiments, the label on the button may also be provided on the surface of the casing located on the peripheral side of the button, which may also serve as a label. In some embodiments, the glasses may be a touch screen, and a control program installed in the glasses may generate a virtual key on a touch screen having an interactive function. The virtual key may select a function, a volume, and a file of the player. In addition, the glasses may also be a combination of a physical display and physical keys.

In some embodiments, the functional component of the glasses may be a speaker assembly 21. The speaker module 21 may be provided with at least one key module 4d, and the key module 4d may be used for human-computer interaction. For example, implement pause / start, recording, answering calls, etc. It should be known that the key module 4d is only for the purpose of illustration. Those skilled in the art can adjust parameters such as the position, number, and shape of the key module on the basis of fully understanding the function of the key module.

In some embodiments, the key module 4d can implement different interactive functions based on the user's operation instructions. For example, clicking the key module 4d once can implement pause / start (such as music, recording, etc.); and quickly clicking the key module 4d twice, Can answer the call; click regularly (for example, click every other second, click a total of two times) to achieve the recording function. In some embodiments, the operation instruction of the user may be an operation of clicking, sliding, scrolling, or a combination thereof. For example, sliding on the surface of the key module 4d up and down to achieve the function of turning up / down the volume.

In other embodiments, the key module 4d may have at least two, and respectively correspond to the left and right two speaker components 21. The user can operate the key module 4d with his left and right hands, respectively, to improve the user experience.

In an application scenario, in order to further improve the human-computer interaction experience of the user, the functions of human-computer interaction can be assigned to the left and right key modules 4d, and the user can operate the corresponding key module 4d according to different functions. For example, corresponding to the left button module 4d: click once to turn on the recording function, and then click again to turn off the recording function; click twice quickly to implement the pause / play function. Quickly click twice on the key module 4d on the right to realize the function of answering calls (if music is playing at this time and there is no call access, you can switch to the next / previous song function).

In some embodiments, the functions corresponding to the left and right button modules 4d described above may be user-defined. For example, the user can use the application software settings to assign the pause / play function performed by the left key module 4d to the right key module 4d; or assign the call answering function performed by the right key module 4d to the left. The key module 4d is executed. In addition, the user can also set the operation instructions (for example, the number of clicks and the swipe gesture) to achieve corresponding functions through application software. For example, the operation instruction corresponding to the call answering function is set from one click to two clicks, and the operation instruction corresponding to the switch to the next / previous song function is set from two clicks to three clicks. User-defined can be more in line with the user's operating habits, to some extent, to avoid operating errors and improve user experience.

In some embodiments, the aforementioned human-computer interaction function may not be unique, but may be set according to functions commonly used by users. For example, the key module 4d can also implement functions such as rejecting calls and reading text messages by voice. Users can customize the functions and operation instructions corresponding to the functions to meet different needs.

In some embodiments, the glasses may be connected to an external device through at least one key module. For example, the glasses may be connected to the mobile phone through a button on the glasses that controls a wireless connection (for example, a button that controls a Bluetooth connection). Optionally, after the connection is established, the user can directly operate the glasses on the external device (for example, a mobile phone) to implement one or more of the functions mentioned above.

It should be noted that the above description of the glasses is only a specific example and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principles of the glasses, it is possible to make various changes in the form and details of the specific ways and steps of implementing the glasses without departing from this principle. Amendments and changes, but these amendments and changes are still within the scope described above. For example, the shape of the key may be a regular shape or an irregular shape such as a rectangle, a circle, an oval, or a triangle. As another example, the shapes of the keys may be the same or different. Such deformations are all within the protection scope of this application.

It should be noted that the above description of the glasses is only a specific example and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principles of the glasses, it is possible to make various changes in the form and details of the specific ways and steps of implementing the glasses without departing from this principle. Amendments and changes, but these amendments and changes are still within the scope described above. For example, the shape of the key may be a regular shape or an irregular shape such as a rectangle, a circle, an oval, or a triangle. As another example, the shapes of the keys may be the same or different. Such deformations are all within the protection scope of this application.

In some embodiments, the glasses further include a voice control function. FIG. 16 is a schematic diagram of a voice control module of glasses according to some embodiments of the present application. The voice control system can be used as part of the auxiliary key module, or can be integrated into the speaker device as a separate module. In some embodiments, the voice control module includes a receiving module 601, a processing module 603, a recognition module 605, and a control module 607.

The receiving module 601 may be configured to receive a voice control instruction and send the voice control instruction to the processing module 603. In some embodiments, the receiving module 601 may be one or more microphones. In some embodiments, when the receiving module 601 receives a voice control instruction issued by a user, for example, when the receiving module 601 receives a voice control instruction of "start playing", the voice control instruction is sent to the processing module 603.

The processing module 603 is communicatively connected with the receiving module 601, generates an instruction signal according to the voice control instruction, and sends the instruction signal to the identification module 605.

In some embodiments, when the processing module 603 receives a voice control instruction issued by the current user from the receiving module 601 through the communication connection, it generates an instruction signal according to the voice control instruction.

In some embodiments, the identification module 605 is communicatively connected with the processing module 603 and the control module 607, identifies whether the instruction signal matches a preset signal, and sends a matching result to the control module 607.

In some embodiments, when the identification module 605 determines that the instruction signal matches a preset signal, the identification module 605 sends the matching result to the control module 607. The control module 607 controls the operation of the speaker device according to the instruction signal. For example, when the receiving module 601 receives a voice control instruction of "start playing" and the recognition module 605 determines that the command signal corresponding to the

voice control instruction matches a preset signal, the control module 607 automatically executes the voice control instruction, that is, Start playing audio material immediately. When the instruction signal does not match the preset signal, the control module 607 may not execute the control instruction.

In some embodiments, the voice control system may further include a storage module in communication with the receiving module 601, the processing module 603, and the recognition module 605; the receiving module 601 may receive a preset voice control instruction and send it to the processing module 603; processing The module 603 generates a preset signal according to the preset voice control instruction, and sends the preset signal to the storage module.

When the identification module 605 needs to match the instruction signal received by the receiving module 601 with a preset signal, the storage module sends the preset signal to the identification module 605 through a communication connection.

In some embodiments, the processing module 603 further includes removing the ambient sound included in the voice control instruction.

In some embodiments, the processing module 603 in the voice control system in this embodiment may further include a process of denoising the voice control instructions. The denoising process refers to removing the ambient sound included in the voice control instruction. In some embodiments, for example, when in a complex environment, the receiving module 601 receives a voice control instruction and sends it to the processing module 603. Before the processing module 603 generates a corresponding instruction signal according to the voice control instruction, in order to avoid environmental sound The recognition process of the subsequent recognition module 605 interferes, and the voice control instruction is first denoised. For example, when the receiving module 601 receives a voice control instruction issued by a user while on an outdoor road, the voice control instruction includes noisy environmental sounds such as vehicles driving on the road, whistle, and the like. The processing module 602 can reduce the The effect of ambient sound on voice control instructions.

It should be noted that the above description of the voice control system is only a specific example and should not be considered as the only feasible implementation solution. Obviously, for the professionals in the field, after understanding the basic principles of the voice control system, they may make various changes in the form and details of the specific ways and steps of implementing the voice control system without departing from this principle. Amendments and changes, but these amendments and changes are still within the scope described above. For example, the receiving module 601 and the processing module 603 may be the same module. Such deformations are all within the protection scope of this application.

In some embodiments, the glasses may further include an indicator module (not shown in the figure) to display the current working status of the speaker component in the glasses. Specifically, the indicator module can emit a light signal, and by observing the light signal, the current working state of the speaker module can be obtained.

In some embodiments, the indicator light can show the power of the speaker component. For example, when the indicator light is red, it means that the power of the speaker component is not good (for example, the power is less than 5%, 10%, etc.). As another example, when the speaker device is being charged, the indicator light is blinking. As another example, when the indicator light is green, it indicates that the speaker device has sufficient power (for example, the power is 50% or more, 80% or more) In some embodiments, the color displayed by the indicator can be adjusted as needed, which is not limited herein.

Of course, it is easy to understand that the indicator light can indicate the power of the speaker device in other ways. In some embodiments, the indicator light may include a plurality of indicators, and the number of the indicator lights may indicate the current power of the speaker device. Specifically, in an application scenario, three indicators may be set. When only one indicator is on, it indicates that the power of the speaker device is insufficient and may be turned off at any time (for example, the power is between 1% and 20%). When the indicator lights only two, it indicates that the power of the speaker device is in a normal use state and can be charged (for example, the power is 21% to 70%, etc.) When the indicator lights are all on, it means that the power of the speaker device is in a full state, no charging is required, and the standby time is long (for example, the power is between 71% and 100%).

In some alternative embodiments, the indicator light may indicate the current communication status of the speaker device. For example, when the speaker device is in a communication connection with other devices (such as wifi, Bluetooth connection, etc.), the indicator light can remain blinking, or it can be displayed in other colors (such as blue).

It should be noted that the above description of the speaker device is only a specific example and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principle of the speaker device, it is possible to make various modifications in the form and details of the specific methods and steps of implementing the speaker device without departing from this principle. Changes, but these amendments and changes are still within the scope described above. For example, when the speaker device is in a charging state, the indicator light may be displayed in another color (such as purple). Such deformations are all within the protection scope of this application.

Under normal circumstances, the sound quality of the speaker component is affected by the physical properties of the components of the speaker component itself, the vibration transmission relationship between the components, the vibration transmission relationship between the speaker component and the outside world, and the efficiency of the vibration transmission system when transmitting vibration. Influencing factors. Each component part of the speaker assembly itself includes a component that generates vibration (such as, but not limited to, a transducer), a component that fixes the speaker component (such as, but not limited to, an ear hook), and a component that transmits vibration (such as, but not limited to, a movement case) Panel, vibration transmission layer, etc.). The vibration transmission relationship between the various components and the vibration transmission relationship between the speaker component and the outside world are determined by the contact manner between the speaker component and the user (such as, but not limited to, clamping force, contact area, contact shape, etc.).

For the purpose of illustration only, the relationship between the sound quality and the components of the speaker component will be further described below based on the bone conduction speaker component. What needs to be known is that the content described below can also be applied to the air-conducted speaker component without violating the principle.

FIG. 17 is an equivalent model of a vibration generating and transmitting system of a speaker assembly according to some embodiments of the present application. As shown in FIG. 17, it includes a fixed end 1101, a sensing terminal 1102, a vibration unit 1103, and a transducing device 1104. Among them, the fixed end 1101 is connected to the vibration unit 1103 through a transmission relationship K1 (k_{41} in FIG. 17), and the sensing terminal 1102 is connected to the vibration unit 1103 through a transmission relationship K2 (k_3, k_5 in FIG. 17), and the vibration unit 1103 is connected through The transfer relationship K3 (R_4, k_5 in FIG. 17) is connected to the transducing device 1104.

The vibration unit referred to here is a movement case, and the transmission relationships K1, K2, and K3 are descriptions of the functional relationships between the corresponding parts of the speaker system equivalent system (which will be described in detail below). The vibration equation of an equivalent system can be expressed as:

$$m_3 \ddot{x}_3 + R_3 \dot{x}_3 + R_4 \dot{x}_4 + (k_3 + k_4) x_3 + k_5 (x_3 - x_4) = f_3(t)$$

$$m_4 \ddot{x}_4 + R_4 \dot{x}_4 + k_5 (x_3 - x_4) = f_4(t)$$

Among them, m_3 is the equivalent mass of the vibration unit 1103, m_4 is the equivalent mass of the transducer 1104, x_3 is the equivalent displacement of the vibration unit 1103, x_4 is the equivalent displacement of the transducer 1104, and k_3 is the equivalent elastic coefficient between the sensing terminal 1102 and the vibration unit 1103, k_4 is the equivalent elastic coefficient between the fixed end 1101 and the vibration unit 1103, and k_5 is the equivalent between the transducer 1104 and the vibration unit 1103. Effective elastic coefficient, R_3 is the equivalent damping between the sensing terminal 1102 and the vibration unit 1103, R_4 is the equivalent damping between the transducer 1104 and the vibration unit 1103, and f_3 and f_4 are the vibration unit 1103, respectively. Interaction force with the transducing device 1104. The equivalent amplitude A_3 of the vibration unit in the system is:

$$A_3 = -\frac{m_4 \omega^2}{(m_3 \omega^2 + j\omega R_3 - (k_3 + k_4 + k_5))(m_4 \omega^2 + j\omega R_4 - k_5) - k_5(k_3 - j\omega R_4)} \cdot f_0 \quad (3)$$

Among them, f_0 represents a unit driving force, and ω represents a vibration frequency. It can be seen that the factors that affect the frequency response of the bone conduction speaker component include the vibration generating part (such as, but not limited to, the vibration unit, the transducing device, the housing, and the interconnection method, such as m_3 , m_4 , k in formula (3), R_3 , R_4 , etc.), the vibration transmitting portion (e.g., but not limited to, skin-contact manner, earhook attributes, as shown in equation (3), k_3 , k_4 , R_3 , etc.). Change the structure of each component of the speaker module and the parameters of the connection between the components, for example, changing the size of the clamping force is equivalent to changing the size of k_4 , changing the bonding method of the glue is equivalent to changing the size of R_4 and k_5 . Changing the hardness, elasticity, and damping of the related materials is equivalent to changing the size of k_3 and R_3 , which can change the frequency response and sound quality of the bone conduction speaker components.

In a specific embodiment, the fixed end 1101 may be a relatively fixed point or a relatively fixed position (for example, an ear hook) of the bone conduction speaker assembly during vibration, and these points or areas may be regarded as bone conduction. The fixed end of the speaker assembly during vibration. The fixed end may be composed of specific components, or may be a position determined according to the overall structure of the bone conduction speaker assembly. For example, the bone conduction speaker component can be hung, bonded, or adsorbed near the human ear by a specific device, or the structure and shape of the bone conduction speaker component can be designed so that the bone conduction site can be attached to the human skin.

The sensing terminal 1102 is a hearing system for the human body to receive sound signals. The vibration unit 1103 is a part of the bone conduction speaker assembly for protecting, supporting, and connecting a transducing device, and includes a vibration transmission layer or panel that transmits vibration to a user. Parts that come into direct or indirect contact with the user, and housings that protect and support other vibration-generating components. The transducing device 1104 is a sound vibration generating device, and may be one or a combination of the transducing devices discussed above.

The transmission relationship K1 is connected to the fixed end 1101 and the vibration unit 1103, and represents the vibration transmission relationship between the vibration generating part and the fixed end of the bone conduction speaker assembly during operation. K1 depends on the shape and structure of the bone conduction device. For example, the bone conduction speaker component can be fixed to the human head in the form of a U-shaped headphone holder / headphone strap, or it can be installed on a helmet, fire mask or other special-purpose masks, glasses and other equipment. Different bone conduction speakers are used. The shape and structure of the acoustic component will affect the vibration transmission relationship K1. Furthermore, the structure of the speaker component also includes physical properties such as the composition material and quality of different parts of the bone conduction speaker component. The transmission relationship K2 connects the sensing terminal 402 and the vibration unit 1103.

K2 depends on the composition of the transmission system including, but not limited to, transmitting sound vibrations to the hearing system through user tissues. For example, when sound is transmitted to the hearing system through the skin, subcutaneous tissue, bones, etc., the physical properties of different human tissues and their interconnections will affect K2. Further, the vibration unit 1103 is in contact with human tissue. In different embodiments, the contact surface on the vibration unit may be a vibration transmission layer or a side of the panel. The surface shape, size, and interaction between the contact surface and the human tissue force and so on will affect the transmission coefficient K2.

The transmission relationship K3 of the vibration unit 1103 and the transducing device 1104 is determined by the internal connection properties of the bone conduction speaker component vibration generating device. The transducing device and the vibrating unit are connected in a rigid or elastic manner, or the connection is changed between the transducing device and the transducing device. The relative position between the vibration units will change the transmission efficiency of the transducer to the vibration unit, especially the transmission efficiency of the panel, thereby affecting the transmission relationship K3.

During the use of the bone conduction speaker module, the sound generation and transmission process will affect the sound quality felt by the final human body. For example, the above-mentioned fixed end, human sensory terminal, vibration unit, transducing device, and transmission relations K1, K2, and K3, etc. may all affect the sound quality of the bone conduction speaker component. It should be noted that K1, K2, and K3 are only a representation of the connection modes of different device parts or systems involved in the vibration transmission process, and can include, but are not limited to, physical connection methods, force transmission methods, and sound transmission efficiency. Wait.

The above description of the bone conduction speaker assembly equivalent system is just a specific example and should not be considered as the only feasible implementation. Obviously, for those skilled in the art, after understanding the basic principles of bone conduction speaker components, it is possible to form specific methods and steps that affect the vibration transmission of bone conduction speaker components without departing from this principle. And various modifications and changes in details, but these modifications and changes are still within the scope of the above description. For example, K1, K2, and K3 described above may be a simple vibration or mechanical transmission mode, or may include a complex non-linear transmission system. The transmission relationship may be formed by directly connecting the various parts, or it may be performed in a non-contact manner. transfer.

FIG. 18 is a structural diagram of a composite vibration device of a speaker assembly according to an embodiment of the present application.

In some embodiments, a composite vibration device is further provided on the glasses. In some embodiments, the composite vibration device may be part of a transducing device. In some embodiments, the composite vibration device in FIG. 18 may be a vibration portion that provides sound inside the headphone core. Specifically, the composite vibration device in the embodiment of the present application is equivalent to the specific embodiment of the transmission relationship K3 of the vibration unit 1103 and the transducing device 1104 in FIG. 17. An embodiment of a composite vibration device of a speaker assembly is shown in FIG. 18 and FIG. 19. A vibration transmitting plate 1801 and a vibration plate 1802 form a composite vibration device. The vibration transmitting plate 1801 is provided as a first annular body 1813, and the first ring body is provided with three first supporting rods 1814 which are radiated toward the center, and the position of the radiating center is fixed to the center of the vibration plate 1802. The center of the vibration plate 1802 is a groove 1820 matching the center of the spoke and the first support rod. The vibration plate 1802 is provided with a second annular body 1821 having a radius different from that of the vibration transmitting plate 1801, and three second struts 1822 different in thickness from the first strut 1814. The first rod 1814 and the second rod 1822 are staggered, and may be, but not limited to, an angle of 60 degrees.

Both the first and second poles can be straight rods or other shapes that meet specific requirements. The number of poles can be set to two or more, and symmetrical or asymmetrical arrangements are used to meet economic and practical effects. Requirements. The vibration transmitting plate 1801 has a thin thickness and can increase elastic force. The vibration transmitting plate 1801 is clamped in the center of the groove 1820 of the vibration plate 1802. A voice coil 1806 is attached to the lower side of the second annular body 1821 of the vibration plate 1802. The composite vibration device further includes a bottom plate 1812 on which an annular magnet 1810 is disposed, and an inner magnet 1811 is concentrically disposed in the annular magnet 1810. An inner magnetic plate 1809 is provided on the top surface of the inner magnet 1811, and a ring magnetic plate 1807 is provided on the ring magnet 1810. A washer 1806 is fixedly disposed above the ring magnetic plate 1807. The first annular body 1813 of the vibration transmitting plate 1801 is fixedly connected to the washer 1806. The entire composite vibration device is connected to the outside through a panel 1830. The panel 1830 is fixedly connected to the center of the convergence of the vibration transmitting plate 1801, and is fixed to the center of the vibration transmitting plate 1801 and the vibration plate 1802. By using the composite vibration device composed of the vibration plate and the vibration transmitting plate, a frequency response as shown in FIG. 20 can be obtained, and two resonance peaks are generated. By adjusting parameters such as the size and material of the two components, the resonance peaks can be caused to appear at different positions, for example, the low-frequency resonance peaks can appear at a lower-frequency moving position, and / or the high-frequency resonance peaks can appear at more High frequency location. Preferably, the stiffness coefficient of the vibration plate is greater than the stiffness coefficient of the vibration transmitting plate, the vibration plate generates a high frequency resonance peak among the two resonance peaks, and the vibration transmission plate generates a low frequency resonance peak among the two resonance peaks. The range of these resonance peaks may be set within or outside the frequency range of sounds audible by the human ear. Preferably, neither of the resonance peaks is within the frequency range of sounds audible by the human ear; more preferably, one resonance peak is within the frequency range of the sound audible by the human ear, and the other resonance peak is outside the frequency range of the sound audible by the human ear; more preferably, both resonance peaks are audible by the human ear Within the frequency range of the sound; and even more preferably, both resonance peaks are within the frequency range of the sound audible to the human ear, and their peak frequencies are between 80 Hz and 18000 Hz; even more preferably, two The resonance peaks are both in the frequency range of the sound that can be heard by the human ear, and its peak value is between 200Hz-15000Hz; even more preferably, both resonance peaks are in the frequency range of the sound that can be reached by the human ear, and its The peak value is between 500 Hz and 12000 Hz; even more preferably, both resonance peaks are in the frequency range of the sound accessible to the human ear, and the peak value is between 900 Hz and 11000 Hz. The frequency of the peaks of the resonance peaks should preferably have a certain difference, for example, the peaks of the two resonance peaks differ by at least 500 Hz; preferably, the peaks of the two resonance peaks differ by at least 1000 Hz; even more preferably, the peaks of the two resonance peaks differ At least 2000 Hz; even more preferably, the peaks of the two resonance peaks differ by at least 5000 Hz. In order to achieve better results, both resonance peaks can be within the audible range of the human ear, and the peak frequencies of the resonance peaks differ by at least 500 Hz; preferably, both resonance peaks can be within the audible range of the human ear. The peaks of the two resonance peaks differ by at least 1000 Hz; still further preferably, the two resonance peaks may both be within the audible range of the human ear, and the peaks of the two resonance peaks differ by at least 2000 Hz; and still further preferably, the two resonance peaks Both can be within the audible range of the human ear, and the peaks of the two resonance peaks differ by at least 3000 Hz; it can be further preferred that both resonance peaks can be within the audible range of the human ear, and the peaks of the two resonance peaks differ At least 4000Hz. One of the two resonance peaks can be within the audible range of the human ear and the other is outside the audible range of the human ear, and the peak frequencies of the two resonance peaks differ by at least 500 Hz; preferably, one resonance peak is audible in the human ear Within the range, the other is outside the audible range of the human ear, and the peak frequencies of the two resonance peaks differ by at least 1000 Hz; more preferably, one of the resonance peaks is within the audible range of the human ear, and the other is audible by the human ear Outside the range, and the peak frequencies of the two resonance peaks differ by at least 2000 Hz; further preferably, one resonance peak is within the audible range of the human ear, the other is outside the audible range of the human ear, and the peak values of the two resonance peaks The frequencies differ by at least 3000 Hz; even more preferably, one resonance peak is within the audible range of the human ear and the other is outside the audible range of the human ear, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 5Hz-30000Hz, and the peak frequencies of the two resonance peaks differ by at least 400Hz; preferably, both resonance peaks can be between 5Hz-30000Hz, and the peaks of the two resonance peaks The frequency difference is at least 1000 Hz; more preferably, the two resonance peaks may be between 5 Hz and 30 000 Hz, and the peak frequency of the two resonance peaks may be at least 2000 Hz; further preferably, the two resonance peaks may both be at a frequency of 5 Hz to 30 000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; further preferably, the two resonance peaks may both be between 5 Hz and 30000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 20Hz-20000Hz, and the peak frequencies of the two resonance peaks differ by at least 400Hz; preferably, both resonance peaks can be between 20Hz-20000Hz, and the peaks of the two resonance peaks The frequency difference is at least 1000 Hz; more preferably, the two resonance peaks may be between 20 Hz and 20,000 Hz, and the peak frequency of the two resonance peaks may be at least 2000 Hz; further preferably, the two resonance peaks may be at a frequency of 20 Hz to 20,000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; even more preferably, the two resonance peaks may both be between 20 Hz and 20,000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 100Hz-18000Hz, and the peak frequencies of the two resonance peaks differ by at least 400Hz; preferably, both resonance peaks can be between 100Hz-18000Hz, and the peaks of the two resonance peaks The frequency difference is at least 1000 Hz; more preferably, the two resonance peaks may be between 100 Hz and 18000 Hz, and the peak frequency of the two resonance peaks may be at least 2000 Hz; further preferably, the two resonance peaks may be at a frequency of 100 Hz to 18000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; further preferably, the two resonance peaks may both be between 100 Hz and 18000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 200Hz-12000Hz, and the peak frequencies of the two resonance peaks differ by at least 400Hz; preferably, both resonance peaks can be between 200Hz-12000Hz, and the peaks of the two resonance peaks The frequencies differ by at least 1000 Hz; more preferably, the two resonance peaks can be between 200 Hz and 12,000 Hz, and the peak frequencies of the two resonance peaks can differ by at least 2000 Hz; further preferably, both resonance peaks can be between 200 Hz and 12000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; even more preferably, the two resonance peaks may both be between 200 Hz and 12000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. Both resonance peaks can be between 500Hz-10000Hz, and the peak frequencies of the two resonance peaks are at least 400Hz different; preferably, both resonance peaks can be between 500Hz-10000Hz, and the peaks of the two resonance peaks The frequency difference is at least 1000 Hz; more preferably, the two resonance peaks may be between 500 Hz and 10000 Hz, and the peak frequency of the two resonance peaks may be at least 2000 Hz; further preferably, both resonance peaks may be between 500 Hz and 10000 Hz. Between, and the peak frequencies of the two resonance peaks differ by at least 3000 Hz; even more preferably, the two resonance peaks may both be between 500 Hz and 10000 Hz, and the peak frequencies of the two resonance peaks differ by at least 4000 Hz. In this way, the resonance response range of the speaker component is widened, and the sound quality that satisfies the conditions is obtained. It is worth noting that in the actual use process, multiple vibrating plates and vibration plates can be set to form a multi-layer vibration structure, which respectively correspond to different frequency response ranges to achieve full-range full-frequency response and high-quality speaker assembly vibration. Or make the frequency response curve meet the requirements in some specific frequency ranges. For example, in a bone conduction hearing aid, in order to meet normal hearing requirements, a transducing device composed of one or more vibration plates and vibration transmitting plates with a resonance frequency in the range of 100 Hz to 10000 Hz may be selected. The description of the composite vibration device composed of a vibration plate and a vibration transmitting plate appears in the Chinese Patent Application No. 201110438083.9 filed on December 23, 2011 and entitled "A Bone Conduction Speaker and Composite Vibration Device" This patent document is incorporated herein by reference in its entirety.

21 is a structural diagram of a composite vibration device of a speaker component in glasses provided by some embodiments of the present application. In another embodiment, as shown in FIG. 20, the composite vibration device of the speaker assembly includes a vibration plate 2002, a first vibration transmitting piece 2003 and a second vibration transmitting piece 2001. The first vibration transmitting plate 2003 fixes the vibration plate 2002 and the second vibration transmitting plate 2001 on the housing 2019. The composite vibration device composed of the vibration plate 2002, the first vibration transmitting plate 2003 and the second vibration transmitting

plate 2001 can generate a lot of At the two resonance peaks, a flatter frequency response curve is generated in the audible range of the hearing system, thereby improving the sound quality of the speaker component.

The number of resonance peaks generated in the triple compound vibration system of the first vibration transmitting plate is greater than that of the composite vibration system without the first vibration transmitting plate. Preferably, the triple compound vibration system can generate at least three resonance peaks, more preferably, at least one resonance peak is not within the range audible to the human ear; more preferably, all resonance peaks are audible to the human ear. It is further preferred that the resonance peaks are all within the range audible to the human ear, and its peak frequency is not higher than 18000 Hz; even more preferably, the resonance peaks are all within the audible range of the human ear. Within the frequency range, and its peak value is between 100 Hz and 15000 Hz; even more preferably, the resonance peaks are all within the frequency range of the sound accessible to the human ear, and its peak value is between 200 Hz and 12000 Hz; even more preferably, the resonance peaks are all in the frequency range of the sound that can be reached by the human ear, and their peaks are between 500Hz-11000Hz. The frequency of the peaks of the resonance peaks should preferably have a certain difference, for example, the peaks of at least two resonance peaks differ by at least 200 Hz; preferably, the peaks of at least two resonance peaks differ by at least 500 Hz; more preferably, at least two The peaks of the resonance peaks differ by at least 1000 Hz; still further preferably, the peaks of at least two resonance peaks differ by at least 2000 Hz; still more preferably, the peaks of at least two resonance peaks differ by at least 5000 Hz. In order to achieve a better effect, the resonance peaks can both be within the audible range of the human ear, and the peak frequencies of at least two resonance peaks have a difference of at least 500 Hz; preferably, the resonance peaks can both be within the audible range of the human ear. The peaks of at least two resonance peaks have a difference of at least 1000 Hz; more preferably, the resonance peaks can both be within the audible range of the human ear, and the peaks of at least two resonance peaks have a difference of at least 1000 Hz; even more preferably, the resonance peaks can be both Within the audible range of the human ear, the peaks of at least two resonance peaks differ by at least 2000 Hz; and even more preferably, the resonance peaks may both be within the audible range of the human ear, and the peaks of at least two resonance peaks differ by at least 3000 Hz; it may be even further preferred that the resonance peaks may all be within the audible range of the human ear, and the peaks of at least two resonance peaks differ by at least 4000 Hz. Two of the resonance peaks may be within the audible range of the human ear, and the other is outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 500 Hz; preferably, the two resonance peaks are in the human ear. Within the audible range of the ear, another resonance peak is outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 1000 Hz; more preferably, the two resonance peaks are within the audible range of the human ear, The other is outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 2000 Hz; further preferably, the two resonance peaks are within the audible range of the human ear, and the other is audible by the human ear Outside the range, and there are at least two resonance peaks with a peak frequency difference of at least 3000 Hz; even more preferably, the two resonance peaks are within the audible range of the human ear, and the other is outside the audible range of the human ear, and at least The peak frequencies of the two resonance peaks differ by at least 4000 Hz. One of the resonance peaks can be within the audible range of the human ear, the other two are outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 500 Hz, preferably, one resonance peak is in the human ear Within the audible range, the other two resonance peaks are outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 1000 Hz; more preferably, one resonance peak is within the audible range of the human ear. The other two are outside the audible range of the human ear, and the peak frequencies of at least two resonance peaks differ by at least 2000 Hz; further preferably, one of the resonance peaks is within the audible range of the human ear, and the other two are audible by the human ear Outside the range, and there are at least two resonance peaks with a peak frequency difference of at least 3000 Hz; even more preferably, one resonance peak is within the audible range of the human ear, and the other two are outside the audible range of the human ear, and at least The peak frequencies of the two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 5Hz-30000Hz, and the peak frequencies of at least two resonance peaks are different by at least 400Hz; preferably, the resonance peaks can be both between 5Hz-30000Hz, and there must be at least two resonance peaks. The frequency difference is at least 1000 Hz; more preferably, the resonance peaks can both be between 5 Hz and 30 000 Hz, and the peak frequencies of at least two resonance peaks can be at least 2000 Hz; further preferably, the resonance peaks can be both between 5 Hz and 30 000 Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may both be between 5 Hz and 30000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 20Hz-20000Hz, and the peak frequencies of at least two resonance peaks differ by at least 400Hz; preferably, the resonance peaks can be both between 20Hz-20000Hz, and the peaks of at least two resonance peaks exist. The frequency difference is at least 1000Hz; more preferably, the resonance peaks can be both between 20Hz-20000Hz, and the peak frequencies of at least two resonance peaks can be at least 2000Hz different; further preferably, the resonance peaks can be both between 20Hz-20000Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may both be between 20 Hz and 20,000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 100 Hz and 18000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 400 Hz. Preferably, the resonance peaks can be both between 100 Hz and 18000 Hz, and there must be at least two resonance peaks. The frequency difference is at least 1000 Hz; more preferably, the resonance peaks can all be between 100 Hz and 18000 Hz, and the peak frequencies of at least two resonance peaks can be at least 2000 Hz; further preferably, the resonance peaks can be both between 100 Hz and 18000 Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may all be between 100 Hz and 18000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 200Hz-12000Hz, and the peak frequencies of at least two resonance peaks differ by at least 400Hz; preferably, the resonance peaks can all be between 200Hz-12000Hz, and there must be at least two resonance peaks. The frequency difference is at least 1000 Hz; more preferably, the resonance peaks may be between 200 Hz and 12,000 Hz, and the peak frequencies of at least two resonance peaks may be at least 2000 Hz; further preferably, the resonance peaks may be between 200 Hz and 12000 Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may all be between 200 Hz and 12000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. The resonance peaks can all be between 500Hz and 10000Hz, and the peak frequencies of at least two resonance peaks differ by at least 400Hz; preferably, the resonance peaks can be both between 500Hz and 10000Hz, and there are at least two resonance peaks. The frequency difference is at least 1000 Hz; more preferably, the resonance peaks may be between 500 Hz and 10000 Hz, and the peak frequencies of at least two resonance peaks may be at least 2000 Hz; further preferably, the resonance peaks may be between 500 Hz and 10000 Hz. And the peak frequencies of at least two resonance peaks differ by at least 3000 Hz; even more preferably, the resonance peaks may all be between 500 Hz and 10000 Hz, and the peak frequencies of at least two resonance peaks differ by at least 4000 Hz. In one embodiment, by using a triple compound vibration system composed of a vibration plate, a first vibration transmitting plate, and a second vibration transmitting plate, the frequency response shown in FIG. 25 can be obtained, and three distinct resonance peaks can be generated. The sensitivity of the speaker component's frequency response in the low frequency range (about 600 Hz) is greatly improved, and the sound quality is improved.

By changing parameters such as the size and material of the first vibration transmitting plate, the resonance peak can be moved, and finally a more ideal frequency response can be obtained. Preferably, the first vibration transmitting sheet is an elastic sheet. The elasticity is determined by various aspects such as the material, thickness, and structure of the first vibration transmitting plate. The material of the first vibration transmitting plate, such as, but not limited to, steel (such as, but not limited to, stainless steel, carbon steel, etc.), light alloy (such as, but not limited to, aluminum alloy, beryllium copper, magnesium alloy, titanium alloy, etc.), plastic (Such as, but not limited to, high-molecular polyethylene, blown nylon, engineering plastics, etc.), or other single or composite materials that can achieve the same performance. For composite materials, such as but not limited to glass fiber, carbon fiber, boron fiber, graphite fiber, graphene fiber, silicon carbide fiber, or aramid fiber, and other reinforcing materials, it can also be a composite of other organic and / or inorganic materials, such as glass Fiber-reinforced unsaturated polyester, epoxy resin or phenolic resin matrix. The thickness of the first vibration transmitting plate is not less than 0.005mm, preferably, the thickness is 0.005mm-3mm, more preferably, the thickness is 0.01mm-2mm, even more preferably, the thickness is 0.01mm-1mm, and even more preferably, the thickness is 0.02mm-0.5mm. The structure of the first vibration transmitting plate may be set in a ring shape, preferably, it includes at least one ring, preferably, it includes at least two rings, which may be concentric rings

or non-concentric rings. At least two struts are connected, and the struts radiate from the outer ring to the center of the inner ring, further preferably including at least one elliptical ring, further preferably including at least two elliptical rings, and different elliptical rings have different curvatures. Radius, the rings are connected by a support rod, and further preferably, the first vibration transmitting plate includes at least one square ring. The structure of the first vibration transmitting sheet may also be set in a sheet shape. Preferably, a hollow pattern is provided on the top, and the area of the hollow pattern is not smaller than the area without the hollow. In the above description, materials, thicknesses, and structures can be combined into different vibration-transmitting sheets. For example, the ring-shaped vibration transmitting plate has different thickness distributions. Preferably, the thickness of the support rod is equal to the thickness of the ring. Further preferably, the thickness of the support rod is greater than the thickness of the ring. More preferably, the thickness of the inner ring is greater than the thickness of the outer ring.

In the present application, specific embodiments of the vibration plate, the first vibration transmitting sheet, and the second vibration transmitting sheet are also disclosed for the above contents. FIG. 25 is a speaker in an MP3 player provided according to some embodiments of the present application. Structural drawing of the vibration generating part of the component. As shown in FIG. 25, the energy conversion device includes a magnetic circuit system composed of a magnetically permeable plate 2210, a magnet 2211, and a magnetically permeable plate 2212, a vibration plate 2214, a coil 2215, a first vibration transmitting plate 2216, and a second vibration transmitting plate 2217. The panel 2213 (that is, the side of the movement case that is close to the user) protrudes the housing 2219, and is bonded to the vibration plate 2214 by glue. The first vibration transmitting plate 2216 connects and fixes the transducer to the housing 2219 to form a suspension structure.

During the operation of the speaker module, the triple vibration system composed of the vibration plate 2214, the first vibration transmitting plate 2216, and the second vibration transmitting plate 2217 can generate a flatter frequency response curve, thereby improving the sound quality of the speaker module. The first vibration transmitting plate 2216 elastically connects the transducing device to the housing 2219, which can reduce the vibration transmitted from the transducing device to the housing, thereby effectively reducing the sound leakage caused by the vibration of the housing, and reducing the vibration of the housing. The effect of sound component sound quality. Figure 25 shows the response curves of the vibration intensity of the casing and the vibration intensity of the panel with frequency. Among them, the thick line shows the frequency response of the vibration generating portion after the first vibration transmitting plate 2216 is used, and the thin line shows the frequency response of the vibration generating portion after the first vibration transmitting plate 2216 is not used. It can be seen that in the frequency range above 500 Hz, the vibration of the housing of the speaker module without the first vibration transmitting plate 2216 is significantly greater than the vibration of the housing of the speaker module containing the first vibration transmitting plate 2216. FIG. 25 shows a comparison of sound leakage in the case where the first vibration transmitting plate 2216 is included and the case where the first vibration transmitting plate 2216 is not included. Wherein, the leakage sound of the device containing the first vibration transmitting plate 2216 in the intermediate frequency (for example, about 1000 Hz) is smaller than the leakage sound of the device without the first vibration transmitting plate 2216 in the corresponding frequency range. It can be seen that after the first vibration transmitting plate is used between the panel and the casing, the vibration of the casing can be effectively reduced, thereby reducing the sound leakage. In some embodiments, the first vibration transmitting plate may include, but is not limited to, stainless steel, beryllium copper, plastic, and polycarbonate materials, and the thickness is in the range of 0.01 mm-1 mm.

It should be noted that the above description of the vibration mechanism is only a specific example and should not be regarded as the only feasible implementation solution. Obviously, for those skilled in the art, after understanding the basic principles of the vibration mechanism, it is possible to make various modifications in the form and details of the specific ways and steps of implementing the vibration mechanism without departing from this principle. Changes, but these amendments and changes are still within the scope described above. For example, the first vibration transmitting plate is not limited to the one or two rings described above, and the number may be two or more. For another example, the shapes of the plurality of components of the first vibration transmitting plate may be the same or different (the components include a circular ring and a square ring). Such deformations are all within the protection scope of this application.

26A and 26B are schematic diagrams showing the structure of a spectacle speaker assembly movement according to some embodiments of the present application. In some embodiments, the speaker assembly 21 includes a housing 210 (ie, a movement case), a vibration panel 221 and a transducing device 22. In some embodiments, the transducing device 22 is housed inside the housing 210 and generates vibration. The vibration of the energy conversion device 22 will cause the housing 210 to vibrate, and thereby the air outside the housing will be vibrated to generate a sound leakage. At least one sound guiding hole 230 is formed in at least a part of the casing 210, and the sound guiding hole 230 is used to lead the sound waves in the casing formed by the air vibration inside the casing 210 to the outside of the casing 210, and the leakage of the sound waves caused by the vibration of the outer shell 210 pushing the air outside the shell interferes. In some embodiments, the interference may reduce the amplitude of the leaky sound wave.

The vibration panel 221 is fixedly connected to the energy conversion device 22, and is synchronously vibrated by the energy conversion device 22. The vibration panel 221 protrudes from the housing 210 through the opening of the housing 210, and at least partially fits the human skin. The vibration is transmitted to the auditory nerve through human tissues and bones, thereby enabling people to hear sound. The transducing device 22 and the housing 210 may be connected by a connecting member 23, and the connecting member 23 positions the transducing device 22 in the housing 210.

The connecting member 23 may be one or more independent components, and may also be provided integrally with the transducing device 22 or the housing 210. In some embodiments, in order to reduce the constraint on vibration, the connecting member 23 may be made of an elastic material.

In some embodiments, the sound introduction hole 230 may be provided at an upper portion of the side wall height, for example, a portion from the top (the panel 221) to the 1/3 height in the side wall height direction.

Taking a cylindrical casing as an example, for the installation position, according to different requirements, the sound introduction hole 230 may be opened in a side wall 211 and / or a bottom wall 212 of the casing. Preferably, the sound introduction hole 230 is opened in an upper part and / or a lower part of the casing side wall 211. The number of sound introduction holes provided in the side wall 211 of the housing may be at least two, and preferably, they are uniformly distributed in a circular circumferential direction. The number of sound introduction holes provided in the bottom wall 212 of the housing may be at least two, and the center of the bottom wall is a circle center, and is uniformly distributed in a ring shape. The sound introduction holes distributed in a ring shape may be provided at least one circle. There may be only one sound induction hole provided in the bottom wall 212 of the housing, and the sound induction hole is disposed at the center of the bottom wall 212.

As for the number, there may be one or more sound guiding holes, preferably a plurality of sound holes, and they are evenly arranged. For ring-shaped sounding holes, the number of sounding holes per circle can be, for example, 6-8.

The shape of the sound introduction hole can be circular, oval, rectangular, or long. A long bar generally refers to a bar shape along a straight line, curve or arc. The sound introduction holes of various shapes may be the same or different on a speaker component.

In some embodiments, a penetrating sound introduction hole 230 is formed in a lower portion of the sidewall of the housing 210 (a portion from the height of the sidewall in the height direction from the 2/3 to the bottom). The number of the sound introduction holes 230 may be, for example, eight, and the shape may be, for example, a rectangle. Each sound introduction hole 230 is uniformly distributed on the side wall of the casing 210 in a ring shape.

In some embodiments, the casing 210 is cylindrical, and a sound guide hole 230 is formed in a middle portion of the sidewall of the casing 210 (a portion in the height direction of the sidewall from 1/3 to 2/3 height). The number of the sound introduction holes 230 may be, for example, eight, and the shape may be, for example, a rectangle. Each sound introduction hole 230 is uniformly distributed on the side wall of the casing 210 in a ring shape.

In some embodiments, a penetrating sound introduction hole 230 is provided in the circumferential direction of the bottom wall of the housing 210. The number of the sound introduction holes 230 may be, for example, eight, and the shape may be, for example, a rectangle. Each sound introduction hole 230 is uniformly distributed on the side wall of the casing 210 in a ring shape.

In some embodiments, penetrating sound introduction holes 230 are respectively formed in upper and lower sides of the side wall of the housing 210. The sound introduction holes 230 are evenly distributed in the upper part and the lower part of the side wall of the casing 210 in a ring shape, and the number of sound introduction holes 230 per circle is eight. In addition, the sound introduction holes 230 provided at the upper and lower portions are symmetrically disposed with respect to the middle section of the casing 210. The shape of each sound introduction hole 230 is circular.

In some embodiments, penetrating sound introduction holes 230 are respectively formed in the upper and lower portions of the side wall of the casing 210 and the bottom wall of the casing 210. The sound introduction holes 230 formed on the side wall are uniformly distributed in a ring shape at the upper and lower portions of the side wall of the housing 210, and the number of the sound introduction holes 230 in each circle is symmetrical with respect to the middle section of the housing 210. Each sound introduction hole 230 opened on the side wall is rectangular. The shape of the sound introduction holes 230 formed on the bottom wall is an elongated shape arranged along an arc, the number of which is four, and the shape is uniformly distributed in a ring shape with the center of the bottom wall as the circle center. The sound introduction hole 230 opened on the bottom wall also includes a circular through hole opened at the center.

In some embodiments, through sound guide holes 230 are opened in the upper part of the side wall of the housing 210, and are uniformly distributed in a ring shape on the upper part of the side wall of the housing 10, for example, the number of the sound guide holes 230 is circular.

In some embodiments, in order to show a better effect of suppressing sound leakage, sound induction holes 230 are uniformly distributed in the upper, middle and lower sides of the side wall 11, respectively, and a circle of sound guides is also provided in the bottom wall 212 of the housing 210 in the circumferential direction. Sound hole 230. The pore size and the number of holes of each sound introduction hole 230 are the same.

In some embodiments, the sound guiding hole 230 may be an unobstructed through hole.

In order to control the effect of the sound wave propagating from the sound introduction hole 230 in the shell, a damping layer (not shown in the description of the specification) can be provided at the opening of the sound introduction hole 230 to adjust the phase and amplitude of the sound wave, thereby correcting the guidance. The effect of sound waves inside the shell. There are many ways to choose and set the material of the damping layer. For example, the damping layer is made of tuning paper, tuning cotton, non-woven fabric, silk, cotton, sponge, or rubber, which has a certain damping effect on sound quality transmission. A damping layer is attached to the inner wall of the sound introduction hole 230, or a damping layer is covered on the outside of the opening of the sound introduction hole 230.

In some embodiments, the corresponding damping layers may be set to have the same phase difference between different sound-inducing holes 230 between different sound-inducing holes to suppress leakage sound at the same wavelength, or may be set differently. The sound introduction holes 230 have different phase differences between them to suppress leakage sounds of different wavelengths (that is, leakage sounds in a specific band).

In some embodiments, different parts of the same sound introduction hole 230 are set to have the same phase (for example, using a pre-designed step or step-shaped damping layer) to suppress leakage sound waves of the same wavelength; or, Different parts of the same sound introduction hole 230 are set to have different phases to suppress leaky sound waves of different wavelengths.

The transducer 22 not only drives the vibration panel 221 to vibrate, but also the transducer 22 itself is a vibration source, which is housed inside the housing 210. The surface vibration of the transducer 22 causes the air in the housing to vibrate accordingly, and the sound waves formed are in the housing. Inside 210, it can be called sound in the shell. The vibration panel 221 and the energy conversion device 22 are positioned on the housing 210 through the connecting member 23, which inevitably applies vibration to the housing 210 and drives the housing 210 to vibrate synchronously. Therefore, the housing 210 pushes the vibration of the air outside the housing to form a sound leakage sound wave. Leaked sound waves propagate outward, forming a leaked sound.

According to the following formula to determine the position of the sound hole to suppress leakage, the reduction in leakage is proportional to:

$$\left(\iint_{S_{\text{opening}}} P_{ds} - \iint_{S_{\text{shell}}} P_{ds} \right) \quad (4)$$

Among them, the S_{opening} is the opening area of the sound hole, and the S_{shell} is the area of the S_{shell} that does not contact the human face.

Pressure inside the shell:

$$P = P_a + P_b + P_c + P_e, \quad (5)$$

P_a , P_b , P_c , and P_e are the sound pressures generated by the a-plane, b-plane, c-plane, and e-plane at any point in the shell space.

$$P_a(x, y, z) = -j\omega\rho_0 \iint_{S_a} W_a(x'_a, y'_a) \cdot \frac{e^{jKR(x_a, y_a, z)}}{4\pi R(x_a, y_a, z)} dx'_a dy'_a - P_{a \text{ in}} \quad (6)$$

$$P_b(x, y, z) = -j\omega\rho_0 \iint_{S_b} W_b(x'_b, y'_b) \cdot \frac{e^{jKR(x_b, y_b, z)}}{4\pi R(x_b, y_b, z)} dx'_b dy'_b - P_{b \text{ in}} \quad (7)$$

$$P_c(x, y, z) = -j\omega\rho_0 \iint_{S_c} W_c(x'_c, y'_c) \cdot \frac{e^{jKR(x_c, y_c, z)}}{4\pi R(x_c, y_c, z)} dx'_c dy'_c - P_{c \text{ in}} \quad (8)$$

$$P_e(x, y, z) = -j\omega\rho_0 \iint_{S_e} W_e(x'_e, y'_e) \cdot \frac{e^{jKR(x_e, y_e, z)}}{4\pi R(x_e, y_e, z)} dx'_e dy'_e - P_{e \text{ in}} \quad (9)$$

among them,

$$R(x', y') = \sqrt{(x - x')^2 + (y - y')^2 + z^2}.$$

An observation point (x, y, z) to the b sound source surface that the distance $(x', y', 0)$ of S_a, S_b, S_c respectively a plane, b plane, c plane Area of the e-plane;

$$R(x'_a, y'_a) = \sqrt{(x - x'_a)^2 + (y - y'_a)^2 + (z - z_a)^2}.$$

Is the distance from the observation point (x, y, z) to a point (x'_a, y'_a, z_a) on the a surface sound source;

$$R(x'_c, y'_c) = \sqrt{(x - x'_c)^2 + (y - y'_c)^2 + (z - z_c)^2}$$

Is the distance from the observation point (x, y, z) to a point on the c-plane sound source (x'_c, y'_c, z_c) ;

$$R(x'_e, y'_e) = \sqrt{(x - x'_e)^2 + (y - y'_e)^2 + (z - z_e)^2}$$

Is the distance from the observation point (x, y, z) to a point (x'_e, y'_e, z_e) on the sound source of the e-plane; $k = \omega / u$ wave number (u is the speed of sound), ρ_0 is the air density, ω is the angular frequency of vibration, P_a resistance, P_b resistance, P_c resistance, and P_e resistance are the acoustic resistance of air itself, which are,

$$P_{a \text{ fl}} = A \cdot \frac{z_a \cdot r + j\omega \cdot z_a \cdot r'}{\varphi} + \delta \quad (10)$$

$$P_{b \text{ fl}} = A \cdot \frac{z_b \cdot r + j\omega \cdot z_b \cdot r'}{\varphi} + \delta \quad (11)$$

$$P_{c \text{ fl}} = A \cdot \frac{z_c \cdot r + j\omega \cdot z_c \cdot r'}{\varphi} + \delta \quad (12)$$

$$P_{e \text{ fl}} = A \cdot \frac{z_e \cdot r + j\omega \cdot z_e \cdot r'}{\varphi} + \delta \quad (13)$$

Among them, r is the sound damping per unit length, r' is the sound mass per unit length, z_a is the distance from the observation point to the sound source on the a plane, z_b is the distance from the observation point to the sound source on the b plane, and z_c is The distance from the observation point to the c-plane sound source, and z_e is the distance from the observation point to the e-plane sound source.

$W_a(x, y)$, $W_b(x, y)$, $W_c(x, y)$, $W_e(x, y)$, and $W_d(x, y)$ are a , b , c , e , and d , respectively The sound source intensity per unit area can be derived from the following formula group (14):

$$\begin{aligned} F_e &= F_a = F - k_1 \cos \omega t - \iint_{S_a} W_a(x, y) dx dy - \iint_{S_e} W_e(x, y) dx dy - f \\ F_b &= -F + k_1 \cos \omega t + \iint_{S_b} W_b(x, y) dx dy - \iint_{S_e} W_e(x, y) dx dy - L \\ F_c &= F_d = F_b - k_2 \cos \omega t - \iint_{S_c} W_c(x, y) dx dy - f - \gamma \\ F_d &= F_b - k_2 \cos \omega t - \iint_{S_d} W_d(x, y) dx dy \end{aligned} \quad (14)$$

Among them, F is the driving force converted by the transducer, F_a , F_b , F_c , F_d , and F_e are the driving forces of a , b , c , d , and e , respectively, and S_d is the housing (d Face), f is the viscous resistance formed by the small gap in the side wall, $\eta \Delta s (dv / dy)$, L is the equivalent load of the face when the vibration plate acts on the face, and γ is the dissipation on the elastic element 2. Energy, k_1 and k_2 are the elastic coefficients of elastic element 1 and elastic element 2 respectively, η is the fluid viscosity coefficient, dv / dy is the velocity gradient of the fluid, Δs is the cross-sectional area of the object (plate), and A is the amplitude. φ is the area of the sound field, δ is a high-order quantity (derived from the incomplete symmetry of the shape of the casing), and at any point outside the casing, the sound pressure generated by the vibration of the casing is:

$$P_d = -j\omega\rho_0 \iint W_d(x'_d, y'_d) \cdot \frac{e^{jKR(x'_d, y'_d)}}{4\pi R(x'_d, y'_d)} dx'_d dy'_d \quad (15)$$

among them,

$$R(x'_d, y'_d) = \sqrt{(x - x'_d)^2 + (y - y'_d)^2 + (z - z_d)^2}$$

Is the distance from the observation point (x, y, z) to a point (x'_d, y'_d, z_d) on the d-plane sound source.

P_a , P_b , P_c , and P_e are all functions of position. When we open a hole at any position on the shell, if the opening area is S_{opening} , the total effect of sound pressure at the opening is

$$\iint_{S_{\text{opening}}} P_d ds.$$

Since the vibration panel 221 on the housing 10 is closely attached to the human body tissue, and its output energy is absorbed by the human tissue, then only the d-plane pushes the air outside the shell to vibrate, forming a sound leakage. The total effect of the housing to push the air vibration outside the shell is

$$\iint_{S_{\text{外壳}}} P_d ds.$$

In some application scenarios, our goal is to make

$$\iint_{S_{\text{外壳}}} P_d ds$$

versus

$$\iint_{S_{\text{外壳}}} P_d ds$$

The size is the same, and the directions are opposite, so as to reduce the effect of leakage. Once the basic structure of the device is determined,

$$\iint_{S_{\text{shell}}} P_d \, ds$$

Is an amount we cannot adjust, so adjust

$$\iint_{S_{\text{shell}}} P_{ds} \, ds,$$

Make it with

$$\iint_{S_{\text{shell}}} P_d \, ds$$

offset, and

$$\iint_{S_{\text{shell}}} P_{ds} \, ds$$

It contains complete phase and amplitude information. The phase, amplitude, and shell size of the speaker component, the vibration frequency of the transducer, the opening position, shape, number, size of the sound hole, and whether there is damping on the hole are all closely related. This allows us to achieve the purpose of suppressing sound leakage by adjusting the opening position, shape and number of sound introduction holes and / or increasing damping and / or adjusting damping materials.

In-shell sound waves and leak sound waves are equivalent to the two sound sources shown in. In the embodiment of the present invention, a penetrating sound introduction hole 250 is provided on the wall surface of the housing, which can guide and propagate the sound waves inside the shell to the outside of the shell, and propagate in the air with the leaked sound waves to interfere with each other, thereby reducing the leaked sound waves. The amplitude, which reduces the sound leakage. Therefore, the technical solution of the present application, through the convenient improvement of opening sound introduction holes in the housing, solves the problem of sound leakage to a certain extent without increasing the volume and weight of the speaker component.

According to the above formula deduced by the inventors, those skilled in the art can easily understand that the elimination effect of the sound leakage sound, the shell size of the speaker assembly, the vibration frequency of the transducing device, the opening position, shape, and number of sound introduction holes. Size and whether there is damping on the hole are closely related, so the opening position, shape, number of the sound hole, damping material on the hole, etc. can have a variety of different schemes according to needs.

FIG. 27 is a diagram illustrating an effect of suppressing sound leakage by a speaker assembly according to some embodiments of the present application. In the target area of the accessory of the speaker component (for example, the speaker component shown in FIGS. 26A and 26B), the phase of the leaked sound wave transmitted to the target area, and the sound wave in the shell propagates to the target area through the sound introduction hole. The phase difference is close to 180 degrees. With this setting, the leakage sound waves generated by the shell can be significantly reduced or even eliminated in the target area.

As shown in FIG. 27, in the frequency band of 1500 Hz to 4000 Hz, the leakage sound wave is significantly suppressed. Among them, in the frequency band of 1500Hz to 3000Hz, the suppressed leakage sound basically exceeds 10dB. Especially in the frequency band of 2000Hz ~ 2500Hz, the sound leakage is reduced by more than 20dB compared with the scheme without opening the sound hole after opening the sound hole in the upper part of the side of the shell.

It should be noted that the above description of the noise reduction sound hole of the glasses is only a specific example and should not be regarded as the only feasible implementation solution. Obviously, for a person skilled in the art, after understanding the basic principle of noise reduction sound hole of glasses, it is possible to implement specific methods and steps of noise reduction sound hole of glasses without departing from this principle. Various modifications and changes in form and detail are made, but these modifications and changes are still within the scope described above. For example, to illustrate what variations there are, many can be listed. The aperture sizes of the sound introduction holes 60 may be inconsistent, so as to suppress sound leakage in different bands. Such deformations are all within the protection scope of this application.

In some embodiments, the speaker device described above can transmit sound to a user by means of air conduction. When air is used to transmit sound, the speaker device may include one or more sound sources. The sound source may be located at a specific position on the user's head, for example, the top of the head, forehead, cheeks, horns, auricle, back of auricle, etc., without blocking or covering the ear canal. For the purpose of description, FIG. 28 shows a schematic diagram of transmitting sound through air conduction.

As shown in FIG. 28, the sound source 2810 and the sound source 2820 can generate sound waves with opposite phases ("+" and "-" in the figure indicate opposite phases). For simplicity, the sound source referred to here refers to the sound output hole on the speaker device for outputting sound. For example, the sound source 2810 and the sound source 2820 may be two sound outlet holes respectively located at specific positions (for example, a movement case or a circuit case) on the speaker device.

In some embodiments, the sound source 2810 and the sound source 2820 may be generated by the same vibration device 2801. The vibration device 2801 includes a diaphragm (not shown in the figure). When the diaphragm is driven by electric signals to vibrate, the front face of the diaphragm drives air to vibrate, and a sound source 2810 is formed at the sound outlet through the sound guide channel 2812. A sound source 2820 is formed at the hole. The sound conducting channel refers to a sound propagation path from the diaphragm to the corresponding sound emitting hole. In some embodiments, the sound guiding channel is a path surrounded by a specific structure (for example, a movement case, or a circuit case) on the speaker. It should be known that, in some alternative embodiments, the sound source 2810 and the sound source 2820 may also be generated by different vibration devices through different diaphragm vibrations.

Among the sounds generated by the sound source 2810 and the sound source 2820, one part is transmitted to the user's ear to form the sound heard by the user, and the other part is transmitted to the environment to form a leaked sound. Considering that the sound source 2810 and the sound source 2820 are relatively close to the user's ear, for convenience of description, the sound transmitted to the user's ear may be referred to as near-field sound, and the leaked sound transmitted to the environment may be referred to as far-field sound. In some embodiments, the near-field / far-field sounds of different frequencies generated by the speaker device are related to the distance between the sound source 2810 and the sound source 2820. Generally speaking, the near-field sound generated by the speaker device will increase as the distance between the two sound sources increases, and the far-field sound (leakage) generated will increase as the frequency increases.

For different frequencies of sound, the distance between the sound source 2810 and the sound source 2820 can be designed separately, so that the low-frequency near-field sound (for example, a sound with a frequency less than 800 Hz) generated by the speaker device is as large as possible, and the high-frequency far-field sound (for example, sounds with a frequency greater than 2000 Hz) as small as possible. In order to achieve the above purpose, the speaker device may include two or more sets of dual sound sources, and each set of dual sound sources includes two sound sources similar to the sound source 2810 and the sound source 2820, and respectively generates sounds with specific frequencies. Specifically, the first group of dual sound sources may be used to generate low-frequency sounds, and the second group of dual sound sources may be used to generate high-frequency sounds. In order to obtain a large low-frequency near-field sound, the distance between two sound sources in the first set of dual sound sources can be set to a larger value. And because the low-frequency signal has a longer wavelength, a larger distance between the two sound sources will not cause an excessive phase difference in the far field, and therefore will not form too much sound leakage in the far field. In order to make the high-

frequency far-field sound smaller, the distance between the two sound sources in the second set of dual sound sources can be set to a smaller value. Because the high-frequency signal has a shorter wavelength, a smaller distance between the two sound sources can prevent a large phase difference from being formed in the far field, and thus can prevent a large sound leakage. The distance between the second group of dual sound sources is smaller than the distance between the first group of dual sound sources.

The beneficial effects that the embodiments of the present application may bring include but are not limited to: (1) Different from the situation of the prior art, in the present application, when the hinge arm is subjected to an external force and rotates relative to the hinge base, the first support surface and the first support surface The connection of the two supporting surfaces pushes the supporting member to move in the opposite direction against the elastic bias of the elastic member, thereby causing the third supporting surface to switch from elastic abutment with one of the first supporting surface and the second supporting surface to the first supporting surface. The other of the support surface and the second support surface elastically abut, in a cross section perpendicular to the central axis of the rotating shaft, the ratio between the maximum distance from the rotating shaft to the connection and the shortest distance from the rotating shaft to the first supporting surface is between 1.1 and 1.5, so that when the state of the hinge is switched by the push of the connection, the hinge has a suitable degree of jump, and then the user has a more obvious touch when the hinge is pulled, and the transition state is not too abrupt and difficult to switch the state of the hinge, thereby providing convenience for users. (2) It is possible to reduce casing vibration and suppress sound leakage. (3) The sound quality of the speaker can be improved. It should be noted that different embodiments may have different beneficial effects. In different embodiments, the possible beneficial effects may be any one or a combination of the foregoing, or any other beneficial effects that may be obtained.

The basic concepts have been described above. Obviously, for those skilled in the art, the above disclosure of the invention is merely an example, and does not constitute a limitation on the present application. Although it is not explicitly stated here, those skilled in the art may make various modifications, improvements and amendments to this application. Such modifications, improvements and amendments are suggested in this application, so such modifications, improvements and amendments still belong to the spirit and scope of the exemplary embodiments of this application.

Meanwhile, specific words are used in this application to describe the embodiments of this application. For example, "one embodiment", "an embodiment" and / or "some embodiments" means a certain feature, structure or characteristic related to at least one embodiment of the present application. Therefore, it should be emphasized and noted that the "one embodiment" or "one embodiment" or "an alternative embodiment" mentioned two or more times in different places in this specification does not necessarily refer to the same embodiment. In addition, certain features, structures, or characteristics in one or more embodiments of the present application may be appropriately combined.

In addition, those skilled in the art can understand that aspects of this application can be illustrated and described through several patentable categories or situations, including any new and useful process, machine, product or substance combination, or their Any new and useful improvements. Accordingly, various aspects of the present application can be executed entirely by hardware, can be executed entirely by software (including firmware, resident software, microcode, etc.), and can also be executed by a combination of hardware and software. The above hardware or software can be called "data block", "module", "engine", "unit", "component" or "system". In addition, aspects of the present application may manifest as a computer product located in one or more computer-readable media, the product including a computer-readable program code.

In addition, unless explicitly stated in the claims, the order of processing elements and sequences described herein, the use of alphanumeric characters, or the use of other names is not intended to limit the order of processes and methods of the present application. Although the above disclosure discusses some embodiments of the invention that are currently considered useful through various examples, it should be understood that such details are for illustrative purposes only, and that the appended claims are not limited to the disclosed embodiments only. Instead, the rights The requirements are intended to cover all modifications and equivalent combinations that are within the spirit and scope of the embodiments of this application. For example, although the system components described above can be implemented by hardware devices, they can also be implemented only by software solutions, such as installing the described system on an existing server or mobile device.

For the same reason, it should be noted that, in order to simplify the expressions disclosed in this application and thereby help the understanding of one or more inventive embodiments, the foregoing description of the embodiments of the application sometimes incorporates multiple features into one embodiment, in the drawings or their description. However, this disclosure method does not mean that the subject of the present application requires more features than those mentioned in the claims, indeed, the features of an embodiment are less than all the features of a single embodiment disclosed above.

In some embodiments, numbers describing components and the number of attributes are used. It should be understood that, for such numbers used in the description of the embodiments, the modifiers "about", "approximately" or "substantially" are used in some examples To modify. Unless stated otherwise, "about", "approximately" or "substantially" indicates that the number allows for a variation of $\pm 20\%$. Accordingly, in some embodiments, the numerical data used in the specification and claims are approximate values, and the approximate values may be changed according to the characteristics required by individual embodiments. In some embodiments, the numerical data should take the specified significant digits into account and adopt a general digits retention method. Although the numerical ranges and data used to confirm the breadth of the range in some embodiments of this application are approximate values, in specific embodiments, the setting of such values is as accurate as possible within the feasible range.

Finally, it should be understood that the embodiments described in this application are only used to illustrate the principles of the embodiments of this application. Other variations may also fall within the scope of this application. Therefore, by way of example and not limitation, alternative configurations of embodiments of the present application may be considered consistent with the teachings of the present application. Accordingly, the embodiments of the present application are not limited to the embodiments explicitly introduced and described in the present application.

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CN207443125U *	2017-09-28	2018-06-01	盐城宝丰磁电有限公司	A kind of water-proof loudspeaker structure
US20190204617A1 *	2017-12-29	2019-07-04	Zungie Inc.	Wearable device
CN110022503A *	2018-01-08	2019-07-16	深圳市韶音科技有限公司	Osteoacoustic sounding device
CN109609920A *	2018-01-08	2018-09-28	深圳市韶音科技有限公司	a kind of bone-conduction speaker
CN117395872A	2018-01-08	2024-01-12	深圳市韶音科技有限公司	Bone conduction loudspeaker
CN207720875U *	2018-01-08	2018-08-10	深圳市韶音科技有限公司	Osteoacoustic sound-producing device
US1055071B2 *	2018-01-31	2020-02-04	Bose Corporation	Eyeglass headphones
CN109391188B *	2018-02-11	2020-02-21	维沃移动通信有限公司	Loudspeaker assembly and electronic equipment
CN110611873B *	2018-05-15	2021-07-02	深圳市韶音科技有限公司	Testing method of bone conduction loudspeaker

CN208780932U *	2018-08-24	2019-04-23	深圳市韶音科技有限公司	A kind of electronic building brick and glasses
CN208847981U *	2018-08-24	2019-05-10	深圳市韶音科技有限公司	A kind of hinge and glasses
CN208780926U *	2018-08-24	2019-04-23	深圳市韶音科技有限公司	A kind of hinge and glasses
CN208780924U	2018-08-24	2019-04-23	深圳市韶音科技有限公司	A kind of glasses
CN108846466A	2018-08-24	2018-11-20	深圳市韶音科技有限公司	A kind of glasses
CN108061902A *	2018-08-24	2018-12-21	深圳市韶音科技有限公司	A kind of electronic building brick and glasses
CN208267805U	2019-01-05	2019-08-16	深圳市韶音科技有限公司	Bone conduction earphone core and osteoacoustic loudspeaker arrangement
CN208780925U	2018-08-24	2019-04-23	深圳市韶音科技有限公司	A kind of glasses
CN114721164A	2018-08-24	2022-07-08	深圳市韶音科技有限公司	Glasses and assembly of rotating shaft and connecting wire
CN208847977U *	2018-08-24	2019-05-10	深圳市韶音科技有限公司	A kind of glasses
CN209184767U *	2019-01-05	2019-07-30	深圳市韶音科技有限公司	Osteoacoustic loudspeaker arrangement
CN117528322A	2019-01-05	2024-02-06	深圳市韶音科技有限公司	Bone conduction loudspeaker

* Cited by examiner; † Cited by third party

Cited By (28)

Publication number	Priority date	Publication date	Assignee	Title
YWE7876758 *	2021-01-28	2022-03-01	藝高國際光電有限公司	Eyeglass assembly structure
AT828842A1 *	2021-08-09	2023-02-15	Hsi Chou Cheng	Bluetooth glasses
US1183598B2	2018-12-12	2023-12-05	Solos Technology Limited	Eyewear systems, apparatuses, and methods for providing assistance to a user
US11871174B1 *	2018-12-12	2024-01-09	Solos Technology Limited	Personalized directional audio for head-worn audio projection systems, apparatuses, and methods
Family To Family Citations				
US1167994B2	2011-12-23	2023-02-07	Shenzhen Shokz Co., Ltd.	Bone conduction speaker and compound vibration device thereof
US11611634B2	2011-12-23	2023-03-21	Shenzhen Shokz Co., Ltd.	Bone conduction speaker and compound vibration device thereof
CN108878972B	2018-08-24	2024-06-14	深圳市韶音科技有限公司	Hinge and glasses
US1188809B2	2014-01-06	2023-01-17	Shenzhen Shokz Co., Ltd.	Systems and methods for suppressing sound leakage
US1182366B2	2014-01-06	2023-02-14	Shenzhen Shokz Co., Ltd.	Systems and methods for suppressing sound leakage
US1091353B2	2017-07-03	2024-06-18	Holovisions LLC	Augmented reality (AR) eyewear with a section of a fresnel reflector comprising individually-adjustable transmissive-reflective optical elements
US11809994B2	2018-04-26	2022-11-22	Shenzhen Shokz Co., Ltd.	Vibration removal apparatus and method for dual-microphone earphones
WO2020038479A1	2018-08-24	2020-02-27	深圳市韶音科技有限公司	Eyeglasses
WO2020140466A1	2019-01-05	2020-07-09	深圳市韶音科技有限公司	Loudspeaker device
BR112021021746A2	2019-04-30	2021-12-28	Shenzhen Vovtech Co Ltd	Acoustic output device
TW761635B *	2019-06-24	2022-04-21	緯創資通股份有限公司	Wearable display device
CN110289848A *	2019-07-25	2024-04-19	桂林航天工业学院	Movable engineering driller chassis
WO2021262097A1 *	2020-06-23	2021-12-30	Syed Aftab	Eyewear, method of manufacture and use thereof

CN117135215A *	2020-10-16	2020-12-25	深圳市喜幸喜科技有限公司	Bluetooth headset adaptable to different head types
CN118076158A *	2021-05-19	2022-11-22	深圳市韶音科技有限公司	Wearable equipment
KR20230043949A *	2021-02-10	2023-03-31	썬전 삭 캅퍼니 리미티드	hearing aids
US11965539B2 *	2021-07-22	2024-04-23	Microsoft Technology Licensing, Llc	Anti-creep anti-back-out compact fastener
USD1022018S1 *	2021-09-15	2024-04-09	Shenzhen Shokz Co., Ltd.	Glasses with headphones
USD1022016S1 *	2021-09-15	2024-04-09	Shenzhen Shokz Co., Ltd.	Glasses with headphones
USD1022018S1 *	2021-09-15	2024-04-09	Shenzhen Shokz Co., Ltd.	Glasses with headphones
USD1022023S1	2021-09-15	2024-04-09	Shenzhen Shokz Co., Ltd.	Endpieces of glasses with headphones
USD1022017S1 *	2021-09-15	2024-04-09	Shenzhen Shokz Co., Ltd.	Glasses with headphones
USD1022023S1 *	2021-09-15	2024-04-09	Shenzhen Shokz Co., Ltd.	Glasses with headphones
USD1022011S1	2021-09-15	2024-04-09	Shenzhen Shokz Co., Ltd.	V-shaped part of glasses with headphones

* Cited by examiner; † Cited by third party; ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
WO2020038479A1	2020-02-27	Spectacles
US12047780B2	2024-07-23	Loudspeaker apparatus
US11790477B2	2023-07-11	Speaker device
US11960399B2	2022-05-17	Loudspeaker apparatus
US11977275B2	2024-05-07	Glasses
US20210014595A1	2021-01-14	Loudspeaker device
WO2020140456A1	2020-07-09	Loudspeaker device
US20240258727A1	2024-08-01	Loudspeaker apparatus

Priority And Related Applications

Child Applications (1)

Application	Priority date	Filing date	Relation	Title
US17/139,018	2018-08-24	2020-12-31	Continuation	Glasses

Priority Applications (1)

Application	Priority date	Filing date	Title
US17/139,018	2018-08-24	2020-12-31	Glasses

Applications Claiming Priority (2)

Application	Filing date	Title
CN201810975515.1	2018-08-24	

CN201810975515.1A

2018-08-24

Hinge and glasses

Legal Events

Date	Code	Title	Description
2020-04-08	121	Ep: the epo has been informed by wipo that ep was designated in this application	Ref document number: 19851391 Country of ref document: EP Kind code of ref document: A1
2021-02-25	NENP	Non-entry into the national phase	Ref country code: DE
2021-09-01	122	Ep: pct application non-entry in european phase	Ref document number: 19851391 Country of ref document: EP Kind code of ref document: A1

Concepts

machine-extracted

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Name	Image	Sections	Count	Query match
change		claims,abstract,description	8	0.000
glass		claims,description	95	0.000
supporting effect		claims,description	47	0.000
composite material		claims,description	26	0.000
communication		claims,description	7	0.000
reversible effect		claims,description	2	0.000
assembly		abstract,description	7	0.000
assembly		abstract,description	7	0.000
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PTO/SB/08a (01-22)

Approved for use through 05/31/2024. OMB 0651-0031

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		18517910
	Filing Date		2023-11-22
	First Named Inventor	Ernesto Carlos Martinez Villalpando	
	Art Unit	--	
	Examiner Name	--	
	Attorney Docket Number	1537-003USC1	

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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	11086147	B2	2021-08-10	Ingeniospec LLC	
	2	11204512	B2	2021-12-21	Ingeniospec LLC	
	3	11243416	B2	2022-02-08	Ingeniospec LLC	
	4	11326941	B2	2022-05-10	Ingeniospec LLC	
	5	11513371	B2	2022-11-29	Ingeniospec LLC	
	6	11630331	B2	2023-04-18	Ingeniospec LLC	
	7	11644361	B2	2023-05-09	Ingeniospec LLC	
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	Attorney Docket Number	1537-003USC1		

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	10	7255437	B2	2007-08-14	Ingeniospec LLC	
	11	7380936	B2	2008-06-03	Ingeniospec LLC	
	12	7401918	B2	2008-07-22	Ingeniospec LLC	
	13	7438410	B1	2008-10-21	Ingeniospec LLC	
	14	7481531	B2	2009-01-27	Ingeniospec LLC	
	15	7500746	B1	2009-03-10	Ingeniospec LLC	
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	18	7621634	B2	2009-11-24	Ingeniospec LLC	
	19	7677723	B2	2010-03-16	Ingeniospec LLC	

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	Attorney Docket Number	1537-003USC1

	20	7760896	B2	2010-07-20	Gabor Medveczky	
	21	7771046	B2	2010-08-10	I p Venture Inc Ingeniospec LLC	
	22	7792552	B2	2010-09-07	Ingeniospec LLC	
	23	7806525	B2	2010-10-05	Ingeniospec LLC	
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	25	8109629	B2	2012-02-07	Ingeniospec LLC	
	26	8337013	B2	2012-12-25	IpVenture Inc	
	27	8430507	B2	2013-04-30	Thomas A. HowellDavid ChaoC. Douglass ThomasPeter	
	28	8434863	B2	2013-05-07	Thomas A. HowellDavid ChaoC. Douglass ThomasPeter	
	29	8465151	B2	2013-06-18	Ingeniospec LLC	
	30	8500271	B2	2013-08-06	IpVenture Inc	

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	Attorney Docket Number	1537-003USC1		

	31	8770742	B2	2014-07-08	Ingeniospec LLC	
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	33	9033493	B2	2015-05-19	Ingeniospec LLC	
	34	9488520	B2	2016-11-08	Ingeniospec LLC	
	35	9547184	B2	2017-01-17	Ingeniospec LLC	
	36	9690121	B2	2017-06-27	Ingeniospec LLC	
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	38	10060790	B2	2018-08-28	Ingeniospec LLC	
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	Attorney Docket Number	1537-003USC1		

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	43	10359311	B2	2019-07-23	Ingeniospec LLC	
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	45	10777048	B2	2020-09-15	IpVenture Inc	
	46	11042045	B2	2021-06-22	Ingeniospec LLC	

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	1	20150172434	A1	2015-06-18	Kawagishi	
	2	20190097328	A1	2019-03-28	Yong et al.	
	3	20140347265	A1	2014-11-27	Aimone et al.	
	4	20140268008	A1	2014-09-18	Howell et al.	

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	11	20190101977	A1	2020-10-20	Apple Inc	
	12	20180242064	A1	2021-03-16	SNIK LLC	
	13	20180097920	A1	2019-05-28	Apple Inc	
	14	20150248026	A1	2015-09-03	Carl Zeiss Vision International GmbH	
	15	20190297701	A1	2019-09-26	Logitech Europe SA	

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	Examiner Name	--		
	Attorney Docket Number	1537-003USC1		

	16	20170032646	A1	2017-02-02	Motorola Mobility LLC	
	17	20150126845	A1	2015-05-07	Research Foundation of State University of New Yor	
	18	20190158946	A1	2019-05-23	SNIK LLC	
	19	20170108715	A1	2017-04-20	Eddie Bauer	
	20	20180124497	A1	2018-05-03	Bragi GmbH	
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	22	20070030442	A1	2007-02-08	Ingeniospec LLC	
	23	20160246059	A1	2016-08-25	Kopin Corp	
	24	20130250232	A1	2013-09-26	Oakley Inc	
	25	20170078883	A1	2017-03-16	Digimarc Corp	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		18517910	
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	27	20180088340	A1	2018-03-29	Magic Leap Inc	
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	1	2020206775	WO	A1	2020-10-15	Shenzhen Guangyang Technology Co., Ltd., Shenzhen		☐
	2	2020038479	WO	A1	2020-02-27	Shenzhen Shaoyin Technology Co., Ltd.		☐

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(Not for submission under 37 CFR 1.99)

Application Number	18517910
Filing Date	2023-11-22
First Named Inventor	Ernesto Carlos Martinez Villalpando
Art Unit	--
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Attorney Docket Number	1537-003USC1

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	First Named Inventor	Ernesto Carlos Martinez Villalpando
	Art Unit	--
	Examiner Name	--
	Attorney Docket Number	1537-003USC1

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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	/SHIXIONG WANG/	Date (YYYY-MM-DD)	2024-09-12
Name/Print	Shixiong Wang	Registration Number	72,864

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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Docket Number (Optional)
1537-003USC1

In re Application of: Ernesto Carlos Martinez Villalpando

Application No.: 18/517,910

Filed: November 22, 2023

For: EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

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Near-ear directional sound output structure, and audio glasses

Abstract

The present application relates to a near-ear directional sound output structure, and a pair of audio glasses. A near-ear directional sound output structure, comprising a mounting cavity and a sound emission device arranged in the mounting cavity, wherein the mounting cavity is provided with sound output holes; the sound output holes are in communication with the sound emission device by means of provided sound output cavities; the sound output holes comprise a first sound output hole provided near an ear, and a second sound output hole provided away from the ear; the first sound output hole is arranged near the sound emission device, and the second sound output hole is arranged away from the sound emission device, and the second sound output hole is in communication with the sound emission device by means of a provided second sound output cavity. A sound emitted from a sound emission device can form a sound field at an earhole under the action of a directional sound emission structure, and the sound emitted from the sound emission device cannot be heard in a surrounding environment outside an ear due to an interference cancellation effect, thereby achieving the function of directional sound emission. According to the pair of audio glasses, by means of the directional effect of a directional sound output structure, insofar as the power of a sound emission device is unchanged, a sound reaching an ear of a human body is enhanced while sounds propagated to other places are attenuated.

Classifications

5G2C11/00 Non-optical adjuncts; Attachment thereof

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Claims

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Claims

[Claim 1] A directional sound output structure near the ear, characterized in that it comprises a mounting cavity, and a sound generator provided in the mounting cavity; a sound hole provided in the mounting cavity; and the sound hole passes through the device. Some sound cavity is connected with the speaker;

The sound hole includes a first sound hole arranged close to the ear, and a second sound hole arranged far away from the ear; the first sound hole is arranged close to the sound generator, and the second sound hole is farther than the sound generator is arranged; the second sound hole communicates with the sound generator through a second sound cavity provided.

[Claim 2] The near-ear directional sound output structure according to claim 1, characterized in that it further comprises a third sound outlet; the third sound outlet passes through a provided third sound cavity. Connect with speaker

[Claim 3] The near-ear directional sound output structure according to claim 1, wherein the first sound output hole communicates with the sounder through a first sound output cavity; the first sound output The cavity is provided with a sound guide wall, so that the sound of the sound generator is reflected from the sound guide wall and then transmitted from the first sound outlet hole.

[Claim 4] A directional sound output structure near the ear according to claim 3, wherein the sound generator is connected to the mounting cavity through a mounting seat provided; the mounting seat is close to the first output. The sound cavity is set; the installation cavity is provided with a plurality of installation protrusions; the installation seat is provided with an installation groove matching the installation protrusion; the installation seat is detachably fixed to the installation cavity through the installation groove and the installation protrusion inside.

[Claim 5] A near-ear directional sound output structure according to claim 2, wherein the third sound hole communicates with the back cavity of the sound generator through the third sound cavity; The back cavity is set in the opposite direction of the sound output direction of the speaker.

[Claim 6] The near-ear directional sound output structure according to claim 5, wherein the second sound hole communicates with the back cavity of the sounder through the second sound cavity; The first sound cavity is separated from the second sound cavity and the third sound cavity by the sound generator.

[Claim 7] The third sound-out cavity is a near-ear directional sound-out structure according to claim 6, wherein the mounting cavity is composed of a housing cavity provided; the housing is close to The outer side of the first sound outlet cavity is an arc-shaped recess; the first sound hole is provided in the arc-shaped recess, so that the first sound

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hole has an arc structure and faces the ear hole.

[Claim 6] An audio glasses for directional sound output, characterized by comprising the glasses body, the directional sound output structure of any one of claims 1 to 7, a control circuit and a battery; the directional sound output structure device The temple of the glasses body is close to one end of the ear, and the control circuit and the battery are arranged in the temple of the glasses body;

The first sound hole is arranged at the side of the temple near the ear; the second sound hole is arranged at the end of the temple.

[Claim 9] The audio glasses with directional sound output according to claim 8, wherein the mounting cavity and the sound output cavity are formed in the inner cavity of the temple; the first sound hole, the first sound outlet Three sound holes are provided on the underside of the temples.

[Claim 10] The audio glasses with directional sound output according to claim 8, characterized in that, a fixed cavity for mounting a control circuit or a battery is provided in the temples; the control circuit and the battery are provided in The same eyeglass legs or two eyeglass legs are respectively arranged at one end of the glasses frame.

[Claim 11] The audio glasses for directed sound output according to claim 8, characterized in that the control circuit is provided with a Bluetooth module; or/and a sound pickup.

[Claim 12] The audio glasses with directional sound output according to claim 8, wherein the control circuit is provided with a charging port, and the charging port is provided on the lower side of the temple.

Description

Directional sound output structure near ear and audio glasses

[0001] This application is based on a Chinese patent application with an application number of 201910296023.4 and a filing date of April 12, 2019, and claims its priority. The entire content of the application is hereby incorporated into this application as a whole.

[0002] Technical Field

[0003] This application relates to audio equipment, and more specifically to a near-ear directional sound output structure and its audio glasses

[0004] Background Technology

[0005] Commonly used audio equipment, when the equipment is used, the sound has no directionality and radiates from the center to the surroundings. Except for the reflector, it basically radiates in the form of rays. In order to achieve a small range of use, the volume can only be reduced, such as earphones. After wearing the earphones, the ambient sound cannot be heard (the external sound is blocked). If the earphones are worn for a long time, the ears will feel uncomfortable. If worn for a long time, the ears and hearing will be damaged. On the other hand, the bone conduction earphone transmits sound directly to the eardrum through the skull, which may cause discomfort such as itching for the first time wearer and impaired sound effect. It can only be used for special occasions.

[0006] The Chinese patent "A New Type of Glasses" discloses a new type of glasses, including a spectacle frame, temples hingedly arranged on both sides of the spectacle frame, a circuit board, a Bluetooth chip, a microphone radio chip, an audio driver chip, and a speaker And a battery, wherein the temple includes a first shell and a second shell that are snap-connected, the first shell has a mounting cavity, the circuit board, the Bluetooth chip, the microphone radio chip, the audio driver chip, the speaker, and the battery are respectively fixedly arranged in the mounting cavity, and a plurality of sound outlets are opened on the lower side of the first housing near the speaker; and the circuit board is provided with Switch button, the switch button penetrates the lower side of the first housing; the Bluetooth chip, the microphone radio chip and the audio driver chip are fixedly arranged on the circuit board, the speaker and the speaker The batteries are respectively electrically connected with the circuit board; the circuit board is provided with a charging contact, and the charging contact penetrates through the lower side of the first housing.

[0007] The above-mentioned patents only install a circuit board, a Bluetooth chip, a microphone radio chip, an audio driver chip, a speaker, and a battery on the temples, and a sound hole is provided near the speaker. The sound from the speakers on the temples is only transmitted through the sound hole, and the sound effect is not designed. The sound will follow The sound hole emits to the surroundings, there is no directionality, the sound effect is poor, and the experience is affected.

[0008] Application content

[0009] The purpose of the present application is to overcome the defects of the prior art and provide a directional sound output structure near the ear and audio glasses.

[0010] In order to achieve the above purpose, the application adopts the following technical solutions:

[0011] A directional sound output structure close to the ear, comprising a mounting cavity and a sound generator arranged in the mounting cavity; the mounting cavity is provided with a plurality of sound holes; the sound holes pass through the sound cavity provided Connect with the speaker;

[0012] The sound hole includes a first sound hole arranged close to the ear, and a second sound hole arranged far from the ear

The first sound hole is arranged close to the sounder, and the second sound hole is arranged farther than the sounder; the second sound hole communicates with the sounder through a second sound cavity provided.

[0013] A further technical solution is: further comprising a third sound outlet; the third sound outlet communicates with the sounder through a third sound cavity provided.

[0014] The further technical solution is: the first sound outlet is communicated with the sounder through a first sound-out cavity; the first sound-out cavity is provided with a sound guide wall, so that the sound of the sounder can pass from the sound guide wall After reflection, it comes out from the first sound hole.

[0015] A further technical solution is as follows: the sound generator is connected to the mounting cavity through a mounting seat provided; the mounting seat is arranged close to the first sound outlet cavity.

[0016] The further technical solution is: a plurality of installation protrusions are provided in the installation cavity; the installation seat is provided with an installation groove matching the installation protrusions; and the installation cavity is provided with a plurality of installation protrusions; The installation seat is provided with an installation groove matching the installation protrusion; the installation seat is detachably fixed in the installation cavity through the installation groove and the installation protrusion.

[0017] A further technical solution is as follows: the third sound outlet is communicated with the back cavity of the sound generator through the third sound cavity; the back cavity is arranged in the opposite direction of the sound output direction of the sound generator.

[0018] The further technical solution is: the second sound outlet is communicated with the back cavity of the sound generator through the second sound cavity; the first sound cavity is connected to the third sound cavity and the second sound outlet through the sound device Sound cavity partition.

[0019] A further technical solution is that the inner wall of the third sound outlet cavity relative to the third sound outlet hole is an arc structure.

[0020] A further technical solution is as follows: the installation cavity is constituted by a housing inner cavity; the outer side of the housing close to the first sound-out cavity is an arc-shaped recess; the first sound-out hole is arranged in The arc-shaped recessed portion is such that the first sound hole has an arc-shaped structure and faces the ear hole. [0021] An audio glasses for directional sound output, comprising a glasses body, the above-mentioned directional sound output structure, a control circuit and a battery; the directional sound output structure is arranged on the ears of the glasses body, and the control circuit . The battery is located in the temple of the glasses body;

[0022] The first sound hole is provided at the side of the temple near the ear; the second sound hole is provided at the end of the temple

[0023] A further technical solution is: the mounting cavity and the sound outlet cavity are formed in the inner cavity of the temple, the first sound hole and the third sound hole are provided on the lower side of the temple.

[0024] The further technical solution is: a fixed cavity for installing a control circuit or a battery is provided in the eyeglass legs; the control circuit and the battery are located on the same eyeglass leg or are respectively located on the two eyeglass legs near one end of the eyeglass frame .

[0025] The further technical solution is: the control circuit is provided with a Bluetooth module; or/and a microphone.

[0026] A further technical solution is: the control circuit is provided with a charging port, and the charging port is provided on the lower side of the temple.

[0027] The beneficial effects of the present application compared with the prior art are: the directional sound output structure of the present application is provided with a number of sound holes on the mounting cavity, and the sound holes communicate with the sounder through the sound cavity, making it close to The sound hole of the ear hole can propagate normal phase sound waves, and the sound hole farther than the ear hole propagates anti-phase sound waves at the time, causing interference near the ear and superimposing each other, so that a superimposed sound field is formed in the near ear area, and the sound wave in the area far away from the ear The interference cancels out, and the sound decays rapidly. In addition, the sound guide wall inside the first sound cavity can direct the sound waves emitted by the sound generator to the ear holes of the human body. Setting the directional sound output structure on the glasses can form audio glasses with directional sound output. This application has a simple structure, the sound emitted by the sounder can form a sound field at the ear hole through the action of the directional sounding structure, and the outside of the ear can not hear the sound from the sounder in the surrounding environment due to the effect of interference cancellation, thus realizing the function of directional sounding . Through the directional effect of the directional sound output structure, the audio glasses make the sound reaching the human ears increase while the power of the sound generator is unchanged, and the sound transmitted to other places is weakened.

[0028] The application will be further described below with reference to the drawings and specific embodiments.

[0029] BRIEF DESCRIPTION

[0030] FIG. 1 is a three-dimensional structure diagram of a near-ear directional sound output structure of the present application;

[0031] FIG. 2 is a front view of a directional sound output structure near the ear of the present application;

[0032] FIG. 3 is a side view of a directional sound output structure near the ear of the present application; [0033] FIG. 4 is an internal structure diagram of a near-ear directional sound output structure of the present application;

[0034] FIG. 5 is an internal structure diagram of a near-ear directional sound output structure of the present application;

[0035] FIG. 6 is an exploded view of a directional sound output structure near the ear of the present application;

[0036] FIG. 7 is a structural diagram of a mounting seat of a near-ear directional sound output structure of the present application;

[0037] FIG. 8 is a schematic view of the sound field of a near-ear directional sound output structure of the present application;

[0038] FIG. 9 is a three-dimensional structure diagram of an audio glasses for directional sound output in this application.

[0039] Specific embodiments

[0040] In order to fully understand the technical content of the present application, the technical solution of the present application will be further introduced and illustrated below in conjunction with specific embodiments, but it is not limited thereto.

[0041] Figures 1 to 9 are drawings of embodiments of the application.

[0042] A near-ear directional sound output structure Q, as shown in FIGS. 1 to 6, includes a mounting cavity 10, and a sounder 11 provided in the mounting cavity 10. The installation cavity 10 is provided with a plurality of sound holes. The sound hole communicates with the sounder 11 through the sound cavity provided. The sounder 11 may be a horn. The sound emitted by the sounder 11 is transmitted from the sound hole after the sound cavity is adjusted. The sound cavity is specially processed to make the sound propagate from the sound hole meet the requirements.

[0043] The sound hole includes a first sound hole 12 arranged close to the ear, and a third sound hole 13 and a second sound hole 14 arranged far from the ear. The first sound hole 12 is arranged close to the sound generator 11, and the third sound hole 13 and the second sound hole 14 are arranged farther than the sound generator 11. The first sound hole 12, the third sound hole 13, and the second sound hole 14 are arranged in different positions and have different functions. Since the sound generator 11 can generate positive and anti-phase sound waves, the positive phase sound waves are transmitted through the first sound cavity 15 to the first sound hole 12, and then transmitted to the human ear through the first sound hole 12; The inverted sound wave is transmitted to the third sound hole 13 and the second sound hole 14 through the third sound outlet 16 and the second sound cavity 18, and then to the environment around the ear.

[0044] The first sound outlet 12 communicates with the sounder 11 through the first sound outlet cavity 15. The inner wall of the first sound outlet cavity 15 has an arc-shaped structure, so that after the sound emitted by the sound generator 11 propagates to the inner wall, it is emitted back to form a concentrated state, and then is transmitted from the first sound outlet 12.

[0045] Preferably, an inclined sound guide wall is provided in the first sound outlet cavity 15, so that the sound of the sound generator 11 is reflected from the sound guide wall and then transmitted from the first sound outlet hole 12.

[0046] Alternatively, when the sound generator 11 is arranged obliquely, the inner wall of the first sound outlet cavity 15 serves as a sound guide wall, so that the sound generator 11 Sound can be reflected through.

[0047] Since the first sound hole 12 is facing the ear hole, the sound of the sound generator 11 is reflected to the ear hole after passing through the sound guide wall, thereby achieving the purpose of directional sound output.

[0048] Wherein, as shown in FIG. 7, the sounder 11 is connected to the mounting cavity 10 through a mounting seat 17 provided. The mounting seat 17 is arranged close to the first sound outlet 15. The mounting seat 17 is provided with a sound guide opening 172, so that the sound emitted by the sounder 11 can be transmitted from the first sound outlet 12 through the sound guide opening 172. The mounting base 17 is provided with a fixing hole 171 for fixing the sounder 11, so that the sounder 11 is fixed to the mounting cavity 10 behind the mounting base. The sound guide port 172 is set according to requirements, so that the sound of the sound generator 11 can be transmitted to the ear hole.

[0049] In other embodiments, the sounder 11 may be directly installed in the installation cavity 10.

[0050] Specifically, a number of mounting protrusions 101 are provided in the mounting cavity 10. The mounting base 17 is provided with a mounting groove 173 matching the mounting protrusion 101. The mounting base 17 is detachably fixed in the mounting cavity 10 through the mounting groove 173 and the mounting protrusion 101.

[0051] The inner wall of the third sound outlet cavity 16 relative to the third sound hole 13 has an arc structure, so that the sound output direction of the third sound hole 13 is determined and the sound wave energy is relatively concentrated.

[0052] The third sound outlet hole 13 communicates with the back cavity of the sound generator 11 through the third sound outlet cavity 16. The end of the third sound output cavity 16 is in communication with the back cavity, and the back cavity is set in the opposite direction of the sound output direction of the sound generator 11. The third sound outlet 13 is provided at the other end of the third sound cavity 16. The third sound-out cavity 16 is a long and narrow sound-guiding cavity, and the sound emitted by the sounder 11 is reflected and interfered by the second sound-guiding cavity 16, so that the sound propagated from the third sound-out hole 13 is an inverted sound wave, and The high frequency sound waves are filtered, and the low frequency sound waves are transmitted from the third sound outlet 13. The end of the second sound guide cavity 16 communicating with the back cavity is a big end, so that the sound waves of the sound generator 11 can fill the second sound guide cavity 16

[0053] The second sound outlet hole 14 communicates with the back cavity of the sound generator 11 through the second sound outlet cavity 18. One end of the second sound outlet cavity 18 communicates with the back cavity, and the second sound outlet hole 14 is provided at the other end of the second sound outlet cavity 18. The end of the second sound outlet cavity 18 that communicates with the sounder 11 is the big end, and the cross-sectional area of the inner cavity of the second sound outlet cavity 18 gradually decreases in the direction in which it extends, and when it reaches the middle position, the second sound outlet The direction of the hole 14 gradually increases, forming a structure where the cross-sectional area of the inner cavity of the second sound cavity 18 is small in the middle and large at the two ends. The reverse cross-acoustic wave of the sounder 11 is transmitted from the back cavity through the second sound outlet cavity 18 and then from the second sound outlet hole 14. Since the second sound outlet cavity 18 has a filtering effect on high-frequency sound waves, the second sound outlet A low-to-mid frequency sound wave coming out of the hole 14.

[0054] Wherein, in order to achieve the low, medium and high frequency positive phase sound waves transmitted from the first sound outlet 12, the low, medium frequency reverse sound waves From the third sound hole 13 and the second sound hole 14, the first sound cavity 15 is separated from the third sound cavity 16 and the second sound cavity 18 through the sound generator 11 and the mounting seat 17, so that the positive The cross-talk wave is transmitted from the first sound hole 12, and the antiphase sound wave is transmitted from the third sound hole 13 and the second sound hole 14.

[0055] Preferably, the third sound-out cavity 16, the second sound-out cavity 18 are respectively arranged on both sides of the back cavity, and the first sound-out cavity 15, the third sound-out cavity 16, and the second sound-out cavity 18 are located The planes are parallel to each other.

[0056] The installation cavity 10 is constituted by the inner cavity of the housing 21 provided. The shell 21 is hollowed out inside, and the inner cavity is divided into the required first sound cavity 15, the third sound cavity 16, and the second sound cavity 18 as required. The outer side of the housing 21 close to the first sound outlet cavity 15 is an arc-shaped recess 211. The first sound hole 12 is provided in the arc-shaped recess 211, so that the first sound hole 12 has an arc structure. The bottom of the arc-shaped recess 211 matches the upper end of the root of the human ear. The first sound hole 12 is located at one end of the arc-shaped recess, so that the first sound hole 12 is directly opposite to the ear hole, so that the first sound hole 12 spreads Sound can be conducted to the eardrum through the ear hole.

[0057] The sound output directions of the first sound outlet hole 12 and the third sound outlet hole 13 are located on the same side of the housing 21, and the sound output direction of the second sound outlet hole 14 is the same as that of the first sound outlet hole 12 and the third sound outlet. The sound outlet direction of the sound hole 13 is vertical or forms a set angle. Specifically, the first sound hole 12 and the third sound hole 13 are provided on the lower side of the housing 21 so that the direction of sound is downward, and the second sound hole 14 is provided on the outside of the housing 21, so that the The tone direction is outward.

[0058] As shown in FIG. 7, the positive phase sound wave is transmitted from the first sound hole 12 near the ear hole, the reverse sound wave is transmitted through the third sound hole 13 and the second sound hole 14, and the reverse sound wave is relatively positive. The cross sound wave is far away from the ear hole. According to the wave interference theory, when the normal phase sound wave and the reverse phase sound wave meet, they can produce a cancellation effect at a local position, and attenuate with distance, the sound wave has a superposition effect at the local position, and a strengthened sound field is obtained. Therefore, the sound wave can only produce a sound field in a local area (SPL) (that is, the sound field is at the distance from the ear hole), and the sound field far away from this local area is zero.

[0059] In another embodiment, the number of sound holes is not limited to three, and there may be multiple sound holes according to structural requirements and sound emission requirements

[0060] An audio glasses for directional sound output, as shown in FIGS. 1 to 8 and 9, includes a glasses body 20, the above-mentioned directional sound output structure Q, a control circuit 22, and a battery 23. The directional sound output structure Q is arranged on the temple of the glasses body 20 close to one end of the ear. Similarly, the control circuit 22 and the battery 23 are provided on the temples of the glasses body 20 close to one end of the glasses frame. The first sound hole 12 is provided on the side of the temple near the ear. The second sound hole 14 is provided at the end of the temple, and the direction of the second sound hole 14 can be any direction.

[0061] Wherein, the distance between the first sound hole 12 and the third sound hole 13 is A1, and the first sound hole 12 and the second sound hole

The distance of 14 is A2, A1: A2 is approximately equal to 1:1.

[0062] The installation cavity 10. The sound outlet cavity is formed in the inner cavity of the temple, and the sound outlet is also provided in the temple.

[0063] Wherein, the outer shell of the temple is formed by extending the shell 21 of the sound-emitting structure 2. The housing of the temple includes a first housing 211 and a second housing 212, and the cavity formed between the first housing 211 and the second housing 212 is the installation cavity 10. The installation cavity 10 is not only used to install the sound generator 11 and the sound guide cavity, but also can be used to install the control circuit 22 and the battery 23. Wherein, a fixed cavity 19 for installing the control circuit 22 or the battery 23 is provided in the temple. The fixed cavity 19 is separated by a baffle 24 provided in the installation cavity 10, so that the fixed cavity 19 does not interfere with the sound output cavity.

[0064] Preferably, the control circuit 22 and the battery 23 are provided on one of the temples or on the two temples respectively. In order to make the whole glasses more balanced, the battery 23 is arranged on one of the eyeglass legs, the control circuit 22 is arranged on the other eyeglass leg, and the battery 23 and the control circuit 22 are connected by wires passing through the glasses frame. At the same time, the battery 23 and the control circuit 22 can also be arranged in the same temple.

[0065] The control circuit 22 has a pickup for picking up environmental sounds. The sound field of the environment can be read by the pickup, and after electronic amplification, it is output to the sound generating device. The amplified sound field will only be heard by the user with the device, and will not be transmitted to the surrounding users. In this way, far-field pickup can be realized. The distance is played to users, such as those who need hearing assistance. In order to facilitate wireless connection with other electronic devices, the control circuit 22 is provided with a Bluetooth module.

[0066] FIG. 8 is a schematic diagram of simulated sound output.

[0067] The control circuit 22 is provided with a charging interface, and the charging interface is provided on the underside of the temples, which is convenient for charging and beautiful.

[0068] In summary, the directional sound output structure of the present application is provided with a plurality of sound holes on the mounting cavity, and the sound holes communicate with the sound generator through the sound cavity, so that the sound holes close to the ear holes can be transmitted positively. Cross-acoustic waves, the sound holes farther than the earholes propagate antiphase sound waves at the time, causing interference near the ears, and superimposing each other, so that the near ear area forms a superimposed sound field, and the sound wave interference in the area away from the ears cancels out, and the sound attenuates rapidly. In addition, the sound guide wall inside the first sound cavity can direct the sound waves emitted by the sound generator to the ear holes of the human body. Setting the directional sound output structure on the glasses can form audio glasses with directional sound output. This application has a simple structure, the sound emitted by the sounder can form a sound field at the ear hole through the action of the directional sounding structure, and the ear Due to the effect of interference cancellation on the outside of the flower, the surrounding environment cannot hear the sound from the speaker, so that the function of directional pronunciation is realized. Through the directional effect of the directional sound output structure, the audio glasses make the sound reaching the human ears increase while the power of the sound generator is unchanged, and the sound transmitted to other places is weakened.

[0069] The foregoing only uses examples to further illustrate the technical content of this application for easier understanding by readers, but it does not mean that the implementation of this application is limited to this. Any technical extension or re-creation made according to this application is all Protected by this application. The scope of protection of this application is subject to the claims.

Summary of the invention

technical problem

The solution to the problem

The beneficial effects of the invention

Patent Citations (7)

Publication number	Priority date	Publication date	Assignee	Title
CN101227765A *	2007-01-15	2008-07-23	陈登	Method for eliminating noise of audio equipment and audio equipment with silencing apparatus using the method
EP2717650A1 *	2012-10-04	2014-04-09	Acer Incorporated	Portable apparatus with a receiver and two sound holes
CN108227719A *	2016-10-14	2016-01-06	广东欧珀移动通信有限公司	A kind of mobile terminal
CN205039076U *	2016-07-14	2017-03-22	深圳前海零距物联网络科技有限公司	Audio output intelligence glasses
CN206975345U *	2017-06-15	2019-02-06	深圳市新律美科技有限公司	A kind of novel glasses
Family To Family Citations				
GB102016103477A1 *	2016-02-26	2017-08-31	USound GmbH	Audio system with beam-forming speakers and glasses with such an audio system
WO2017221247A1 *	2016-06-21	2017-12-28	Audio Pixels Ltd.	Systems and manufacturing methods for an audio emitter in spectacles

* Cited by examiner; † Cited by third party

Cited By (10)

Publication number	Priority date	Publication date	Assignee	Title
US11805796B2	2018-12-12	2023-12-05	Solos Technology Limited	Eyewear systems, apparatuses, and methods for providing assistance to a user

US11871174B1 *	2018-12-12	2024-01-09	Solos Technology Limited	Personalized directional audio for head-worn audio projection systems, apparatuses, and methods
Family To Family Citations				
CN110333367B *	2019-11-01	2021-09-17	歌尔股份有限公司	Intelligent head-mounted equipment
CN110356067B *	2019-11-01	2022-03-19	歌尔股份有限公司	Intelligent head-mounted equipment
CN110933548A *	2019-11-22	2020-03-27	歌尔股份有限公司	Intelligent head-mounted equipment
CN110944262A *	2019-11-22	2020-03-31	歌尔股份有限公司	Intelligent head-mounted equipment
CN111486904A *	2020-04-14	2020-07-28	深圳市深科创科技有限公司	Balanced type audio glasses leg and audio glasses
CN111770420B *	2020-08-28	2020-12-04	歌尔光学科技有限公司	Wearable sound production mechanism, neck area earphone and wear display device
CN112255438 *	2021-04-29	2022-11-22	歌尔光学科技有限公司	Audio device and intelligent head-mounted equipment
CN113556555B *	2021-07-07	2023-01-24	歌尔股份有限公司	Intelligent head-mounted device

* Cited by examiner; † Cited by third party; ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
WO2020206775A1	2020-10-15	Near-ear directional sound output structure, and audio glasses
KU2766545C1	2022-03-15	Glasses
CN111918167B	2021-11-12	Intelligent wearable glasses
US4904078A	1990-02-27	Eyeglass frame with electroacoustic device for the enhancement of sound intelligibility
WO2022142866A1	2022-07-07	Sound generating device
CN209696024U	2019-11-26	A kind of speaker and glasses
CN104853278A	2015-08-19	Mini sound box
WO2020124866A1	2020-06-25	Audio output module and head-mounted smart terminal
CN209419840U	2019-09-20	A kind of nearly ear is directed out sound structure and its audio glasses
JP7047778B2	2022-04-05	Sound collecting device
WO2024087496A1	2024-05-02	Earphone
WO201600986A1	2016-01-07	Earphone
CN213076096U	2021-04-27	TWS earphone
CN113226634B	2024-02-20	Earphone
WO2024087496A1	2024-05-02	Earphone
WO2024087491A1	2024-05-02	Earphone
CN20985318U	2024-05-17	Earphone
CN216679947U	2023-03-21	Intelligent head-mounted equipment and intelligent system
JP6224429U	2020-01-09	Earphone with hearing aid
CN212634196U	2021-03-12	Bluetooth headset glasses of stereo sound chamber of dual track
US11895454B1	2024-02-06	Earphones
CN230401933U	2024-01-26	Earphone
JP9187151U	2013-11-14	Dialogue hearing aid
CN220554096U	2024-03-01	Earphone with different wearing modes

WO2020206775A1	2024-05-02	Earpiece
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Priority And Related Applications

Applications Claiming Priority (2)

Application	Filing date	Title
CN201910296023.4	2019-04-12	
CN201910296023.4A	2019-04-12	A kind of nearly ear is directed out sound structure and its audio glasses

Legal Events

Date	Code	Title	Description
2020-11-25	121	Ep: the epo has been informed by wipo that ep was designated in this application	Ref document number: 19923975 Country of ref document: EP Kind code of ref document: A1
2021-10-13	NENP	Non-entry into the national phase	Ref country code: DE
2022-06-29	32PN	Ep: public notification in the ep bulletin as address of the addressee cannot be established	Free format text: NOTING OF LOSS OF RIGHTS PURSUANT TO RULE 112(1) EPC (EPO FORM 1205A DATED 08/03/2022)
2022-11-16	122	Ep: pct application non-entry in european phase	Ref document number: 19923975 Country of ref document: EP Kind code of ref document: A1

Data provided by IFI CLAIMS Patent Services



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www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION # 18/517,910	RECEIPT DATE / TIME 09/12/2024 04:16:35 PM Z ET	ATTORNEY DOCKET # 1537-003USC1
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Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	8339	FILED BY	KELSEY DEMELLO
PATENT CENTER #	67153823	FILING DATE	11/22/2023
CUSTOMER #	145340	FIRST NAMED INVENTOR	Ernesto Carlos Martinez Villalpando
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Shixiong Wang

Documents

TOTAL DOCUMENTS: 5

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1537-003USC1 - Response to Non-Final Office Action.pdf	7	Amendment/Request for Reconsideration-After Non- Final Rejection	126 KB
1537-003USC1 - TD.pdf	2	Terminal Disclaimer Filed	200 KB
FOR-2.pdf	7	Foreign Reference	340 KB
1537-003USC1_IDS.pdf	11	Information Disclosure Statement (IDS) Form (SB08)	1236 KB
FOR-1.pdf	27	Foreign Reference	2138 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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1537-003USC1 - Response to Non-Final Office Action.pdf	E05D81380A835FAFD7F374D415994D1F3732CAB476C77A0D4 5D1B6CACC53E63E2FA421CE9EAD4E191557A9A53C88F00A1 9B5BBC3CCE2C8B217D5E2B3DBDDF1B5
1537-003USC1 - TD.pdf	EB4FAA34B39047005E5AD6A3A9D27E8CCCC5C66298D76BBF BF40524BD463F77B5E88ED9A9E6E5CECF058C540D2D3AC6E 4CEDEBF1DACEDE75551C93E6E1637F4B
FOR-2.pdf	FC46BDEB314168C1826154E15F251DB251D33D68057B4C74B E10496E273E90E782F829A92C960FB44F421E9C7936B82DD1 C04748981FA6870ADBFBBC9DC3CAC4B
1537-003USC1_IDS.pdf	DE1F1B90B7170999E3C5370733591287CACF7E0D830E5C9BE F4C7FCE3F85A1D08F5E77146231A66367743A4F504591DE752 97ED56F17E19A8858E56565C45615
FOR-1.pdf	CB32158FC54D58CD39489B89B35DAA27DBBE9AC0E402F3C EA70373BDD03A4C5FBAE126E3252CB92B5E1F1CD8784C96F 7A6FE1C785BD345EB483ECA69DCF43C6B

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Ernesto Carlos Martinez Villalpando *et al.*
Serial No.: 18/517,910
Filed: November 22, 2023
Title: EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR
PROVIDING ASSISTANCE TO A USER
Group Art Unit: 2872
Examiner: William R. Alexander
Confirmation No.: 8339
Attorney Docket No.: 1537-003USC1

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-01450

September 12, 2024

RESPONSE TO FINAL OFFICE ACTION UNDER 37 C.F.R § 1.116

This is in response to the Non-Final Office Action dated June 12, 2024. This response is filed by the 3-month due date of September 12, 2024. No extension of time is needed.

Claims begin on page 2 of this paper.

Remarks begin on page 5 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method to provide assistance to a user through an eyewear device, comprising:
receiving first data from a first sensor, the first sensor is incorporated into the eyewear device, the first sensor measures a parameter related to the user;
receiving second data from a second sensor, wherein the second sensor is an external sensor;
analyzing a state of the user, wherein the analyzing uses the first data and the second data;
determining a context of the user, wherein determining uses the first data and the second data; and
providing assistance to the user, wherein the assistance is in a form of feedback, and wherein the feedback is related to the state and the context.
2. (Canceled)
3. (Currently Amended) The method of claim [[2]]1, wherein a first element of the context is a physical orientation of the user.
4. (Original) The method of claim 3, wherein a second element of the context is an activity that the user is doing.
5. (Original) The method of claim 3, wherein a third element of the context is the user's environment.
6. (Currently Amended) The method of claim [[2]]1, wherein the assistance is in a form of audio communication for the user.
7. (Canceled)
8. (Currently Amended) A computer readable storage medium storing program code for causing a data processing system to perform steps comprising:
receiving first data from a first sensor, the first sensor is incorporated into an eyewear device, the first sensor measures a parameter related to a user;
receiving second data from a second sensor, wherein the second sensor is an external sensor;

determining a context of the user, wherein the determining uses the first data and the second data; and

providing assistance to the user, wherein the assistance is related to the context, and wherein the assistance is in a form of audio communication to the user.

9. (Currently Amended) The computer readable storage medium of claim [[7]]8, wherein a first element of the context is a physical orientation of the user.
10. (Original) The computer readable storage medium of claim 8, wherein a second element of the context is an activity that the user is doing.
11. (Original) The computer readable storage medium of claim 8, wherein a third element of the context is the user's environment.
12. (Canceled)
13. (Currently Amended) The computer readable storage medium of claim [[7]]8, further comprising:
analyzing a state of the user, wherein the analyzing uses the first data and the assistance is related to both the state and the context.
14. (Canceled)
15. (Currently Amended) A system for execution by a data processing system to provide assistance to a user through an eyewear device, comprising:
a voice interface, the voice interface has a microphone and a speaker, the voice interface to receive user commands and to provide assistance to the user;
a sensor data input, the sensor data input to receive sensor data;
a processor, the processor is in electrical communication with the voice interface and the sensor data; and
a computer program for processing the sensor data, the computer program and the processor to cause the data processing system to perform steps comprising:
receiving first data from a first sensor, the first sensor is incorporated into the eyewear device, the first sensor measures a parameter related to the user;
receiving second data from a second sensor, wherein the second sensor is an external sensor;

determining a context for the user, wherein the determining uses the first data and
the second data;

analyzing a state of the user, wherein the analyzing uses the first data and the second
data; and

providing assistance to the user, the assistance is related to the context and the state.

16. (Currently Amended) The system of claim [[14]]15, wherein the analyzing considers a category selected from the group consisting of health, wellbeing, safety, cognitive, physical, and emotional.
17. (Original) The system of claim 15, wherein the assistance is designed to help the user correct a negative condition.
18. (Original) The system of claim 15, wherein the assistance is designed to help the user by encouraging a positive condition.
19. (Original) The system of claim 17, the system further comprising:
a device, the device is external to the eyewear device, the device is in electrical communication with the eyewear device and the device is used to provide the assistance to the user.
20. (Canceled)
21. (Currently Amended) The system of claim [[14]]15, the steps further comprising:
receiving third data from a plurality of embedded sensors, the determining uses both the first data and the third data and the analyzing uses both the first data and the third data.

REMARKS

Claims 1, 3-6, 8-11, 13, 15-19, and 21 are pending in the present application. Claims 1, 3, 6, 8, 9, 12, 13, 15, 16, and 21 have been amended. Claims 2, 7, 12, 14, and 20 are canceled. No new claims are added in this paper.

In taking the foregoing actions, Applicant respectfully submits Applicant is not necessarily conceding in this application that these claims, as originally presented, are not patentable over the references cited by the U.S. Patent and Trademark Office (USPTO), as pertinent ones of the present claim amendments and cancellations are only for facilitating expeditious prosecution. Applicant respectfully reserves the right to pursue the canceled claims and/or other claims in one or more continuing applications.

Applicant-Initiated Interview Summary

A telephonic interview regarding the instant matter was conducted on July 9, 2024, between Examiner William R. Alexander and Applicant's representative, Shixiong Wang, Reg. No. 79,880. Patentability under non-statutory double patenting and 35 U.S.C. § 102 was discussed. Applicant thanks the Examiner for his time and consideration in conducting the interview. An agreement was reached that the proposed amendments incorporating the allowable subject matter in claims 7, 14, and 20 in claims 1, 8, and 15 respectively would overcome the current rejections under 35 U.S.C. § 102.

Allowable Subject Matter

The Examiner states that "claims 7, 14, and 20 are object to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims." Office Action, p. 11. Applicant acknowledges with thanks the Examiner's indication of allowability of claims 7, 14, and 20 if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Solely in the interest of advancing prosecution, Applicant has hereinabove incorporated the limitations of claims 2, 7, 12, 14, and 20 in claims 1, 8, and 15, respectively, and canceled claims 2, 7, 12, 14, and 20.

Claim Objections

Claims 12-14 were objected to because the phrases “storage medium of claim 7” and “storage medium of claim 12” contained a typographical error. Office Action, p. 5. Without conceding the propriety of the rejection, and in the interests of advancing prosecution, amendments to claims 12 and 13 presented in this paper have corrected the typographical error to state “storage medium of claim 8.” Claims 12 and 14 have been canceled, rendering the objection moot.

Claims 16, 20, and 21 was objected to because the phrase “the system of claim 14” contained a typographical error. Office Action, p. 5. Without conceding the propriety of the rejection, and in the interests of advancing prosecution, amendments to claims 16 and 21 presented in this paper have corrected the typographical error to state “the system of claim 15.” Claim 20 has been canceled, rendering the objection moot.

Accordingly, Applicant respectfully submits that these objections are now moot, and respectfully requests the withdrawal of these rejections.

Rejection of claims under 35 U.S.C. § 102

Claims 1-6, 8-13, 15-19, and 21 are rejected under 35 U.S.C. § 102 as allegedly anticipated by U.S. Patent App. No. 2016/0066847 to Sales et al. (hereinafter “Sales”). Office Action, p. 6.

As discussed above, solely in the interest of advancing prosecution, Applicant accepts the allowable subject matter indicated by Examiner and incorporated the limitations in claims 2, 7, 12, 14, and 20 into claims 1, 8, and 15, respectively.

Therefore, Applicant respectfully submits that claims 1, 3-6, 8-11, 13, 15-19, and 21 are allowable. Claims 2, 7, 12, 14, and 20 are canceled, which renders the rejections of the claims moot. Applicant respectfully requests the withdrawal of the rejections under 35 U.S.C. § 102 and claims 1, 3-6, 8-11, 13, 15-19, and 21 be placed in condition for allowance.

Double Patenting

U.S. Patent No. 11,835,798

Claim 1 stands rejected on the alleged ground of non-statutory double patenting as being unpatentable over claim 1 of U.S. Patent No. 11,835,798. Office Action, pp. 2-4.

Though Applicant may not necessarily acquiesce to the grounds of the asserted double patenting rejections, a Terminal Disclaimer in compliance with 37 CFR 1.321 (c) or 1.321 (d) has been submitted or is being submitted herewith to obviate these non-statutory double patenting rejections.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of all double patenting rejections of the claims.

Conclusion

Accordingly, Applicant respectfully submits that all claims in the application are in a condition for allowance and respectfully solicit the prompt issuance of a Notice of Allowance. If any issues remain, the Examiner is encouraged to call the undersigned practitioner at the number listed below.

Date: September 12, 2024

Respectfully submitted,

/SHIXIONG WANG/

Shixiong Wang, Reg. No.: 79,880

Oliver S. Han, Reg. No.: 72,864

CALDWELL INTELLECTUAL PROPERTY LAW

Tel: 857.776.4505

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 18/517,910		Filing Date 11/22/2023		☐ To be Mailed		
ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO										
APPLICATION AS FILED - PART I										
		(Column 1)		(Column 2)						
FOR		NUMBER FILED		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(j))		minus 20 =		*		x \$40 =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		x \$ 192 =				
☐ 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	09/12/2024	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		
								ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	* 16	Minus	** 20	= 0	x \$ 40 =		0		
	Independent (37 CFR 1.16(h))	* 3	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.						Program Support Specialist				
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/DAMALI AYANA BERRY/				
*** 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.
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1	8339
145340	7590	07/15/2024		
Caldwell Intellectual Property Law 200 Clarendon Street 59th Floor Boston, MA 02116			EXAMINER ALEXANDER, WILLIAM R	
			ART UNIT	PAPER NUMBER
			2872	
			NOTIFICATION DATE	DELIVERY MODE
			07/15/2024	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):

alexander@caldwellllaw.com
docketing@caldwellip.com
kelsey@caldwellllaw.com

<i>Applicant-Initiated Interview Summary</i>	Application No. 18/517,910	Applicant(s) Villalpando et al.		
	Examiner WILLIAM R ALEXANDER	Art Unit 2872	AIA (First Inventor to File) Status Yes	Page 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	Title	Type
WILLIAM R ALEXANDER	Primary Examiner	Telephonic
Steve Wang	Attorney	

Date of Interview: 09 July 2024

Issues Discussed:

35 U.S.C. 102

Attorney stated applicant is planning to respond to the non-final office action by amending claim 1 with allowable dependent claim 7, amending claim 8 with the allowable dependent claim 14, and amending independent claim 15 with the allowable dependent claim 20.

Objections

Attorney stated that applicant is planning to amend claims 12, 13, 14, 16, 20, and 21 to address the claim objections detailed in the office action dated 6/12/2024.

Non-statutory Double Patenting

Attorney stated that applicant is planning to file a terminal disclaimer to address the double patenting as detailed in the office action dated 6/12/2024.

/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	
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.



UNITED STATES PATENT AND TRADEMARK OFFICE

USPTO Automated Interview Request (AIR)

Jun 19 2024

This paper requesting to schedule and/or conduct an interview is appropriate because:

This submission is requested to be accepted as an authorization for this interview to communicate via the internet. Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned concerning scheduling of the interview via video conference, instant messaging, or electronic mail, and to conduct the interview in accordance with office practice including video conferencing.

Name(s):
Shixiong Wang

S-signature:
/Shixiong Wang/

Registration Number:
79880

U.S. Application Number:
18517910

Confirmation Number:
8339

E-mail Address:
steve@caldwellllaw.com

Phone Number:
+1 8577764505

Proposed Time of Interview:
6-27-2024 10:00 AM ET

Alternative Proposed Time(s) of Interview:
6-27-2024 2:00 PM ET

Preferred Interview Type:
Video Conference

I am the applicant or applicant's representative for this application.

Topic for Discussion:
Claim amendments, double patenting rejections, 102 rejections.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1	8339
145340	7590	06/12/2024		
Caldwell Intellectual Property Law 200 Clarendon Street 59th Floor Boston, MA 02116			EXAMINER ALEXANDER, WILLIAM R	
			ART UNIT	PAPER NUMBER
			2872	
			NOTIFICATION DATE	DELIVERY MODE
			06/12/2024	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):

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Continuation of Disposition of Claims* 8) Claim(s) is/are objected to: 7,12-14,16 and 20-21

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file

provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The filing of a terminal disclaimer by itself is not a complete reply to a nonstatutory double patenting (NSDP) rejection. A complete reply requires that the terminal disclaimer be accompanied by a reply requesting reconsideration of the prior Office action. Even where the NSDP rejection is provisional the reply must be complete. See MPEP § 804, subsection I.B.1. For a reply to a non-final Office action, see 37 CFR 1.111(a). For a reply to final Office action, see 37 CFR 1.113(c). A request for reconsideration while not provided for in 37 CFR 1.113(c) may be filed after final for consideration. See MPEP §§ 706.07(e) and 714.13.

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The actual filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/apply/applying-online/eterminal-disclaimer.

Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claim Claim 1 of U.S. Patent No. 11,835,798. Although the claims at issue are not identical, they are not patentably distinct from each other because of the follow.

Instant Application (18/517,910)	US 11,935,798
1. A method to provide assistance to a user through an eyewear device, comprising; receiving first data from a first sensor, the first sensor is incorporated into the eyewear device, the first sensor measures a parameter related to the user; analyzing a state of the user, wherein the analyzing uses the first data; and providing assistance to the user, the assistance is in a form of feedback, and the feedback is related to the state.	1. A method to provide assistance to a user through an eyewear device, comprising; receiving first data from a first sensor, the first sensor is incorporated into the eyewear device, the first sensor measures a parameter related to the user; analyzing a state of the user, wherein the analyzing uses the first data and providing assistance to the user, the assistance is in a form of feedback, and the feedback is related to the state, wherein the first data is a speech signal obtained from the user, the analyzing further comprising: comparing an error rate of a voice recognition process applied to the first data with an historical error rate for the user's speech signals; and assigning the state to the user based on the comparing.

Claim Objections

Claims 12 and 13 are objected to because of the following informalities: The phrase “storage medium of claim 7” is assumed to be a typographical error. Examiner assumes that the phrase should have been written “storage medium of claim [[7]]8”. Appropriate correction is required.

Claim 14 is objected to because of the following informalities: The phrase “storage medium of claim 12” is assumed to be a typographical error. Examiner assumes that the phrase should have been written “storage medium of claim [[12]]8”. Appropriate correction is required.

Claims 16, 20, and 21 are objected to because of the following informalities: The phrase “the system of claim 14” is assumed to be a typographical error. Examiner assumes that the phrase should have been written “the system of claim [[14]]15”. Appropriate correction is required.

Claim Rejections - 35 USC § 102

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 (i.e., changing from AIA to pre-AIA) 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.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

Claims 1-6, 8-13, 15-19, and 21 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Sales et al. (US 2016/0066847).

Regarding Claim 1, Sales discloses a method to provide assistance to a user through an eyewear device (Paragraphs 0012 and 0066), comprising;

receiving first data from a first sensor, the first sensor is incorporated into the eyewear device (Fig. 4, sensors 430, Paragraphs 0080-0081),

the first sensor measures a parameter related to the user (Paragraph 0068, lines 1-9, measures deviation from a wearer's normal posture); analyzing a state of the user, wherein the analyzing uses the first data; and providing assistance to the user, the assistance is in a form of feedback, and the feedback is related to the state (Paragraph 0066-0068, measures deviation from a wearer's normal posture and notifies the wearer of the deviation from the normal physiology state, namely posture).

Regarding Claim 2, Sales discloses a method to provide assistance to a user through an eyewear device (Paragraphs 0012 and 0066), comprising:

receiving first data from a first sensor, the first sensor is incorporated into the eyewear device (Fig. 4, sensors 430, Paragraphs 0080-0081),

the first sensor measures a parameter related to the user (Paragraph 0068, lines 1-9, measures deviation from a wearer's normal posture); determining a context of the user, wherein the determining uses the first data during the determining; and providing assistance to the user, the assistance is related to the context (Paragraph 0066-0068, measures deviation from a wearer's normal posture and notifies the wearer of the deviation from the normal physiology state, namely posture).

Regarding Claim 3, Sales discloses as is set forth above and further discloses wherein a first element of the context is a physical orientation of the user (Paragraphs 0015 and 0039-0040, orientation of wearer is measured).

Regarding Claim 4, Sales discloses as is set forth above and further discloses wherein a second element of the context is an activity that the user is doing (Paragraph 0041, lines 1-6, determines when the wearer is sitting, lying down, standing, walking, running, lifting, running, exercising, etc.).

Regarding Claim 5, Sales discloses as is set forth above and further discloses wherein a third element of the context is the user's environment (Paragraph 0016, capture an image of the wearer's surrounds).

Regarding Claim 6, Sales discloses as is set forth above and further discloses wherein the assistance is in a form of audio communication for the user (Paragraph 0065, lines 10-15, communicating through a speaker to the wearer).

Regarding Claim 8, Sales discloses a computer readable storage medium storing program code for causing a data processing system (Paragraphs 0017-0020, storage, program, computer processor, and instructions), to perform steps comprising:

receiving first data from a first sensor, the first sensor is incorporated into the eyewear device (Fig. 4, sensors 430, Paragraphs 0080-0081),

the first sensor measures a parameter related to the user (Paragraph 0068, lines 1-9, measures deviation from a wearer's normal posture); determining a context of the user, wherein the determining uses the first data; and providing assistance to the user, the assistance is related to the context (Paragraph 0066-0068, measures deviation from

a wearer's normal posture and notifies the wearer of the deviation from the normal physiology state, namely posture).

Regarding Claim 9, Sales discloses as is set forth above and further discloses wherein a first element of the context is a physical orientation of the user (Paragraphs 0015 and 0039-0040, orientation of wearer is measured).

Regarding Claim 10, Sales discloses as is set forth above and further discloses wherein a second element of the context is an activity that the user is doing (Paragraph 0041, lines 1-6, determines when the wearer is sitting, lying down, standing, walking, running, lifting, running, exercising, etc.).

Regarding Claim 11, Sales discloses as is set forth above and further discloses wherein a third element of the context is the user's environment (Paragraph 0016, capture an image of the wearer's surrounds).

Regarding Claim 12, Sales discloses as is set forth above and further discloses wherein the assistance is in a form of audio communication for the user (Paragraph 0065, lines 10-15, communicating through a speaker to the wearer).

Regarding Claim 13, Sales discloses as is set forth above and further discloses wherein further comprising: analyzing a state of the user, wherein the analyzing uses the first data and the assistance is related to both the state and the context (Paragraph 0041, lines 1-6, determines when the wearer is sitting, lying down, standing, walking, running, lifting, running, exercising, etc. by determining orientation of the user, Paragraph 0065, lines 10-15, communicating through a speaker to the wearer).

Regarding Claim 15, Sales discloses a system for execution by a data processing system to provide assistance to a user through an eyewear device (Paragraphs 0012 and 0066), comprising:

a voice interface, the voice interface has a microphone (microphone, Paragraphs 0035 and 0081) and a speaker (Speaker, Paragraphs 0028 and 0065), the voice interface to receive user commands and to provide assistance to the user;

a sensor data input (Fig. 4, sensors 430, Paragraphs 0080-0081), the sensor data input to receive sensor data;

a processor (Paragraphs 0017-0020, storage, program, computer processor, and instructions), the processor is in electrical communication with the voice interface and the sensor data; and

a computer program (Paragraphs 0017-0020, storage, program, computer processor, and instructions) for processing the sensor data, the computer program and the processor to cause the data processing system to perform steps comprising: receiving first data from a first sensor, the first sensor is incorporated into the eyewear device (Fig. 4, sensors 430, Paragraphs 0080-0081), the first sensor measures a parameter related to the user (Paragraph 0068, lines 1-9, measures deviation from a wearer's normal posture); determining a context (Paragraph 0041, lines 1-6, determines when the wearer is sitting, lying down, standing, walking, running, lifting, running, exercising, etc.) for the user wherein the determining uses the first data; analyzing a state of the user (Paragraph 0066-0068, measures deviation from a wearer's normal posture and notifies the wearer of the deviation from the normal physiology state, namely posture), wherein the analyzing uses the first data; and

providing assistance to the user, the assistance is related to the context and the state (Paragraph 0065, lines 10-15, communicating through a speaker to the wearer).

Regarding Claim 16, Sales discloses as is set forth above and further discloses wherein the analyzing considers a category selected from the group consisting of health, wellbeing, safety, cognitive, physical, and emotional (Paragraph 0042, lines 16-22).

Regarding Claim 17, Sales discloses as is set forth above and further discloses wherein the assistance is designed to help the user correct a negative condition (Paragraph 0042, lines 16-22, asleep and/or unconscious, Paragraph 0065, lines 10-15, communicating through a speaker to the wearer).

Regarding Claim 18, Sales discloses as is set forth above and further discloses wherein the assistance is designed to help the user by encouraging a positive condition (Paragraph 0042, lines 16-22, stable, good, and/or fair, Paragraph 0065, lines 10-15, communicating through a speaker to the wearer).

Regarding Claim 19, Sales discloses as is set forth above and further discloses wherein the system further comprising: a device, the device is external to the eyewear device, the device is in electrical communication with the eyewear device and the device is used to provide the assistance to the user (Paragraphs 0022-0024, Fig. 1, remote computing devices 154).

Regarding Claim 21, Sales discloses as is set forth above and further discloses wherein the system further comprising: receiving third data from a plurality of embedded sensors (Paragraph 0080, lines 13-21), the determining uses both the first data and the

third data and the analyzing uses both the first data and the third data (Paragraphs 0081-0082, the data from at least 3 sensors are analyzed).

Allowable Subject Matter

Claims 7, 14, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: with respect to the allowable subject matter, none of the prior art either alone or in combination disclose or teach of the claimed combination of limitations to warrant a rejection under 35 USC 102 or 103.

Specifically, with respect to claim 7, none of the prior art either alone or in combination disclose or teach of a method including, as the distinguishing feature(s) in combination with the other limitations wherein further comprising: receiving second data from a second sensor, the second sensor is an external sensor and the determining uses both the first data and the second data.

Specifically, with respect to claim 14, none of the prior art either alone or in combination disclose or teach of a computer readable storage medium including, as the distinguishing feature(s) in combination with the other limitations wherein further comprising: receiving second data from a second sensor, the second sensor is an external sensor and the determining uses both the first data and the second data.

Specifically, with respect to claim 20, none of the prior art either alone or in combination disclose or teach of a system including, as the distinguishing feature(s) in combination with the other limitations wherein the steps further comprising: receiving

second data from a second sensor, the second sensor is an external sensor, the determining uses both the first data and the second data and the analyzing uses both the first data and the second data.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sales et al. (US 2019/0298228), Grand et al. (US 2006/0250574), Rizzo, III et al. (US 2015/0002808), Villalpando et al. (US 2020/0285069), are cited to show similar systems and methods.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM R ALEXANDER whose telephone number is (571)270-7656. The examiner can normally be reached M-F 8:30 AM- 4:00 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, Pinping Sun can be reached on (571) 270-1284. 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

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Art Unit: 2872

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/WILLIAM R ALEXANDER/
Primary Examiner, Art Unit 2872

<i>Notice of References Cited</i>	Application/Control No. 18/517,910	Applicant(s)/Patent Under Reexamination Villalpando et al.	
	Examiner WILLIAM R ALEXANDER	Art Unit 2872	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-20160066847-A1	2016-03-10	Sales; Jay William	A61B5/1103	600/595
*	B	US-20190298228-A1	2019-10-03	Sales; Jay William	G08B21/0461	1/1
*	C	US-20060250574-A1	2006-11-09	Grand; Joseph B.	G02B27/0172	351/158
*	D	US-20150002808-A1	2015-01-01	Rizzo, III; Joseph F.	A61N1/36046	351/158
*	E	US-20200285069-A1	2020-09-10	Villalpando; Ernesto Carlos Martinez	H04W4/026	1/1
	F					
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	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.

<i>Search Notes</i> 	Application/Control No. 18/517,910	Applicant(s)/Patent Under Reexamination Villalpando et al.
	Examiner WILLIAM R ALEXANDER	Art Unit 2872

CPC - Searched*		
Symbol	Date	Examiner
G02C5/001,126,14	06/07/2024	WA
G02C11/10,06	06/07/2024	WA
G06F3/167	06/07/2024	WA
H04W4/026,38	06/07/2024	WA
G02C2200/08,16,02	06/07/2024	WA
G02C3/006	06/07/2024	WA

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
351	158	06/07/2024	WA

* 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
CPC:G02C5/001,126,14,G02C11/10,06,G06F3/167,H04W4/026,38,G02C2200/08,16,02,G02C3/006,USPC: 351/158, USPC/CPC combined with Text Search. See search history Printout.	06/07/2024	WA
PE2E Search-Text Search. See Search History Printout.Inventor Search-PE2E Search. See Search History Printout.Applicant Search-PE2E Search. See Search History Printout.	06/07/2024	WA
Global Dossier	06/07/2024	WA

/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	
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<i>Search Notes</i> 	Application/Control No. 18/517,910	Applicant(s)/Patent Under Reexamination Villalpando et al.
	Examiner WILLIAM R ALEXANDER	Art Unit 2872

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	PGPub/USPAT. East Search-Claim Text Search. See Interference Search Printout.	06/07/2024	WA

/WILLIAM R ALEXANDER/ Primary Examiner, Art Unit 2872	
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Bibliographic Data

Application No: 18/517,910

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged:

/WILLIAM R ALEXANDER/

Examiner's Signature

Initials

Title:

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/22/2023	351	2872	1537-003USC1
RULE			

APPLICANTS

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CONTINUING DATA

This application is a CON of 16736593 01/07/2020 PAT 11835798

16736593 is a CIP of 16711340 12/11/2019 PAT 11796833

16711340 has PRO of 62873889 07/13/2019

16736593 has PRO of 62873889 07/13/2019

16736593 has PRO of 62789818 01/08/2019

16711340 has PRO of 62778709 12/12/2018

FOREIGN APPLICATIONS

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12/06/2023

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	"18517910"	(US-PGPUB)	OR	ON	ON	2024/06/06 01:46 PM
L2	1	"20170032646"	(US-PGPUB)	OR	ON	ON	2024/06/06 02:29 PM
L3	9	("2017/0032646").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/06/06 02:30 PM
L4	34	(Artificial Intelligence) More like doc: US-20170032646-A1 Text: (EP-3125208-B1 OR EP-3125208-A1 OR US-10896591-B2 OR JP-6414711-B2 OR JP-2017032992-A OR US-20160350553-A1 OR US-9842224-B2 OR US-9635156-B2 OR US-20160344856-A1 OR US-20170201620-A1 OR US-10257343-B2 OR EP-2929424-B1 OR EP-2929424-A1 OR US-20210034384-A1 OR US-11093262-B2 OR US-11301553-B2 OR US-20200184058-A1 OR US-20190258785-A1 OR US-10657237-B2 OR US-20180113317-A1).did.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 02:30 PM
L5	1	"20170108715"	(US-PGPUB)	OR	ON	ON	2024/06/06 02:30 PM
L6	9	("2017/0108715").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/06/06 02:30 PM
L7	35	(Artificial Intelligence) More like doc: US-20170108715-A1 Text: (US-9946098-B2 OR GB-2593999-A OR EP-2973533-A2 OR IT-UB200159744-A1 OR JP-2022512232-A OR KR-20170009658-A OR JP-2021090518-A OR US-20210263343-A1	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK,	OR	ON	ON	2024/06/06 02:30 PM

		OR CA-3103521-A1 OR CN-108431680-A OR KR-20090010616-A OR EP-3893043-A1 OR KR-100893185-B1 OR US-20090135003-A1 OR US-7834759-B2 OR WO-2019238982-A1 OR IL-286178-B2 OR WO-2017108981-A1 OR EP-3394666-A1 OR US-20190004338-A1).did.	TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	87	L3 L4 L6 L7	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 02:31 PM
L9	37	L3 L4 L6 L7	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 02:31 PM
L10	17	L9 AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 02:48 PM
L11	17	L9 AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 OR gyroscope\$ OR magnet\$7 OR proximity)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 02:51 PM
L12	31200	(EYE\$WEAR OR SPECTACLES OR EYE\$GLASSES OR SUN\$GLASSES OR GOGGLES) AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO,	OR	ON	ON	2024/06/06 02:59 PM

		gyroscope\$ OR magnet\$7 OR proximity)	RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L13	15097	(EYE\$WEAR OR SPECTACLES OR EYE\$GLASSES OR SUN\$GLASSES OR GOGGLES) AND sensor\$ AND microphone AND speaker AND orientation AND assist\$4 AND (acceler\$7 AND gyroscope\$ AND magnet\$7 AND proximity)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 02:59 PM
L14	180478	(G02C5/001 OR G02C11/10 OR G06F3/167 OR H04W4/026 OR H04W4/38 OR G02C2200/08 OR G02C2200/16 OR G02C3/006 OR G02C5/126 OR G02C5/14 OR G02C11/06 OR G02C2200/02).cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 03:11 PM
L15	1459	351/158.CCLS.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:12 PM
L16	42754	L14 L15	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:12 PM
L17	182216	L14 OR (351/158.CCLS.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2024/06/06 03:14 PM

			IBM_TDB)				
L18	2086	L13 AND L17	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 03:14 PM
L19	1261	L13 AND L17	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:18 PM
L20	15	"10307085"	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:26 PM
L21	1	"10307085".PN.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:26 PM
L22	1	"20160066847".PN.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 03:28 PM
L23	670	((("VILLALPANDO") near3 ("Ernesto")) OR (("SO") near3 ("Chiu")) OR ("LAW") near3 ("Kwok")) OR (("CHEUNG") near3 ("Wai"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2024/06/06 04:28 PM
L24	24	((("SOLOS") near3 ("TECHNOLOGY") near3 ("LIMITED"))).AS,AAN M.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:29 PM
L25	39	((("SOLOS") near3 ("TECHNOLOGY") near3 ("LIMITED"))).AS,AAN M.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 04:29 PM
L26	2136	L23 L25	(US-PGPUB; USPAT;	OR	ON	ON	2024/06/06

			USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				04:29 PM
L27	20	L26 AND eyewear AND orientation AND communication	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/06 04:30 PM
L28	15	L26 AND eyewear AND orientation AND communication	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:30 PM
L29	3	L26 AND eyewear AND orientation AND communication AND (first ADJ data)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:31 PM
L30	3	L26 AND eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:31 PM
L31	2	(eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data) AND (computer ADJ readable)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:36 PM
L32	1	"20160066847".pn.	(US-PGPUB)	OR	ON	ON	2024/06/06 04:59 PM
L33	521	L19 AND (external near8 sensor\$)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 05:30 PM
L34	30	L15 AND (external	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06

		near8 sensor\$)					05:59 PM
L37	1	"11835798".pn.	(USPAT)	OR	ON	ON	2024/06/07 04:41 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	2	(eyewear AND orientation AND communication AND (first ADJ data) AND (sensor ADJ data) AND (computer ADJ readable)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/06 04:37 PM



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
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18/517,910

11/22/2023

Ernesto Carlos
Martinez Villalpando

1537-003USC1

CONFIRMATION NO. 8339

145340

Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

PUBLICATION NOTICE



OC000000070024906

Date Mailed: 03/21/2024

Title:EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Publication No.US-2024-0094556-A1

Publication Date:03/21/2024

NOTICE OF PUBLICATION OF APPLICATION

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.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <https://portal.uspto.gov/pair/> PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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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
18/517,910	11/22/2023	2872	768	1537-003USC1	21	3

CONFIRMATION NO. 8339

UPDATED FILING RECEIPT



0000000065859038

145340
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

Date Mailed: 12/15/2023

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)

Ernesto Carlos Martinez Villalpando, Shrewsbury, MA;
Chiu Ming So, Hong Kong, HONG KONG;
Kwok Wah Law, Hong Kong, HONG KONG;
Wai Kuen Cheung, Hong Kong, HONG KONG;

Applicant(s)

Solos Technology Limited, Hong Kong, HONG KONG;

Assignment For Published Patent Application

Solos Technology Limited, Hong Kong, HONG KONG

Power of Attorney: The patent practitioners associated with Customer Number 145340

Domestic Priority data as claimed by applicant

This application is a CON of 16/736,593 01/07/2020 PAT 11,835,798
which is a CIP of 16/711,340 12/11/2019 PAT 11,796,833
which claims benefit of 62/778,709 12/12/2018
and claims benefit of 62/873,889 07/13/2019
and said 16/736,593 01/07/2020 claims benefit of 62/789,818 01/08/2019
and claims benefit of 62/873,889 07/13/2019

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: 12/06/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/517,910**

Projected Publication Date: 03/21/2024

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Preliminary Class

351

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

page 2 of 4

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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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.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 18/517,910	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	64		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	280		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	320		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	21	minus 20 = *	1	x 40 = 40			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *		x = 0			
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			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0			
				TOTAL		TOTAL	
					704		
* If the difference in column 1 is less than zero, enter "0" in column 2.							
APPLICATION AS AMENDED - PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =		x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =		x =
	Application Size Fee (37 CFR 1.16(s))						
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
				TOTAL ADD'L FEE		TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =		x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =		x =
	Application Size Fee (37 CFR 1.16(s))						
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
				TOTAL ADD'L FEE		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.							



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
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18/517,910

11/22/2023

Ernesto Carlos
Martinez Villalpando

1537-003USC1

CONFIRMATION NO. 8339

145340

Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

INFORMAL NOTICE



OC000000065859046

Date Mailed: 12/15/2023

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):

Ernesto Carlos Martinez Villalpando

Chiu Ming So

Kwok Wah Law

Wai Kuen Cheung

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor must be submitted no later than the date on which the issue fee is paid in response to a notice requiring such fee. See 37 CFR 1.53(f).

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.

/dtdinh/



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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/517,910

RECEIPT DATE / TIME
12/13/2023 01:49:26 PM Z ET

ATTORNEY DOCKET #
1537-003USC1

Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 8339

FILED BY Annelise Hurley

PATENT CENTER # 63598391

FILING DATE 11/22/2023

CUSTOMER # 145340

FIRST NAMED INVENTOR Ernesto Carlos Martinez Villalpando

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Keegan Caldwell

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1537-003USC1_NTC_to_File_Missing_Parts_20231213.pdf	2	Applicant Response to Pre-Exam Formalities Notice	186 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
1537-003USC1_NTC_to_File_Missing_Parts_20231213.pdf	7743356DDF12F8AA7217FC9A327FC512E6062BE11FD02BAC711A70F037C993C101DE2F2A2A0B541A19FC70CDF352BB85E6CD526CBC1B915A1336CEA7245D3605

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 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
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1

CONFIRMATION NO. 8339

FORMALITIES LETTER



OC000000065475743

145340
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

Date Mailed: 12/07/2023

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION
FILED UNDER 37 CFR 1.53(b)
Filing Date Granted

An application number and filing date have been accorded to the above-identified nonprovisional application. The item(s) indicated below, however, are missing.

Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- Additional claim fees of **\$40** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- Surcharge as set forth in 37 CFR 1.16(f) has not been received.

The surcharge is due for any one of:

- late submission of the basic filing fee, search fee, or examination fee,
- late submission of inventor's oath or declaration,
- filing an application that does not contain at least one claim on filing, or
- submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required (including the fees noted above) are as follows. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- **\$64** surcharge.
- **\$40** for 1 total claims over 20.
- **\$(0)** previous unapplied payment amount.
- **\$104** TOTAL FEE BALANCE DUE.

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).

Items Required To Avoid Processing Delays:

The deficiencies indicated below should be addressed promptly to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):

Ernesto Carlos Martinez Villalpando
Chiu Ming So
Kwok Wah Law
Wai Kuen Cheung

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor must be submitted no later than the date on which the issue fee is paid in response to a notice requiring such fee. See 37 CFR 1.53(f).

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 addressed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

REPLY VIA ELECTRONIC FILING

A reply may be submitted via electronic filing only by registered users of the appropriate USPTO patent electronic filing system and must include:

- A separate document having the document description, "**Applicant response to Pre-Exam Formalities Notice**"; and
- the item(s) for which a reply period is set forth above.

For more information about electronic filing, contact the Patent Electronic Business Center (EBC) 1-866-217-9197 or visit <https://www.uspto.gov/ebc>

NOTE: If the reply is not being submitted electronically, a copy of this notice must be included.

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**.

/sudenboba/



ELECTRONIC PAYMENT RECEIPT

APPLICATION #
18/517,910

RECEIPT DATE / TIME
12/13/2023 01:49:26 PM Z ET

ATTORNEY DOCKET #
1537-003USC1

Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 8339

FILED BY Annelise Hurley

PATENT CENTER # 63598391

AUTHORIZED BY Keegan Caldwell

CUSTOMER # 145340

FILING DATE 11/22/2023

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Ernesto Carlos Martinez Villalpando

Payment Information

PAYMENT METHOD
CARD / 2227

PAYMENT TRANSACTION ID
E2023BCD49507413

PAYMENT AUTHORIZED BY
Annelise Hurley

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2051	SURCHARGE- LATE FILING FEE, SEARCH FEE, EXAMINATION FEE, INVENTOR'S OATH OR DECLARATION, OR APPLICATION FILED WITHOUT AT LEAST ONE CLAIM OR BY REFERENCE	64.00	1	64.00
2202	EACH CLAIM IN EXCESS OF 20	40.00	1	40.00
TOTAL AMOUNT:				\$104.00

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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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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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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
18/517,910	11/22/2023		664	1537-003USC1	21	3

CONFIRMATION NO. 8339

145340
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

FILING RECEIPT



0000000065475738

Date Mailed: 12/07/2023

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)

Ernesto Carlos Martinez Villalpando, Shrewsbury, MA;
Chiu Ming So, Hong Kong, HONG KONG;
Kwok Wah Law, Hong Kong, HONG KONG;
Wai Kuen Cheung, Hong Kong, HONG KONG;

Applicant(s)

Solos Technology Limited, Hong Kong, HONG KONG;

Assignment For Published Patent Application

Solos Technology Limited, Hong Kong, HONG KONG

Power of Attorney: The patent practitioners associated with Customer Number 145340

Domestic Priority data as claimed by applicant

This application is a CON of 16/736,593 01/07/2020 PAT 11,835,798
which is a CIP of 16/711,340 12/11/2019 PAT 11,796,833
which claims benefit of 62/778,709 12/12/2018
and claims benefit of 62/873,889 07/13/2019
and said 16/736,593 01/07/2020 claims benefit of 62/789,818 01/08/2019
and claims benefit of 62/873,889 07/13/2019

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: 12/06/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/517,910**

Projected Publication Date: 03/14/2024

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

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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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 Assets Control, 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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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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 18/517,910	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	64		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	280		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	320		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	21	minus 20 = *	1	x 40 = 40	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *		x = 0	OR		
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			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0			
				TOTAL		TOTAL	
* If the difference in column 1 is less than zero, enter "0" in column 2.				704			
APPLICATION AS AMENDED - PART II							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	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))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
				TOTAL ADD'L FEE		TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)
	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))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
				TOTAL ADD'L FEE		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.							



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United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/517,910	11/22/2023	Ernesto Carlos Martinez Villalpando	1537-003USC1

CONFIRMATION NO. 8339

FORMALITIES LETTER



OC000000065475743

145340
Caldwell Intellectual Property Law
200 Clarendon Street
59th Floor
Boston, MA 02116

Date Mailed: 12/07/2023

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION
FILED UNDER 37 CFR 1.53(b)
Filing Date Granted

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- Surcharge as set forth in 37 CFR 1.16(f) has not been received.

The surcharge is due for any one of:

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- late submission of inventor's oath or declaration,
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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).

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/sudenboba/



United States Patent and Trademark Office

Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office

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Learn how to identify which of your creative ideas might be intellectual property assets and how to protect them by using the USPTO Intellectual Property (IP) Identifier.

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Kathi Vidal

Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office

Derrick Brent

Deputy Under Secretary of Commerce for Intellectual Property and
Deputy Director of the United States Patent and Trademark Office



UNITED STATES
PATENT AND TRADEMARK OFFICE

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

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/517,910

RECEIPT DATE / TIME
11/29/2023 11:11:15 AM Z ET

ATTORNEY DOCKET #
1537-003USC1

Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 8339

FILED BY Rachel Riley

PATENT CENTER # 63415573

FILING DATE -

CUSTOMER # 145340

FIRST NAMED INVENTOR Ernesto Carlos Martinez Villalpando

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Keegan Caldwell

Documents

TOTAL DOCUMENTS: 0

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
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Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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New Applications Under 35 U.S.C. 111

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #
18/517,910

RECEIPT DATE / TIME
11/29/2023 11:11:15 AM Z ET

ATTORNEY DOCKET #
1537-003USC1

Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 8339

FILED BY Rachel Riley

PATENT CENTER # 63415573

AUTHORIZED BY Keegan Caldwell

CUSTOMER # 145340

FILING DATE -

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Ernesto Carlos Martinez Villalpando

Payment Information

PAYMENT METHOD
CARD / 2227

PAYMENT TRANSACTION ID
E2023ASB11497285

PAYMENT AUTHORIZED BY
Rachel Riley

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2111	UTILITY PATENT APPL. SEARCH FEE	280.00	1	280.00
4011	BASIC FILING FEE- UTILITY	64.00	1	64.00
2311	EXAMINATION OF ORIGINAL PATENT APPLICATION	320.00	1	320.00
TOTAL AMOUNT:				\$664.00

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Application Number	18/517,910
Filing Date	11/22/2023
First Named Inventor	Ernesto Carlos Martinez Villalpando
Title	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER
Art Unit	---
Examiner Name	---
Attorney Docket Number	1537-003USC1

SIGNATURE of Applicant or Patent Practitioner

Signature	/Keegan Caldwell/	Date (Optional)	
Name	Keegan Caldwell	Registration Number	73731
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

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Approved for use through 03/31/2021. OMB 0651-0035

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Application Number	Filing Date
18/517,910	11/22/2023

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

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OR

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I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Solos Technology Limited

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
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SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Kenneth Fan

Date (Optional)

Name

Kenneth Fan

Title

Co-Founder

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APPLICATION #
18/517,910

RECEIPT DATE / TIME
11/28/2023 08:01:58 PM Z ET

ATTORNEY DOCKET #
1537-003USC1

Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 8339

FILED BY Rachel Riley

PATENT CENTER # 63410281

FILING DATE -

CUSTOMER # 145340

FIRST NAMED INVENTOR Ernesto Carlos Martinez Villalpando

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Keegan Caldwell

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1537-003USC1__POA.pdf	4	Power of Attorney	264 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
1537-003USC1__POA.pdf	02098D1DBB9FF12CB7D4750954B732B10F8EB5E415E4B98B0 EA830C55801BD4E14D12B1FD4BC6785E3F09620BDB5FFD6D 043C7476D5C65E490848E7B03C4DFA2

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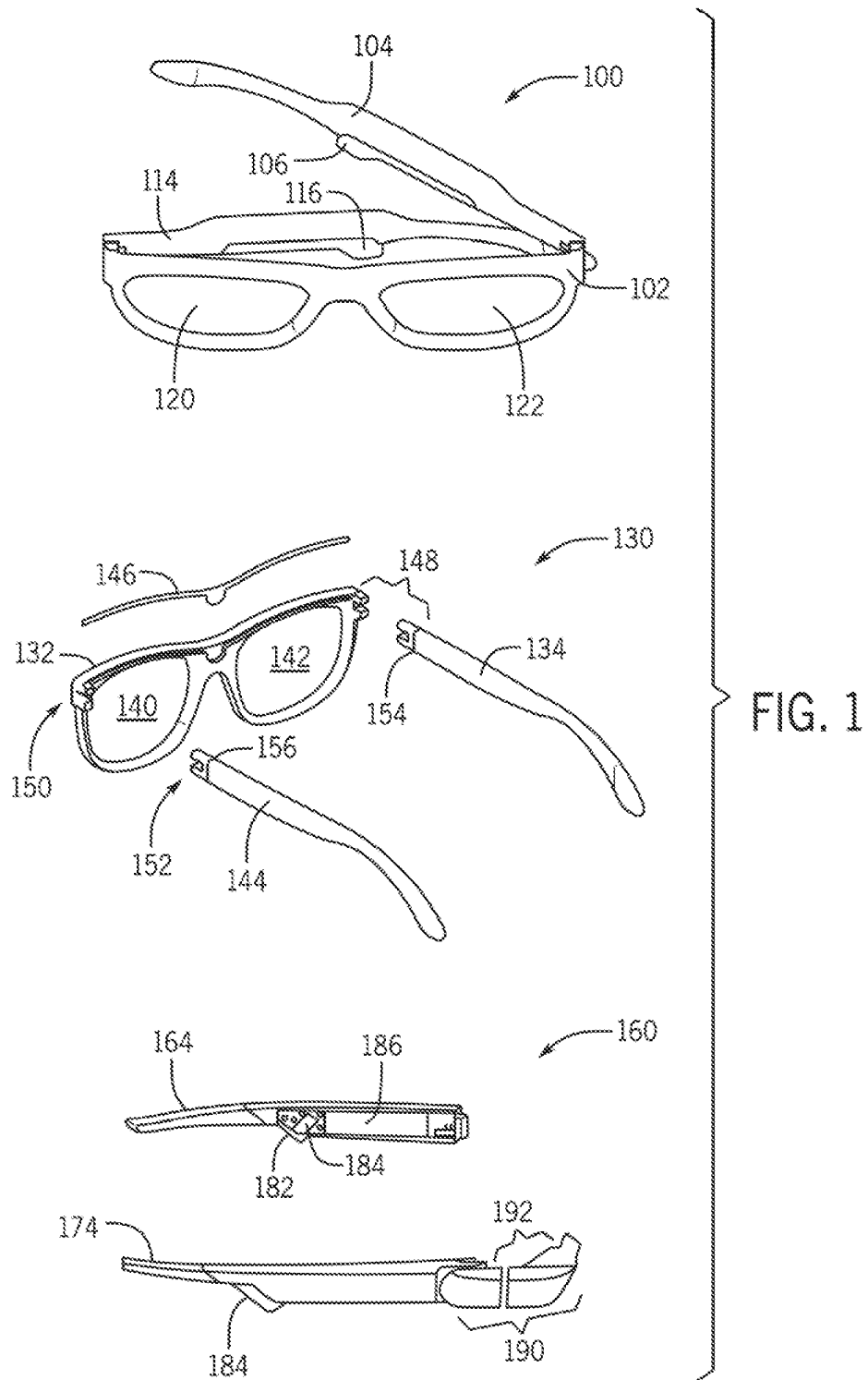


FIG. 2

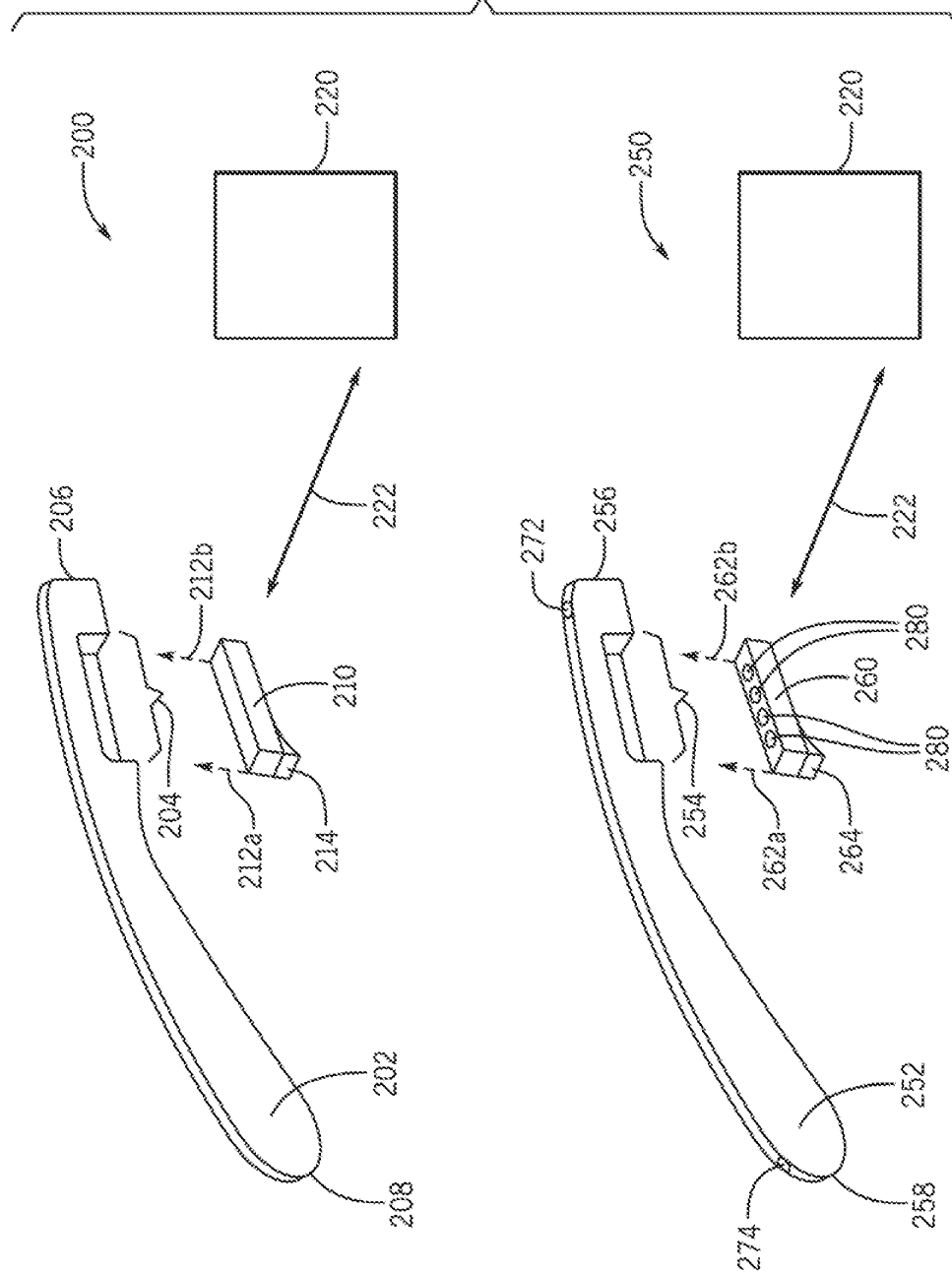


FIG. 3

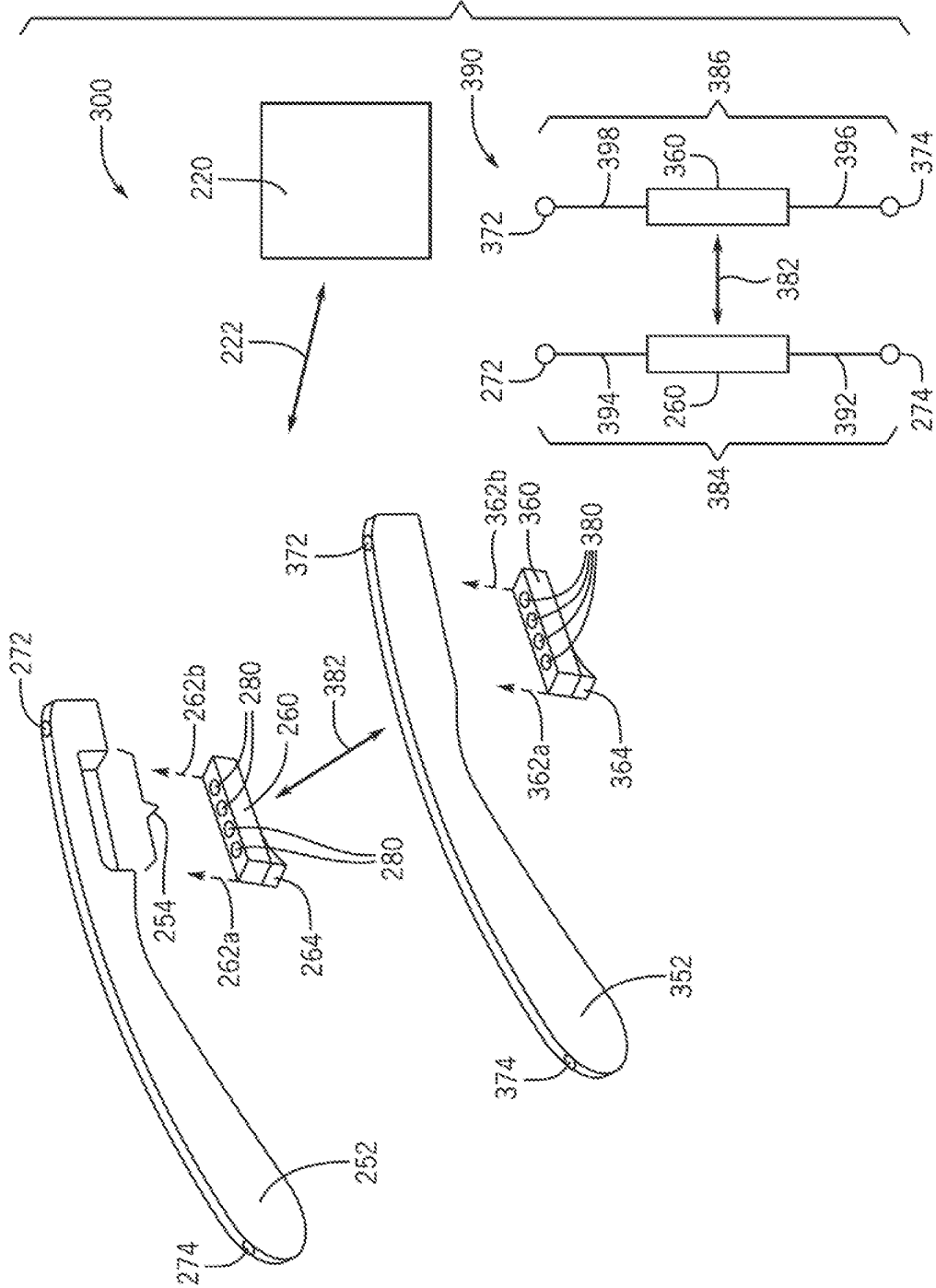
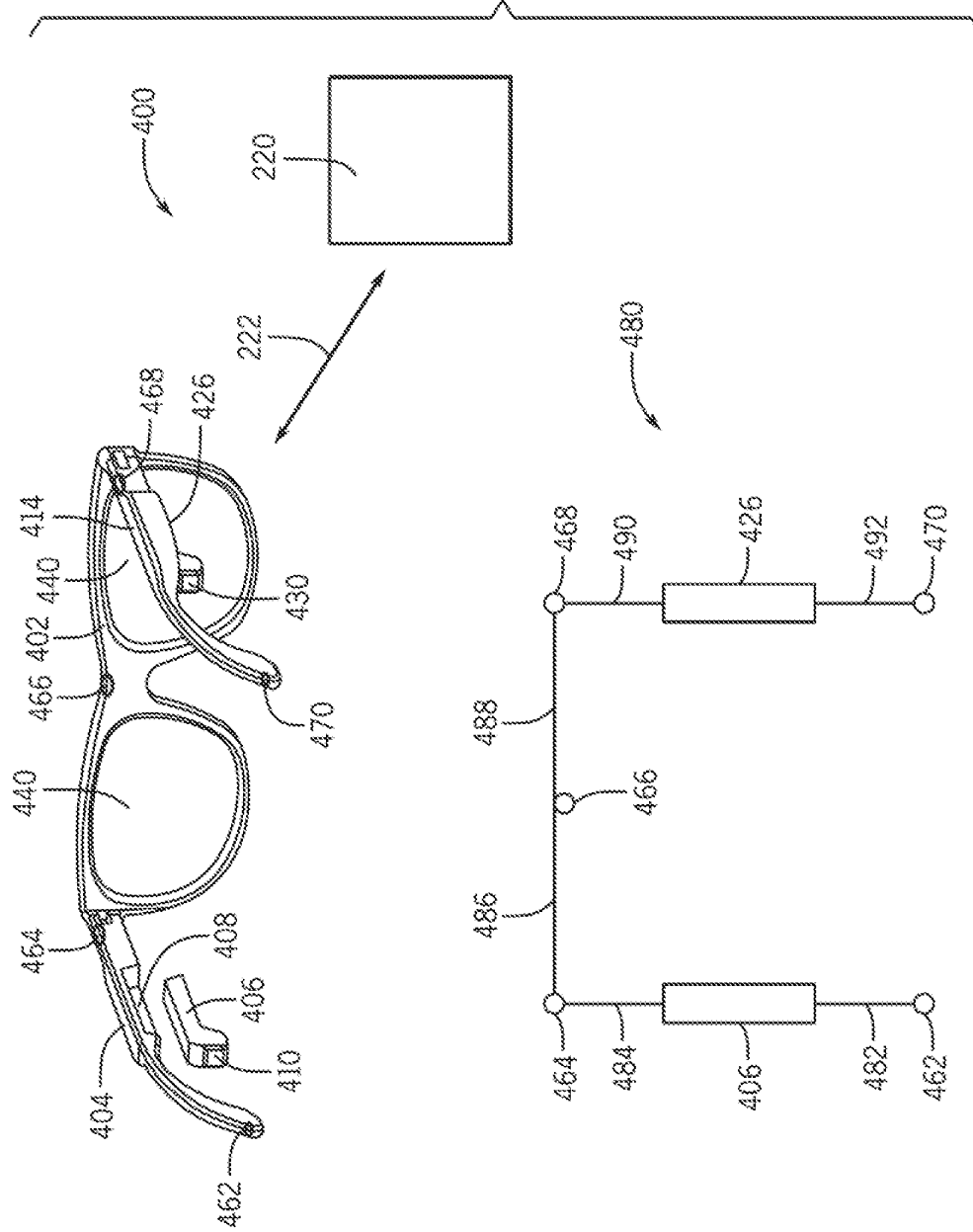
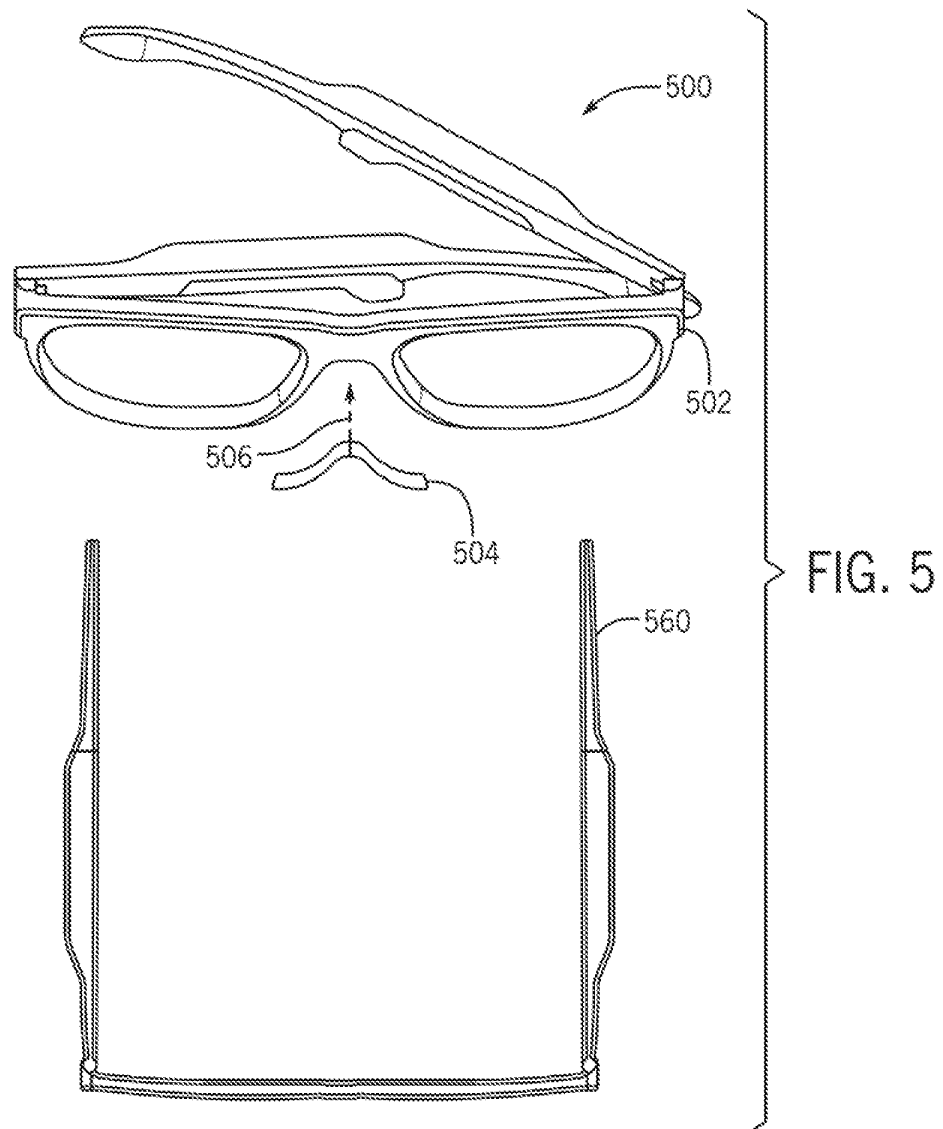


FIG. 4



5/25



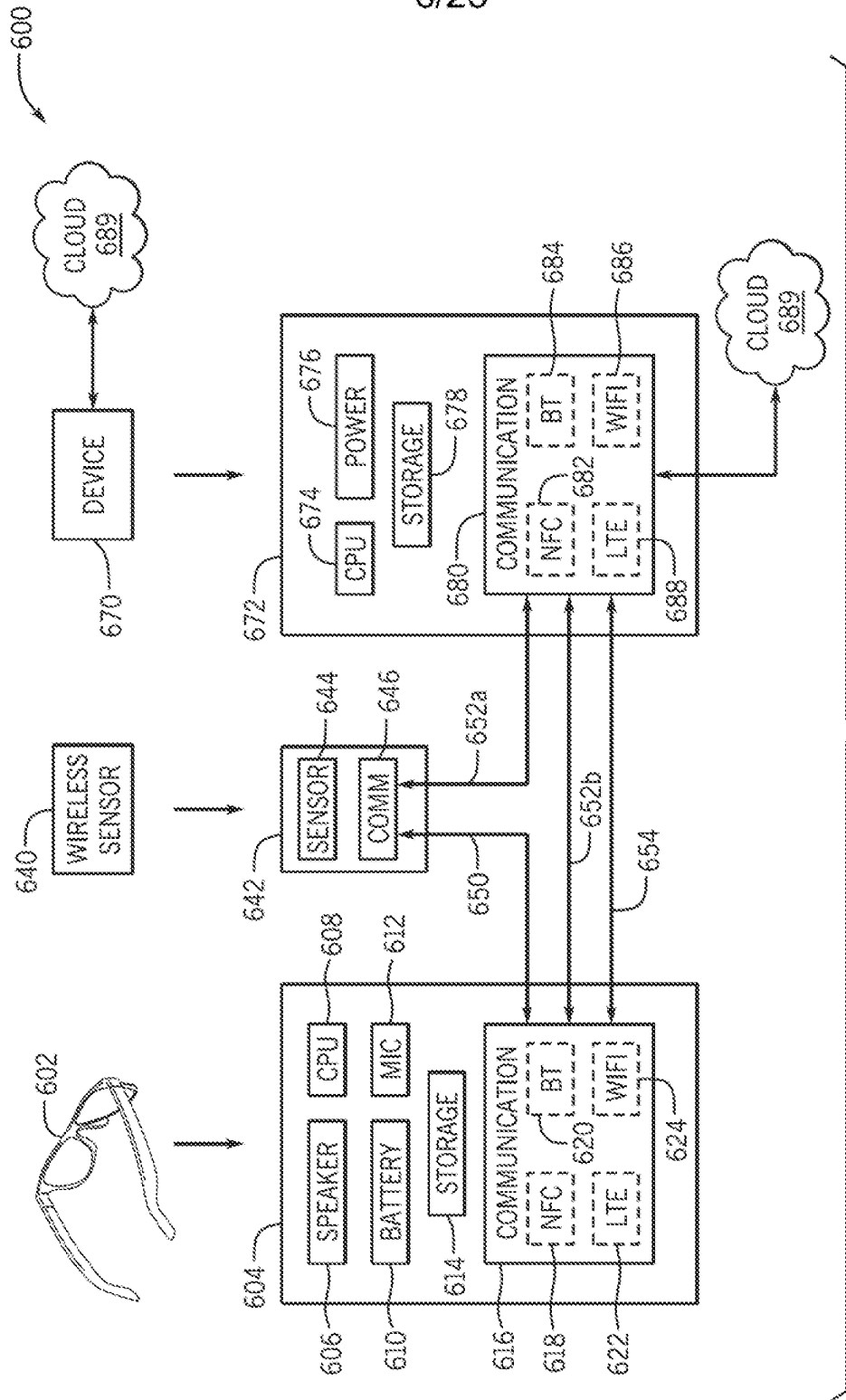


FIG. 6A

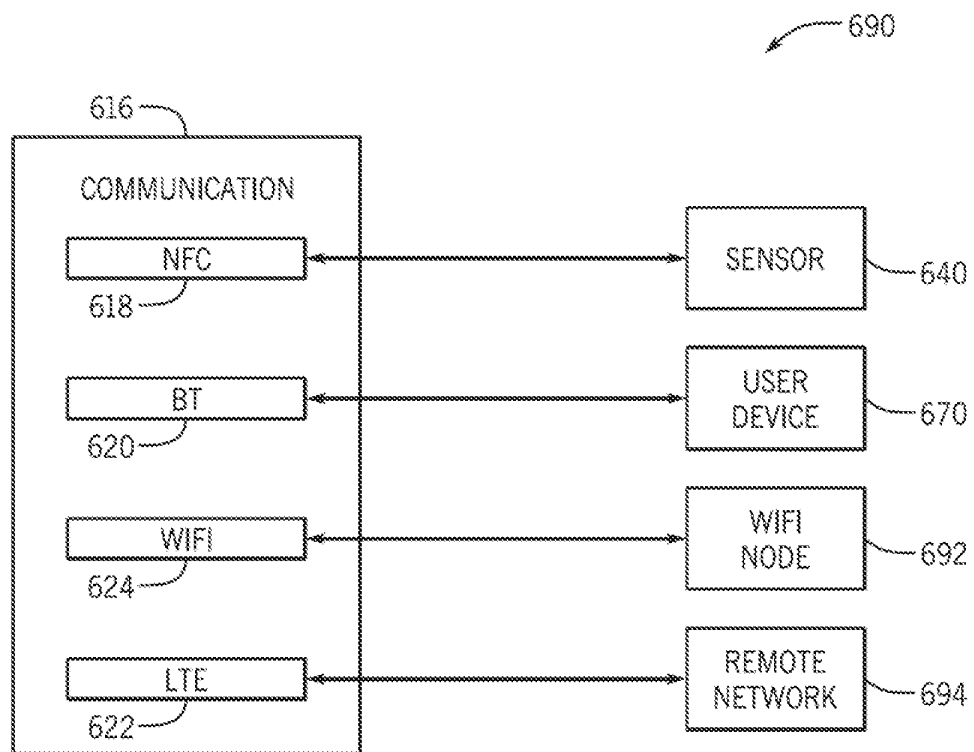


FIG. 6B

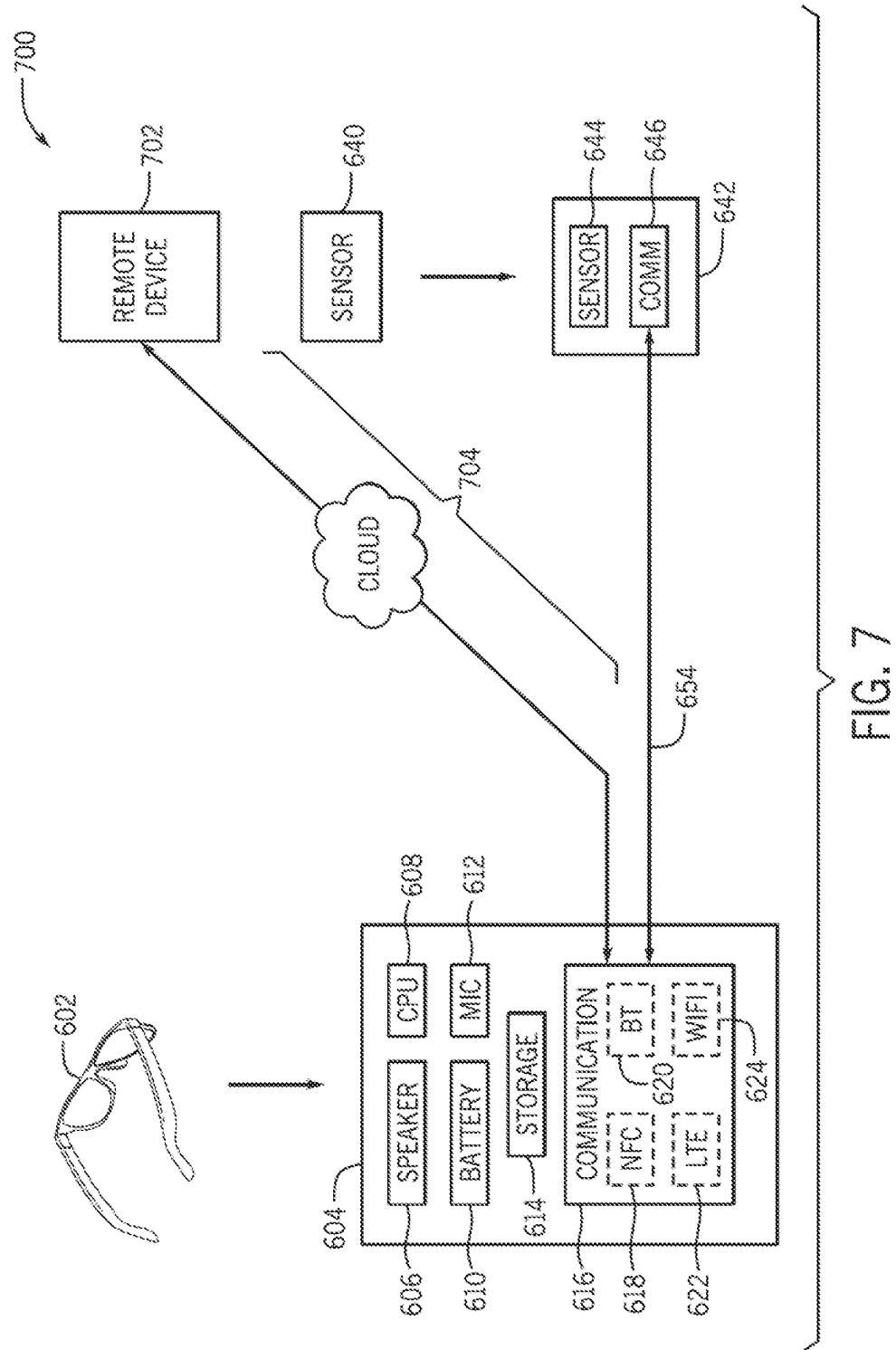


FIG. 7

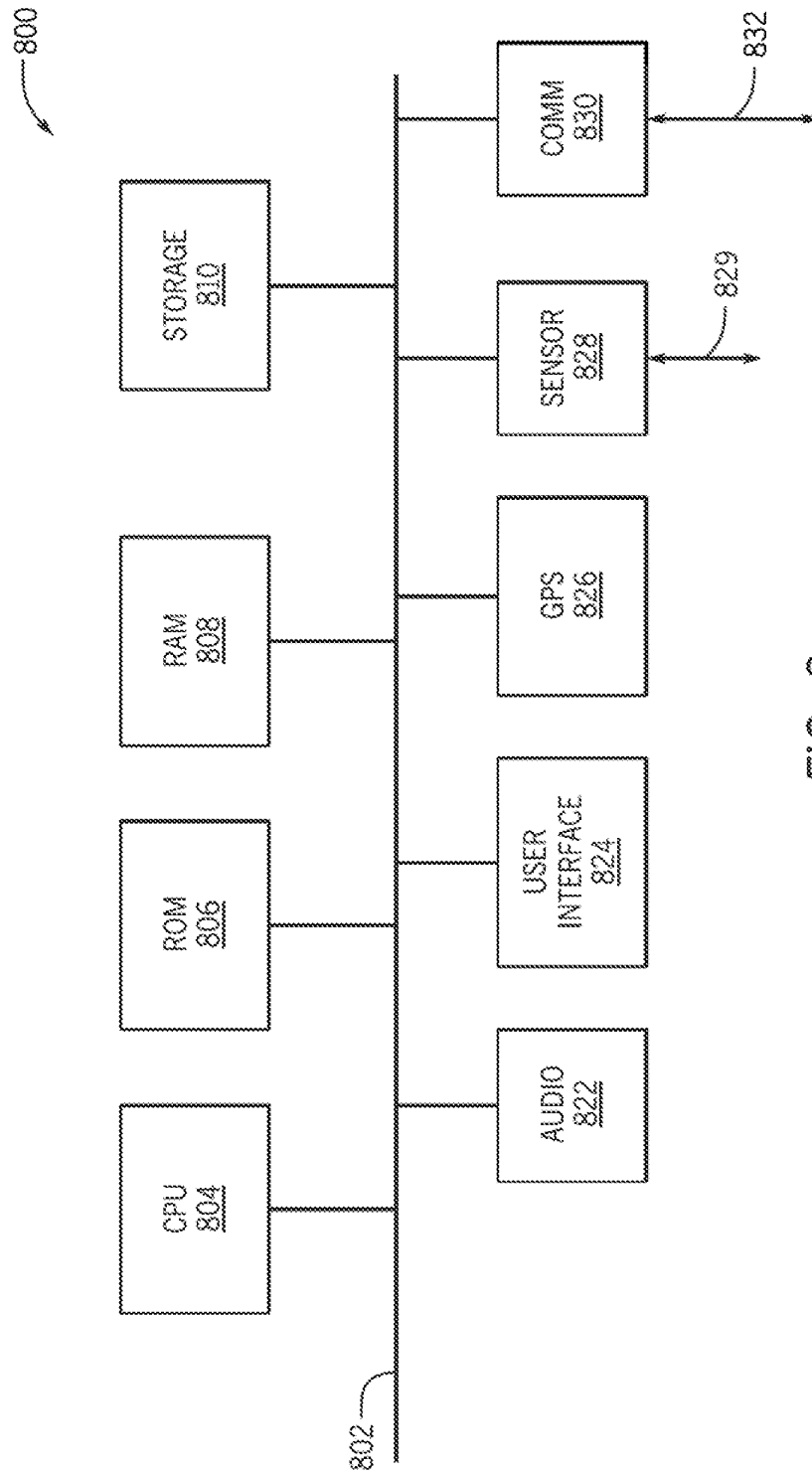


FIG. 8

10/25

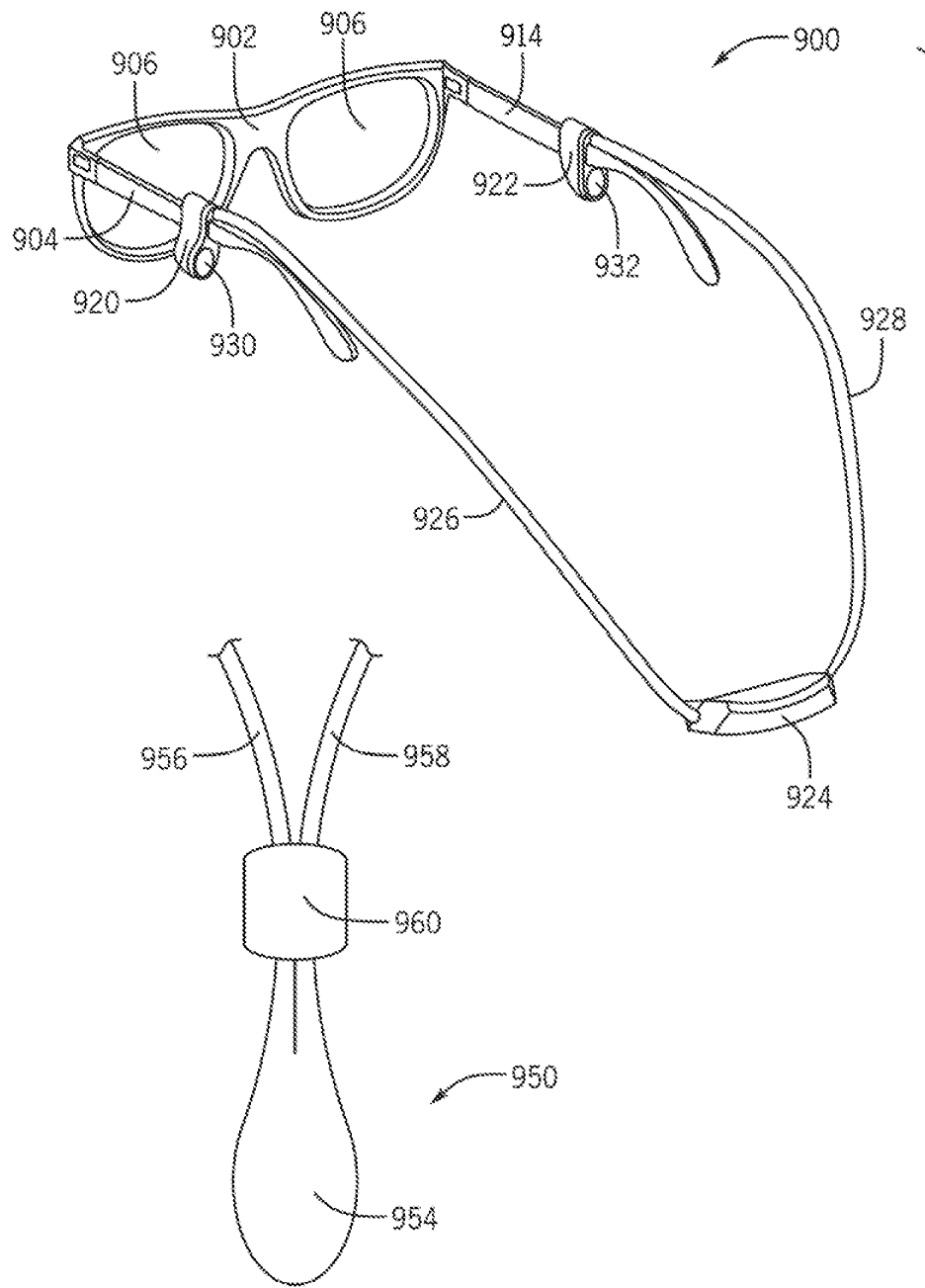


FIG. 9

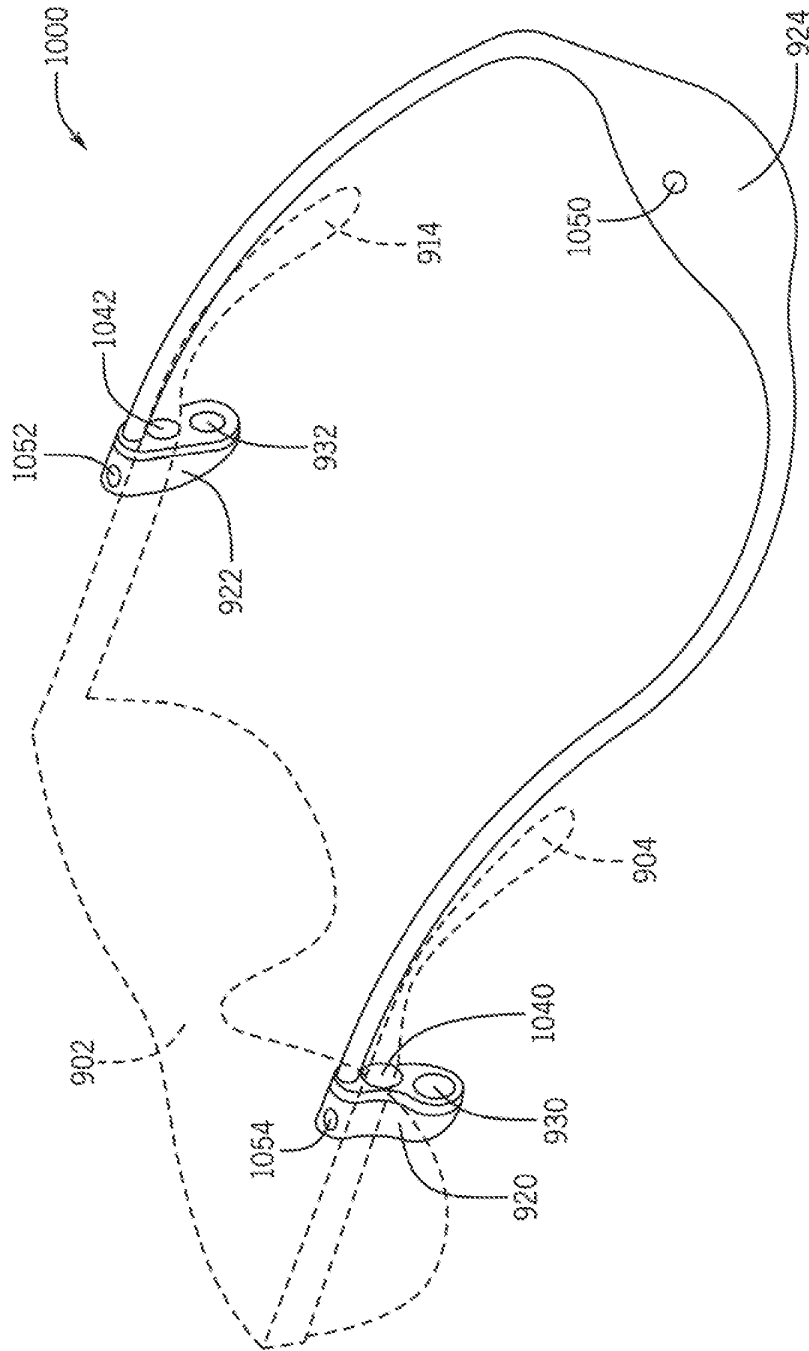
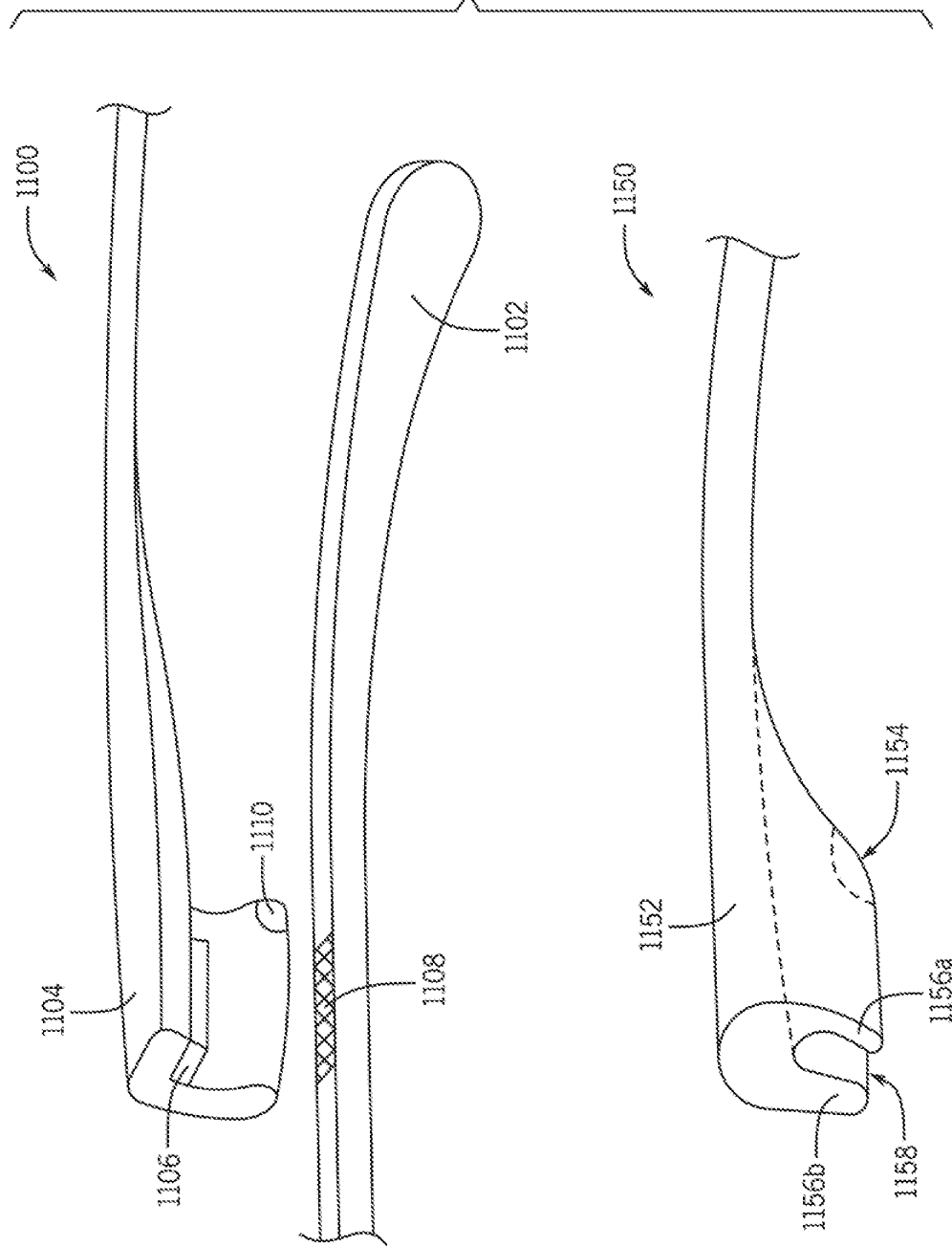


FIG. 10

FIG. 11



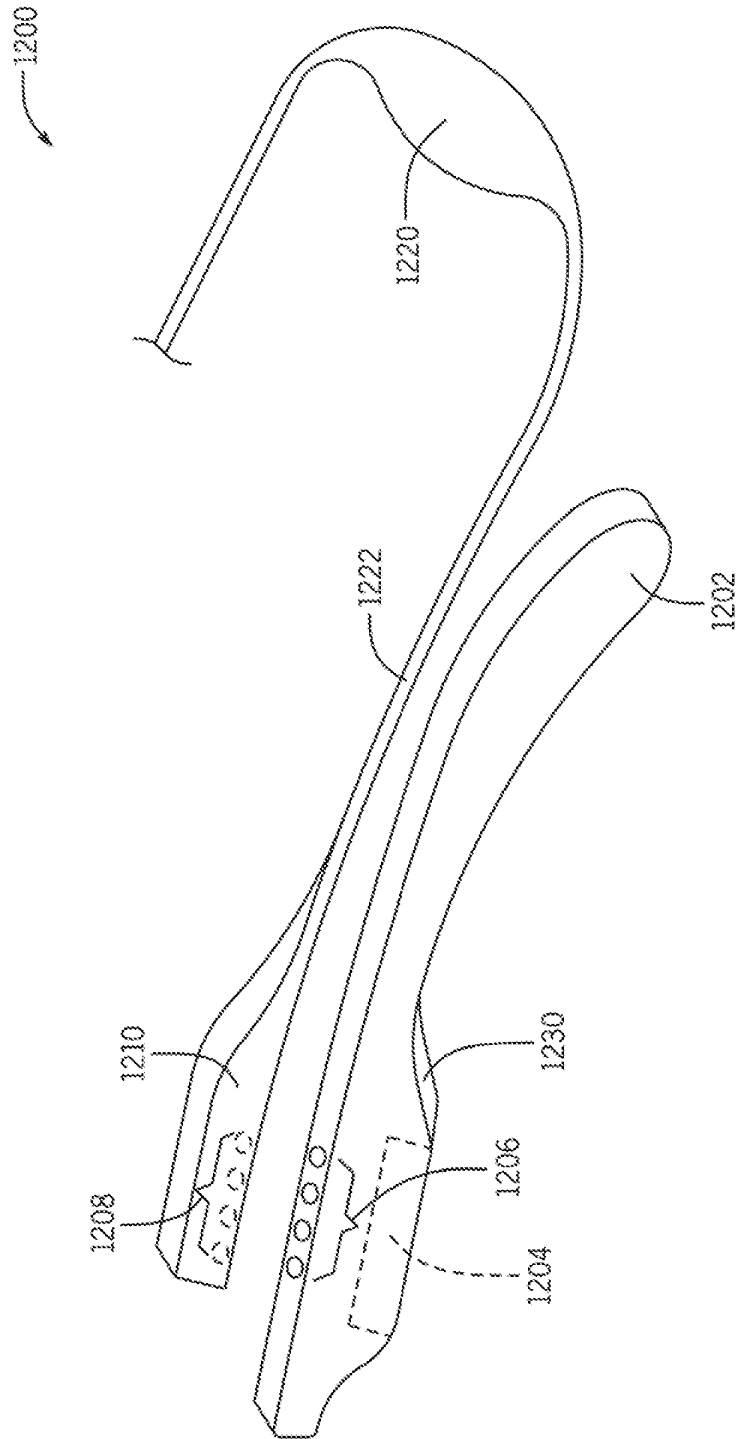
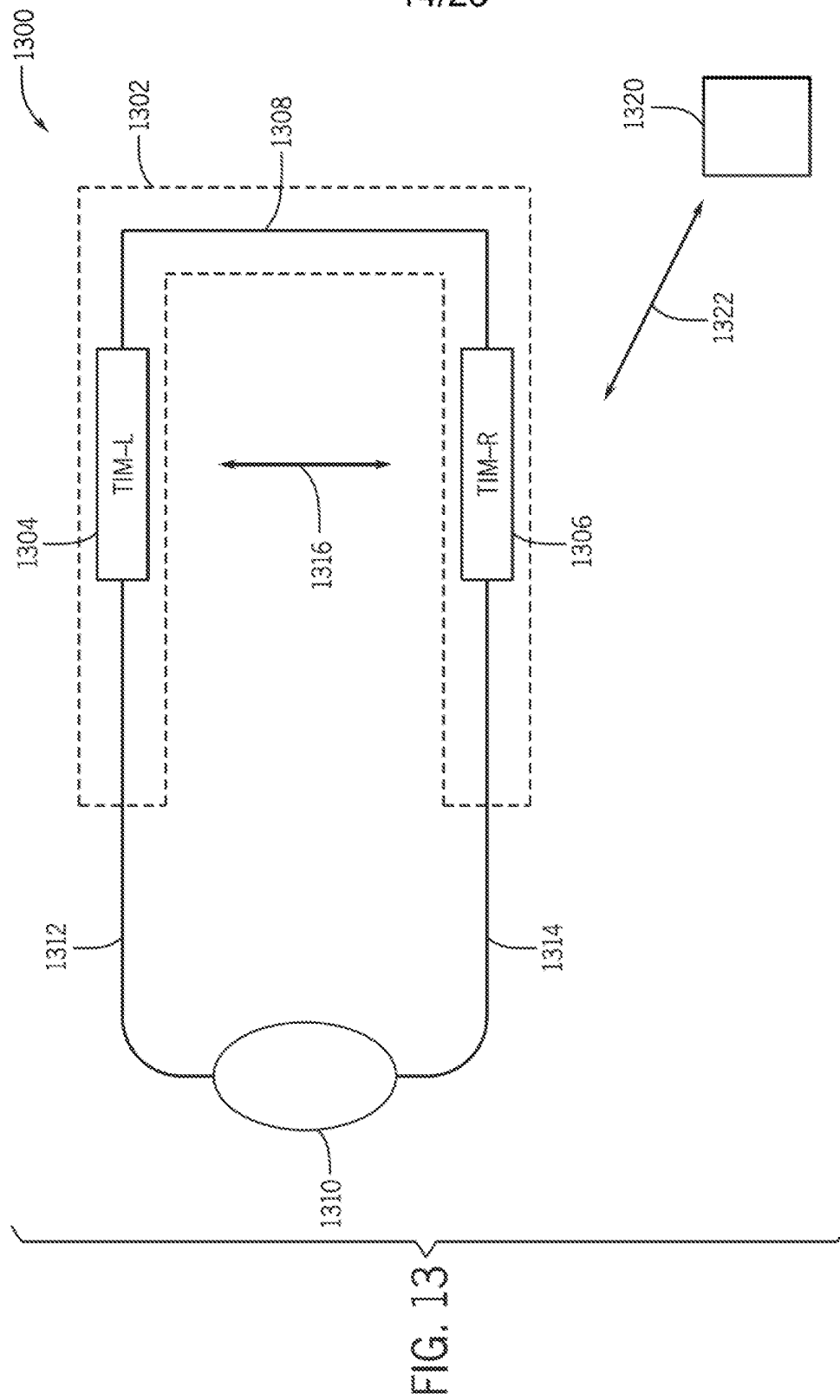


FIG. 12



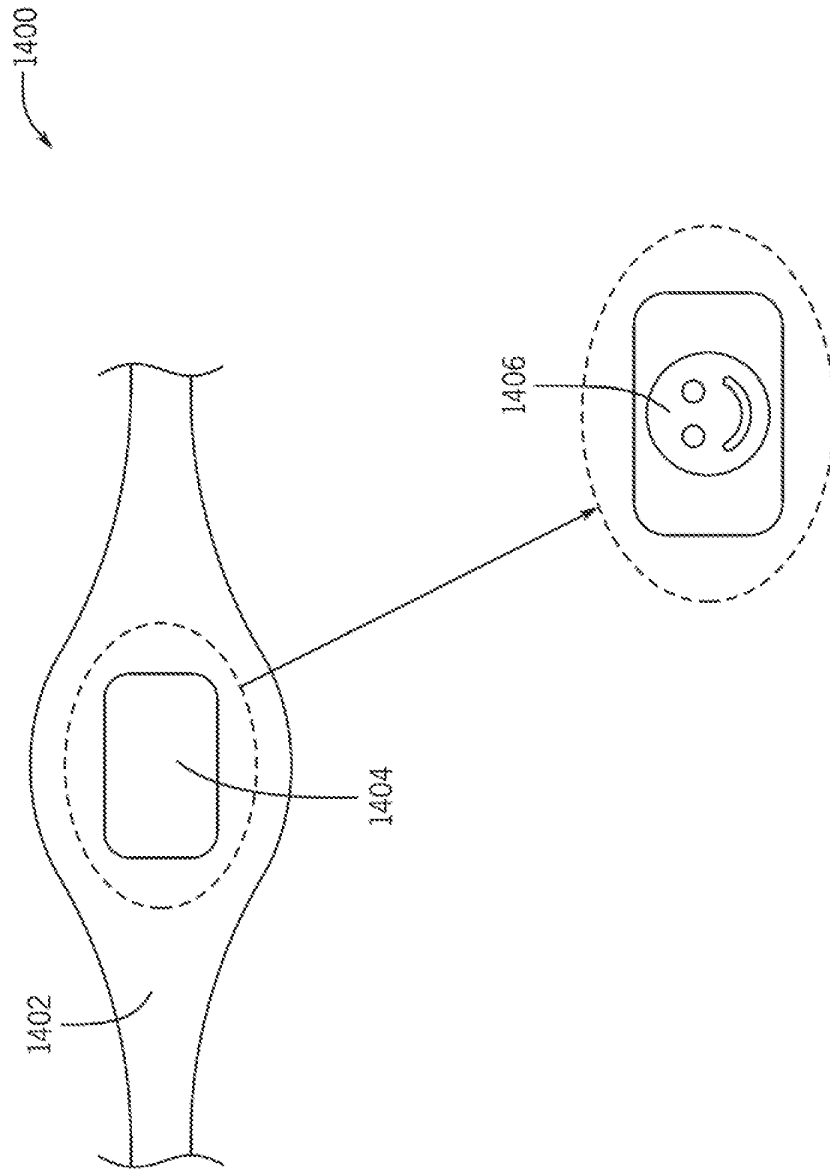


FIG. 14

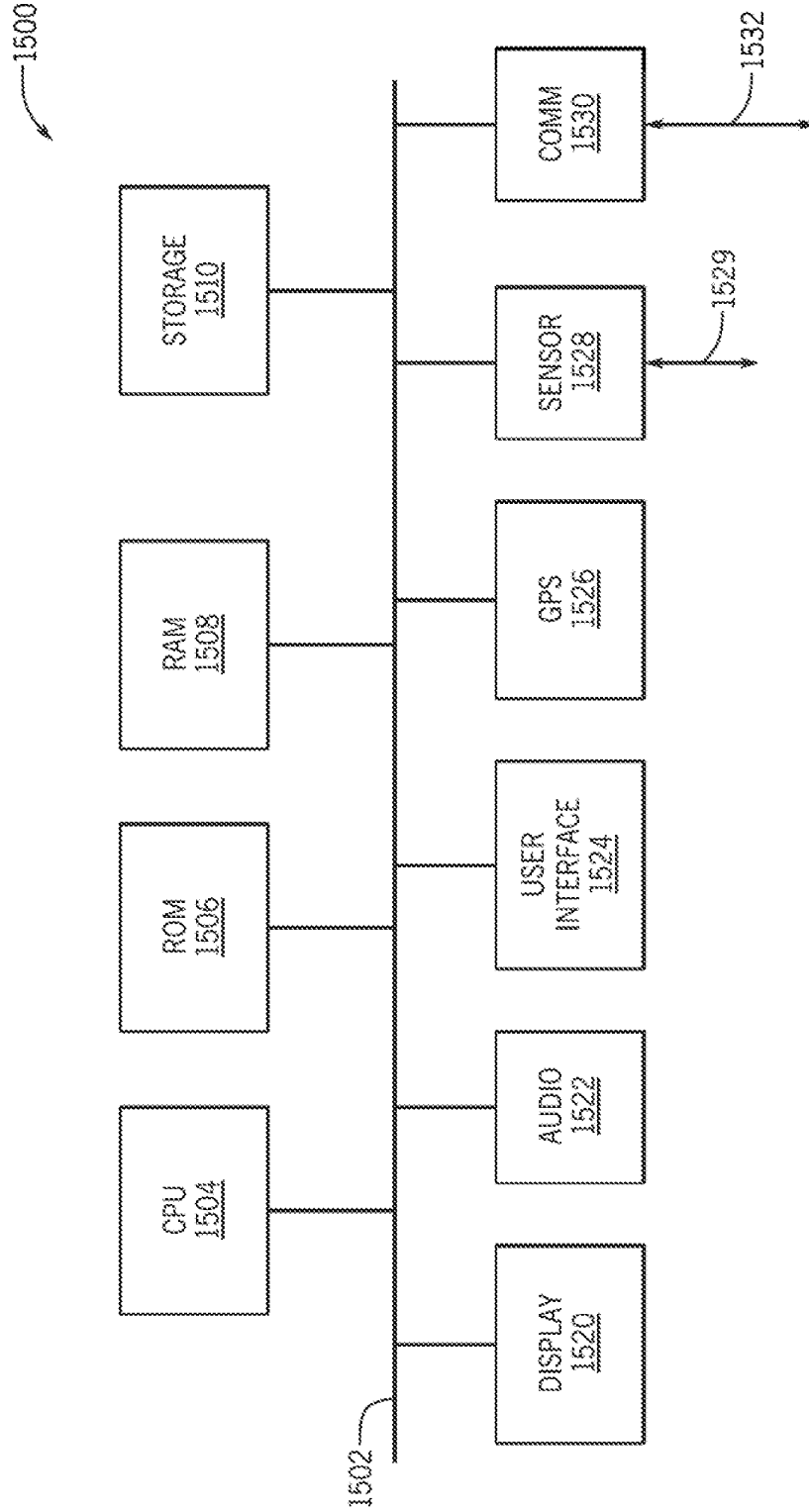


FIG. 15

FIG. 16

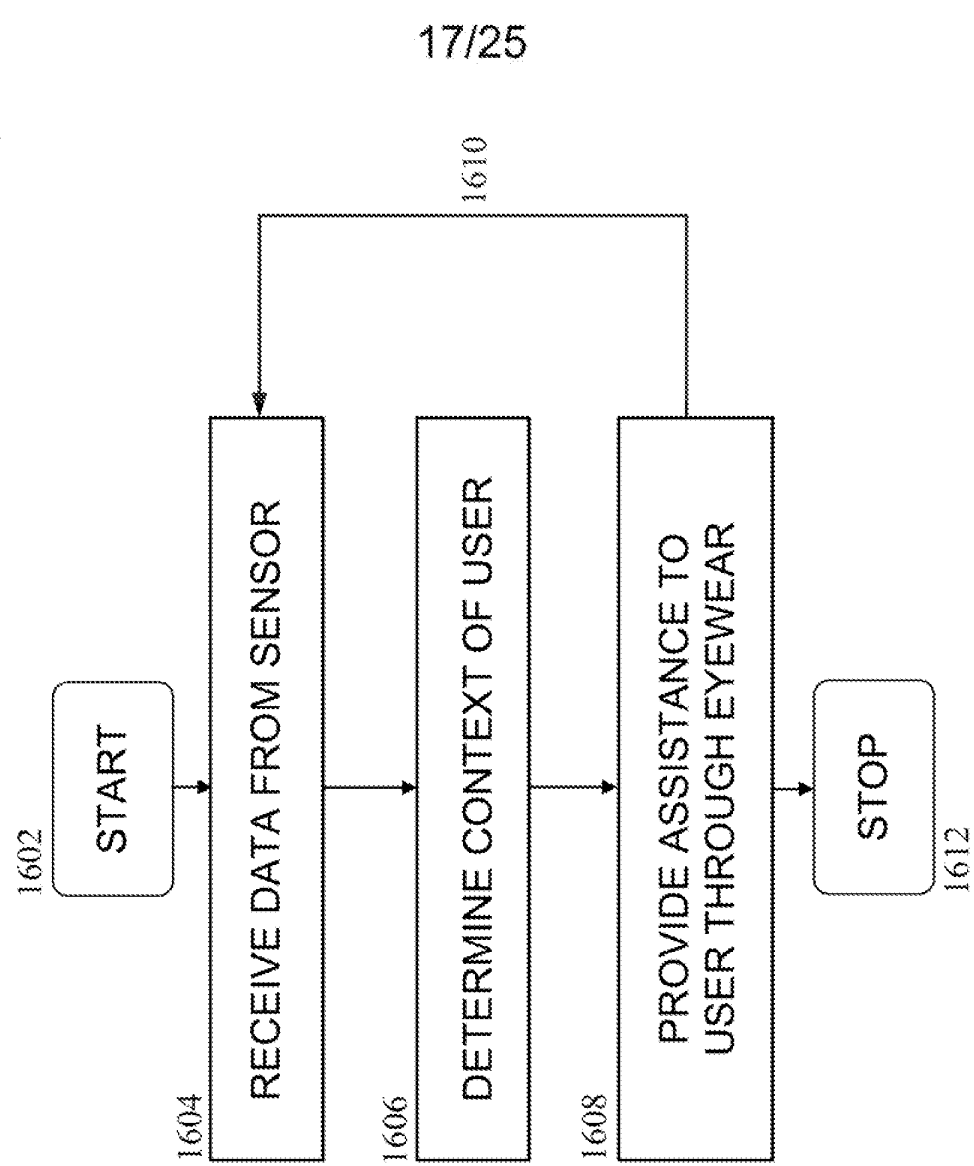
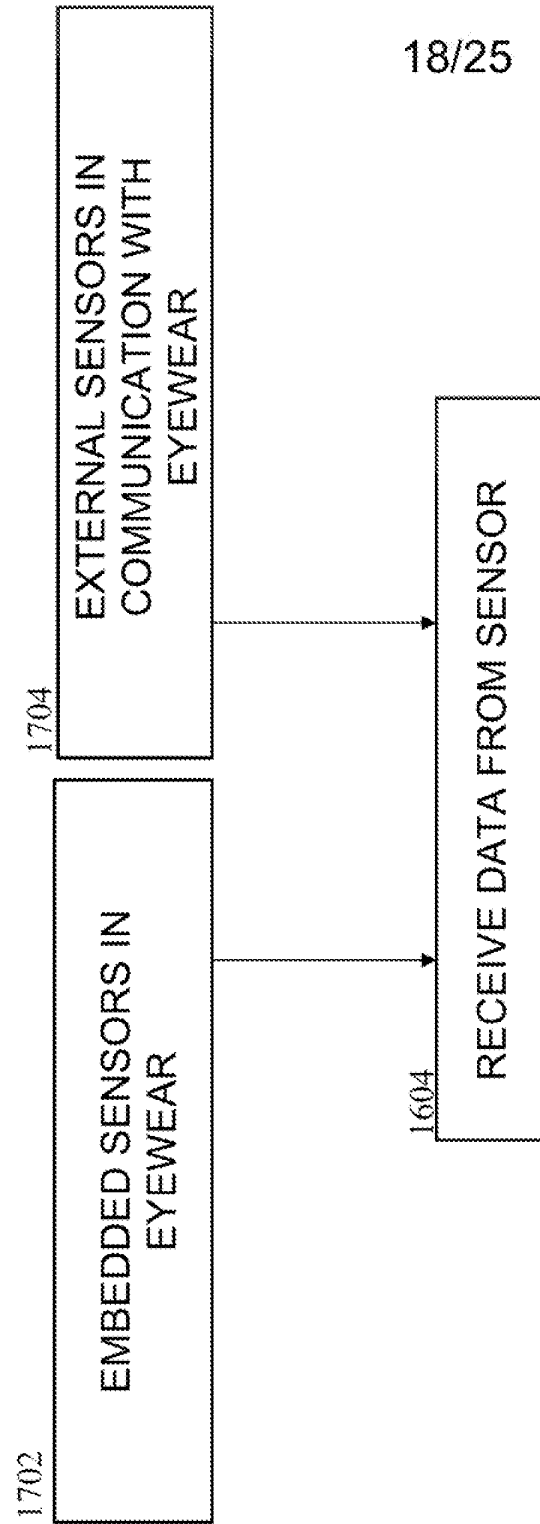


FIG. 17

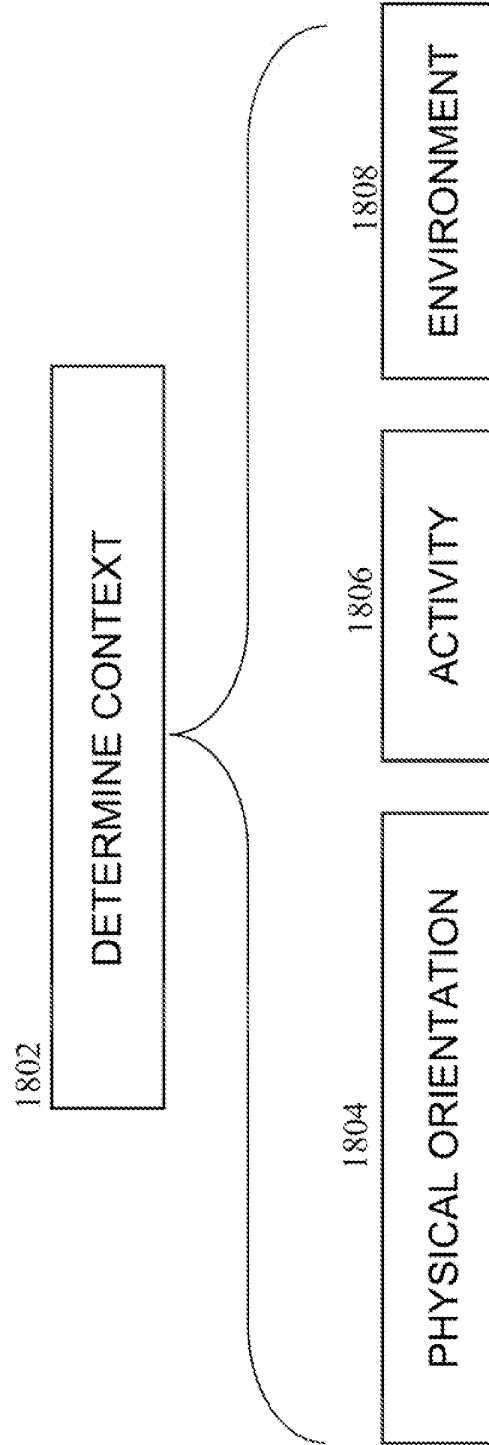
1700



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FIG. 18

1800



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FIG. 19

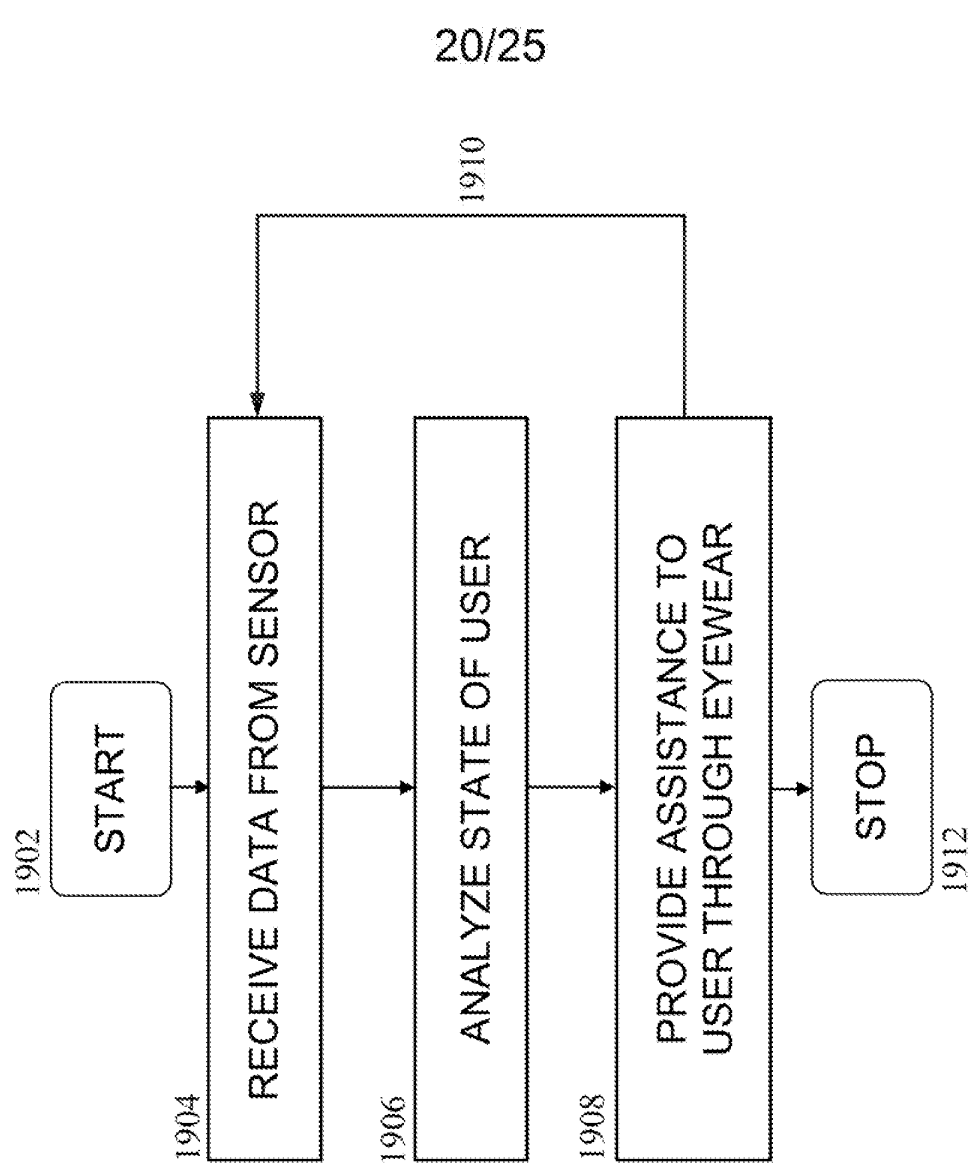


FIG. 20

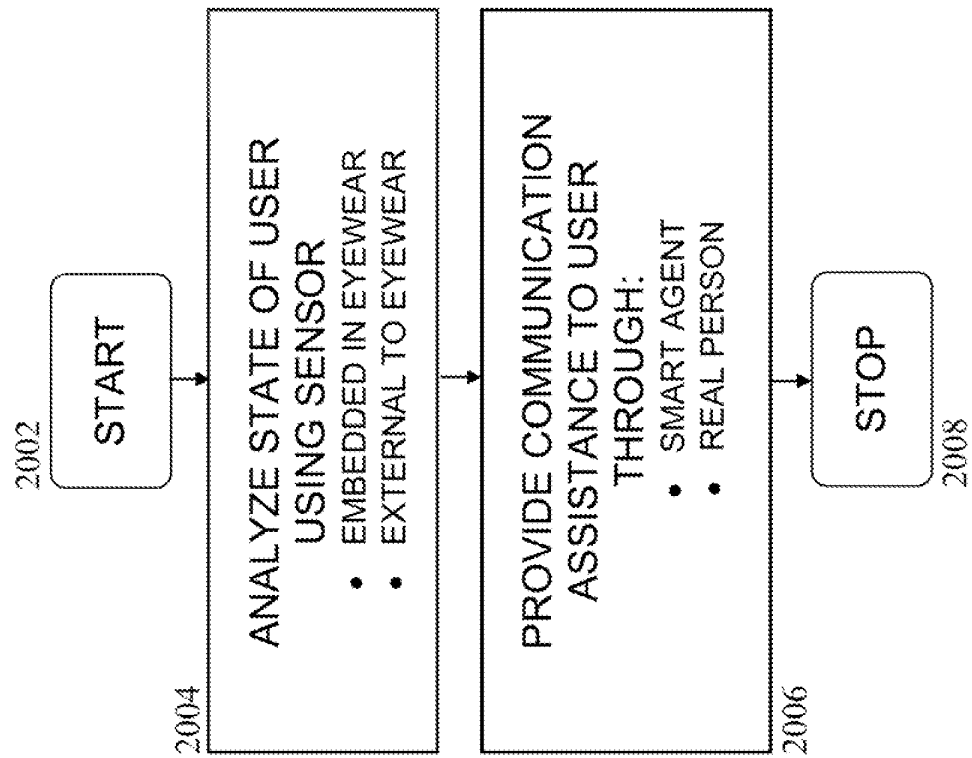


FIG. 21

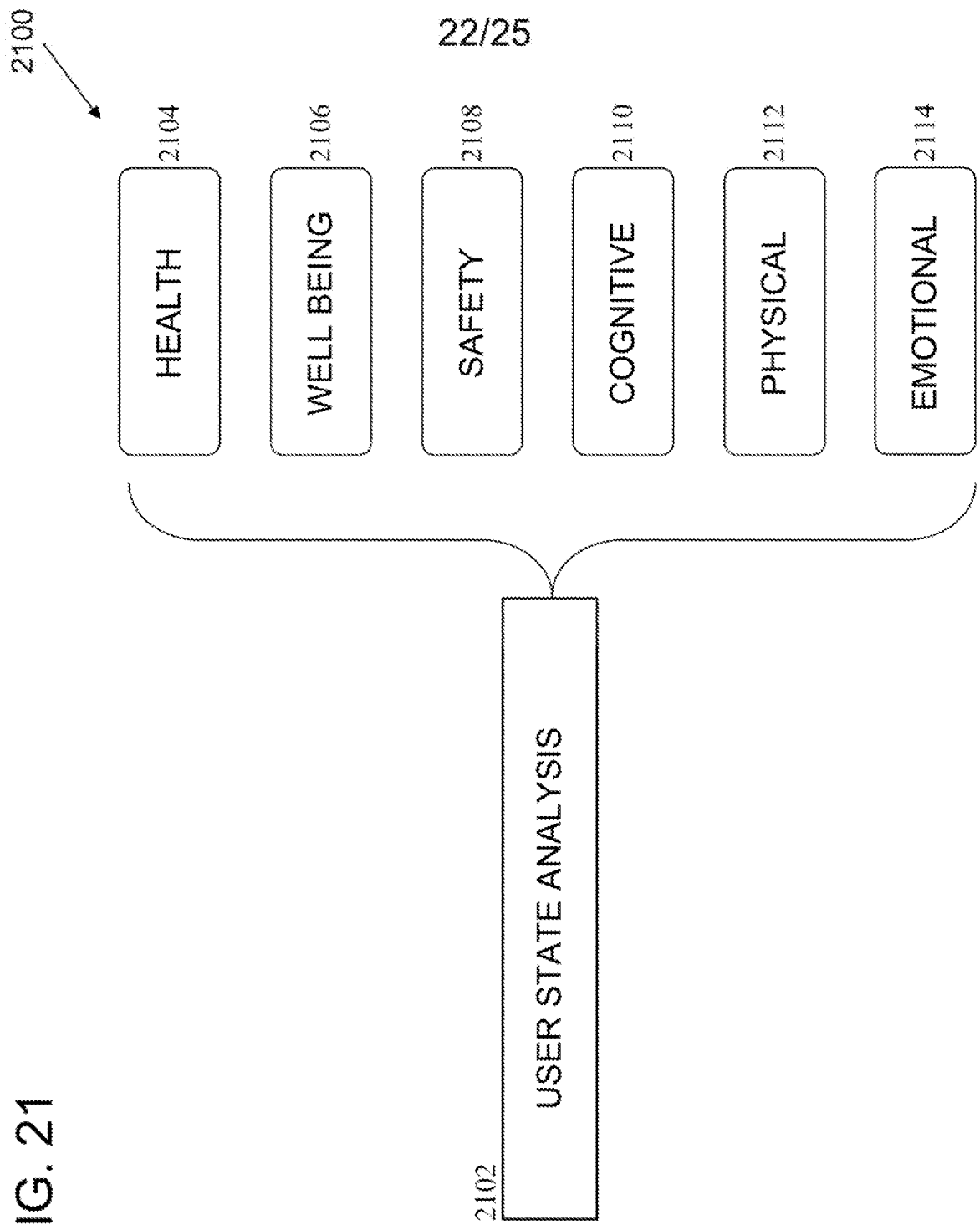
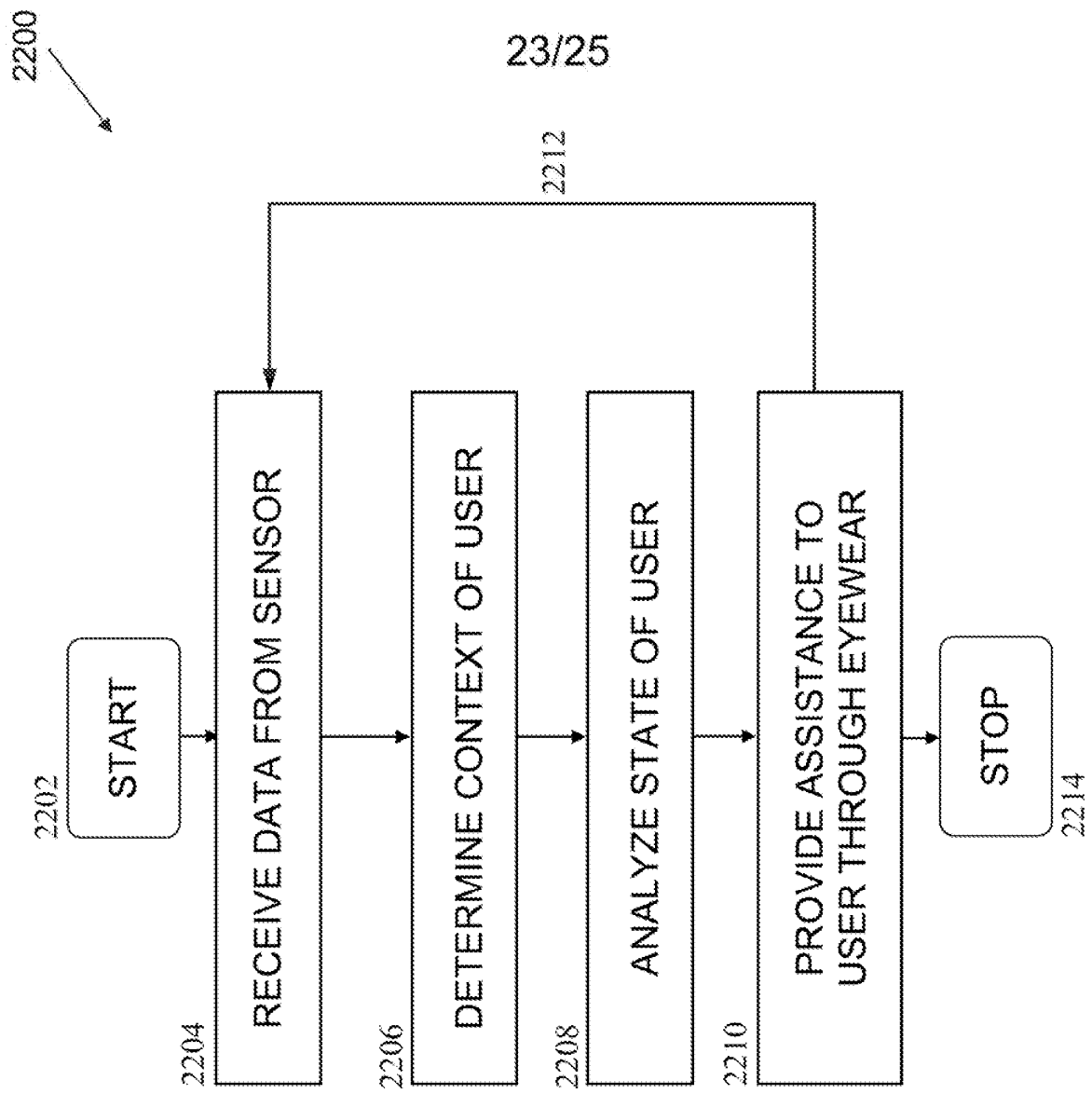
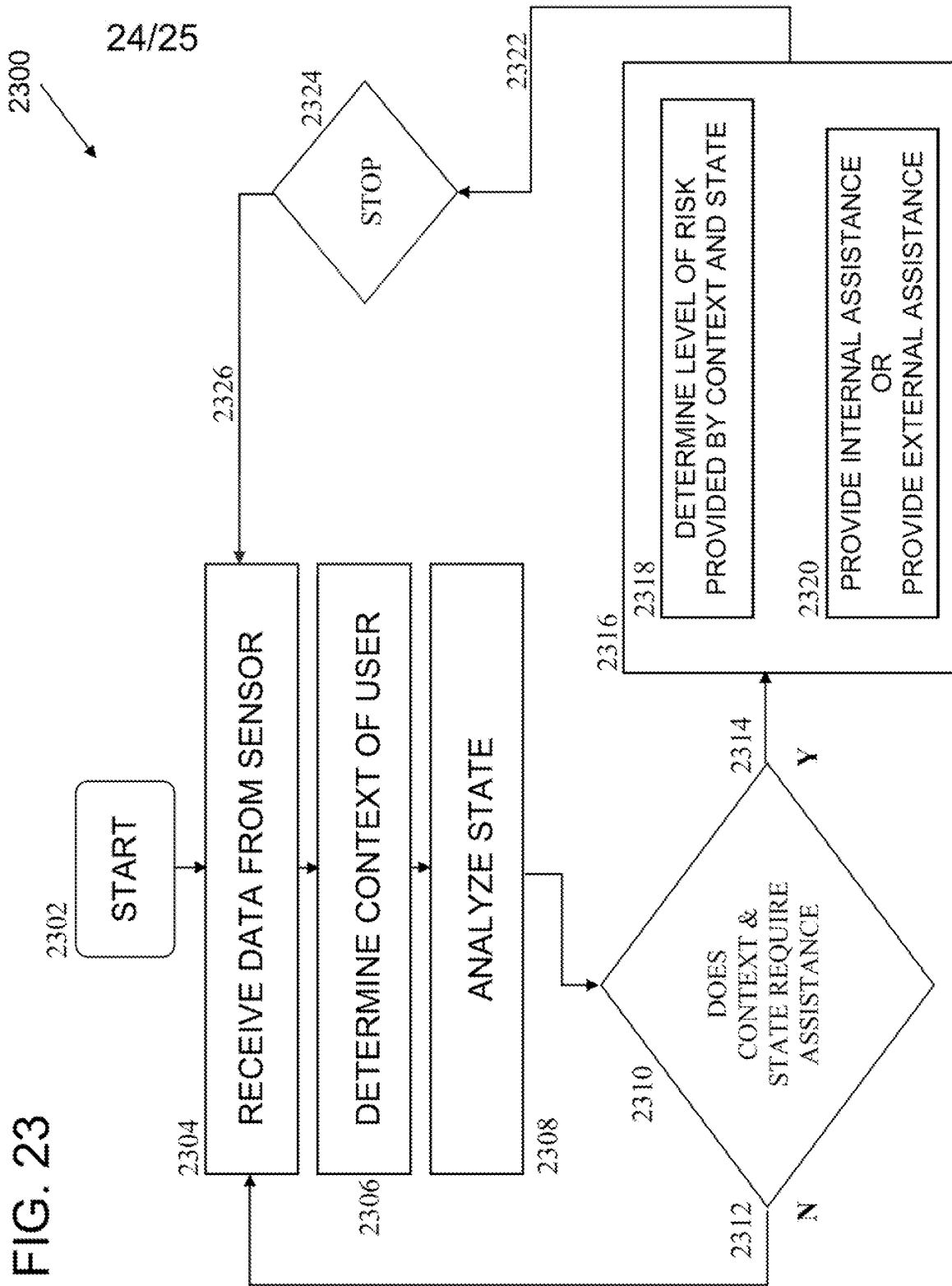


FIG. 22





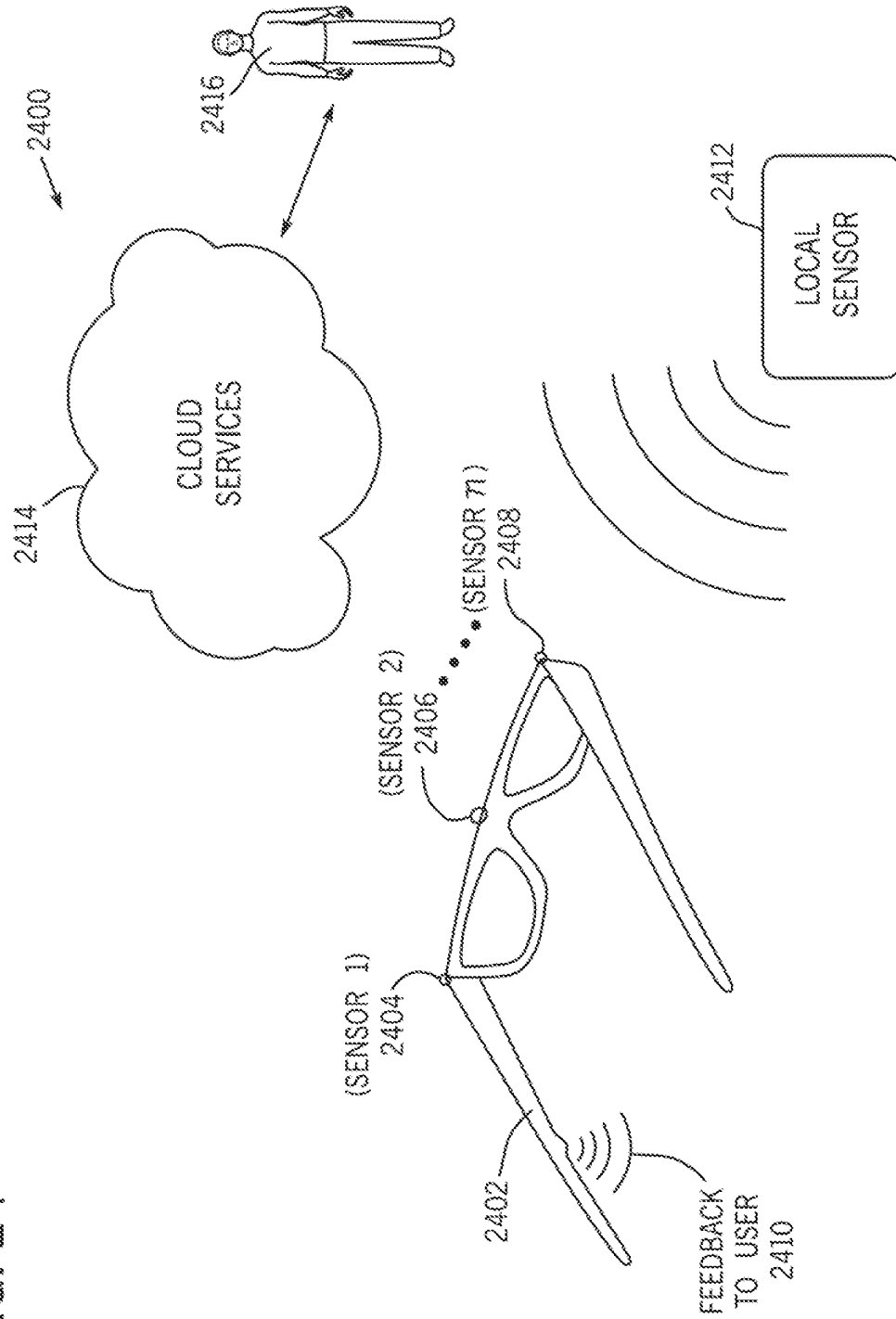


FIG. 24

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of Non-provisional Application No. 16/736,593 filed on January 7, 2020, and entitled “EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER,” which the entirety of which is incorporated herein by reference, which is a continuation-in part of Non-provisional Application No. 16/711,340 filed on December 11, 2019, and entitled “MODULARIZED EYEWEAR SYSTEMS, APPARATUS, AND METHODS,” which claims the benefit of priority of U.S. Provisional Patent Application Serial No. 62/778,709, filed on December 12, 2018, and titled “MODULARIZED EYEWEAR SYSTEM WITH INTERCHANGEABLE FRAME AND TEMPLES WITH EMBEDDED ELECTRONICS FOR MOBILE AUDIO-VISUAL AUGMENTED AND ASSISTED REALITY” and U.S. Provisional Patent Application Serial No. 62/873,889, filed on July 13, 2019, and titled “WEARABLE DEVICES APPARATUSES, SYSTEMS, AND METHODS,” which the entireties of which are incorporated herein by reference. Additionally, Non-provisional Application No. 16/736,593 claims the benefit of priority of U.S. Provisional Patent Application Serial No. 62/789,818 filed on January 8, 2019, and entitled “MODULARIZED EYEWEAR SYSTEM WITH INTERCHANGEABLE FRAME AND TEMPLES WITH EMBEDDED ELECTRONICS FOR AUGMENTED REALITY AND ACTIVITY MONITORING,” which the entirety of which is incorporated herein by reference, and U.S. Provisional Patent Application Serial No. 62/873,889 filed on July 13, 2019, and entitled “WEARABLE DEVICES APPARATUS, SYSTEMS, AND METHODS,” which the entirety of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention generally relates to the field of eyewear devices. In particular, the present invention is directed to apparatuses, methods, and systems for providing information to a user through a modularized eyewear device.

BACKGROUND

[0003] The pace of modern life moves at a fast pace. A person is often placed under the constraint of time and is placed in situations where his or her hands are occupied, and information is not accessible to the person. This can present a problem. Currently available eyewear such as prescription glasses, e.g., prescription reading glasses or prescription sunglasses are expensive and are not readily reconfigured to different user’s needs. This can present a problem. Personalized sound transmission is often done with an occlusive in ear device known as an earphone or earbud.

Such a device obstructs the ear canal and can interfere with a user's hearing of far field and near field sounds. This can present a problem. Thus, problems exist that require technical solutions that use technical means to produce technical effects.

SUMMARY OF THE DISCLOSURE

[0004] In an aspect, a system, apparatus, and method for execution by a data processing system to provide assistance to a user through an eyewear device is described. The system includes a voice interface, the voice interface has a microphone and a speaker, the voice interface to receive user commands and to provide assistance to the user, a sensor data input, the sensor data input to receive sensor data, a processor, the processor is in electrical communication with the voice interface and the sensor data, and a computer program for processing the sensor data. The computer program and the processor cause the data processing system to receive first data from a first sensor incorporated into the eyewear device, wherein the first sensor is configured to measure a parameter related to the user. The data processing system is further configured to determining a context for the user wherein the determining uses the first data, analyzing a state of the user, wherein the analyzing uses the first data, and providing assistance to the user, the assistance is related to the context and the state.

[0005] These and other aspects and features of non-limiting embodiments of the present invention will become apparent to those skilled in the art upon review of the following description of specific non-limiting embodiments of the invention in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] For the purpose of illustrating the invention, the drawings show aspects of one or more embodiments of the invention. However, it should be understood that the present invention is not limited to the precise arrangements and instrumentalities shown in the drawings, wherein:

FIG; 1 illustrates a modular reconfigurable eyewear system, according to embodiments of the invention;

FIG; 2 illustrates a reconfigurable component for an eyewear device, according to embodiments of the invention;

FIG; 3 illustrates multiple reconfigurable components for an eyewear device, according to embodiments of the invention;

FIG; 4 illustrates another reconfigurable modularized eyewear system, according to embodiments of the invention;

FIG; 5 illustrates a perspective view and a top view of the modularized eyewear system from FIG; 4, according to embodiments of the invention;

FIG; 6A illustrates a system architecture for a modularized eyewear device, according to embodiments of the invention;

FIG; 6B illustrates wireless networks corresponding to the system architecture for the modularized eyewear device of FIG; 6A, according to embodiments of the invention;

FIG; 7 illustrates another system architecture for the modularized eyewear device of FIG; 4, according to embodiments of the invention;

FIG; 8 illustrates a block diagram of a temple insert module, according to embodiments of the invention;

FIG; 9 illustrates a modularized eyewear device fitted with a behind the neck module assembly, according to embodiments of the invention;

FIG; 10 illustrates a behind the neck module assembly in perspective view configured with a wearable device, according to embodiments of the invention;

FIG; 11 illustrates coupling a temple interlock to a temple according to embodiments of the invention;

FIG; 12 illustrates coupling a behind the neck module to electronics contained within a temple, according to embodiments of the invention;

FIG; 13 illustrates a schematic for combining a behind the neck module assembly with temple electronics, according to embodiments of the invention;

FIG; 14 illustrates a user interface on a behind the neck module assembly, according to embodiments of the invention;

FIG; 15 illustrates a block diagram for an electronics unit configured for a behind the neck electronics pod (ePOD), according to embodiments of the invention;

FIG; 16 illustrates a method for providing assistance to a user of an eyewear device, according to embodiments of the invention;

FIG; 17 illustrates receiving data from sensors associated with an eyewear device, according to embodiments of the invention;

FIG; 18 illustrates context analysis of a user of an eyewear device, according to embodiments of the invention;

FIG; 19 illustrates another method for providing assistance to a user of an eyewear device, according to embodiments of the invention;

FIG; 20 illustrates user state analysis of a user of an eyewear device, according to embodiments of the invention;

FIG; 21 illustrates different user states, according to embodiments of the invention;

FIG. 22 illustrates a method that combines user context and state for providing assistance to a user of an eyewear device, according to embodiments of the invention;

FIG. 23 illustrates a method that provides different levels of assistance to a user of an eyewear device, according to embodiments of the invention; and

FIG. 24 illustrates a system for providing assistance to a user of an eyewear device, according to embodiments of the invention.

The drawings are not necessarily to scale and may be illustrated by phantom lines, diagrammatic representations and fragmentary views. In certain instances, details that are not necessary for an understanding of the embodiments or that render other details difficult to perceive may have been omitted.

DETAILED DESCRIPTION

[0001] In the following detailed description of embodiments of the invention, reference is made to the accompanying drawings, in which like references indicate similar elements, and in which is shown by way of illustration, specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those of skill in the art to practice the invention. In other instances, well-known circuits, structures, and techniques have not been shown in detail in order not to obscure the understanding of this description. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the invention is defined only by the appended claims.

[0002] In one or more embodiments, methods, apparatuses, and systems are described, that provide modularization of an eyewear system for a user. As described in the description of embodiments below, various combinations and configurations of electronics are taught for incorporation into eyewear devices. Some electronics configurations are removably couplable to an eyewear device. In some embodiments, an electronics configuration is built-into an eyewear device. In yet other embodiments, a behind the neck module assembly is releasably couplable with an eyewear device. In various embodiments, the modularized reconfigurable eyewear devices provide information to a user through the eyewear device. As used in this description of embodiments, information includes streaming audio in the form of music, information also includes parameters of a user's biology (e.g., biometrics of physiology, biomechanics, etc.) such as, but not limited to; heart rate, breathing rate, posture, steps, cadence, etc. Information also includes notifications and information of interest to a user from digital applications embedded in a mobile computing platform (i.e., smart phones, Internet of Things (IoT) devices, etc.) or from environmental or spatial context based on external sensory information such as, but not limited to; geographical positioning data, or

information on a vehicle that a user is using such as; revolutions per minute (RPM) of a bicycle, engine parameters such as RPM, oil pressure, cooling water temperature, wind speed, depth of water, air speed, etc. In various embodiments, information is presented to a user through an eyewear device by, for example, an audio broadcast that a user hears and a video broadcast to a display that the user sees in the eyewear device or sees as an image as projected onto a pupil of the user's eye. Thus, information is to be given an expansive meaning within the scope of embodiments taught herein.

[0003] **Figure 1** illustrates a modular reconfigurable eyewear system, according to embodiments of the invention. With reference to **Figure 1**, a modularized eyewear device is shown in perspective view at 100. The modularized eyewear device 100 has a frame chassis 102. In various embodiments, the frame chassis 102 is ophthalmically constructed to provide frame rim portions that hold lens 120 and lens 122. The lens 120 and 122 can provide any of the functions that eyewear devices provide, such as but not limited to, a safety glass lens, a prescriptive lens, a sunglass lens, a welding glass lens, etc. An eyewear device can also contain a single lens instead of the dual lens illustrated. In some embodiments, a nose pad is provided, thereby providing a cushion for the contact zone with a user's nose. In some embodiments, the nose pad is made from a compliant material such as silicon rubber.

[0004] A temple 104 (left temple) and a temple 114 (right temple) are coupled to the frame chassis 102. The temples 104 and 114 can be flexibly coupled to the frame chassis 102, with hinges as shown in the figure, or the temples 104 and 114 can be provided with a fixed orientation relative to the frame chassis 102.

[0005] In various embodiments, one or more temples (104 and 114) and the chassis frame 102 can be fitted with electronics as described below. Within the view of 100, a left temple insert module (TIM) 106 is configured with the left temple 104 and a right temple insert module (TIM) 116 is configured with the right temple 114. Temple insert modules (TIMs) are described more fully in conjunction with the figures below.

[0006] With continued reference to **Figure 1**, a modularized eyewear device is shown in exploded view at 130. A frame chassis 132 is ophthalmically constructed to encircle a lens 140 and a lens 142 with a frame rim thereby securing the lens 140 and the lens 142 thereto. A brow bar 146 is fastened to the frame chassis 132 in various ways, via assembly fasteners, adhesive, etc. A left temple 144 includes a left temple connector 152 which is rotatably couplable with a left chassis connector 150. Together, the left chassis connector 150 and the left temple connector 152 form a rotatable mechanical and electrical connection between the chassis 132 and the left temple 144,

thereby providing one or more electrical pathways to connect the frame chassis 132 to the left temple 144. Similarly, a right temple 134 is rotatably couplable to the frame chassis 132 through a right hinge assembly 148.

[0007] Note that in some embodiments, a modularized eyewear device is configured such that each temple can be removed from its hinge via an electrical/mechanical connector having one or more electrical contacts, not shown for clarity in the illustration. These electrical contact points can be made using, for example, pins, points, pads, slots, contact devices, etc. For example, the line indicated at 154 demarcates the mating of the right temple connector with the right temple 134. Similarly, the line indicated at 156 demarcates the mating of the left temple connector 152 with the left temple 144.

[0008] Through the provision of electrical/mechanical connectors between each temple, e.g., 134, 144 and the frame chassis 132 the temples are interchangeable with the eyewear device. This functionality permits a user to interchange one temple with another. Different temples can be configured with different electronics to provide different functionality as described herein. Either temple can be configured to accommodate various electronics configurations. For example, in one or more embodiments, the right interchangeable temple accommodates an electronics package that can include one or more of; a biometric sensor, a biomechanical sensor, an environmental sensor, a temperature sensor, an acoustic sensor, a motion sensor, a light sensor, a touch sensor, a proximity sensor, a velocity sensor, an acceleration sensor, a rotation sensor, a magnetic field sensor, a global position system (GPS) receiver, cables, microphones, a micro speaker, a source of electrical power (battery), a camera, a micro display, a heads-up display (HUD) module, a multiaxis inertial measurement unit, a wireless communications system. Note that a TIM can also contain the electronics package and sensor(s) described above. In various embodiments, one or more wireless communication system are provided that utilize for example; near-field communications (NFC) using the industrial-scientific-medical (ISM) frequency of 13.56 MHz, the Adaptive Network Topology (ANT) ANT+ wireless standard, wireless communications using a Bluetooth standard, a Bluetooth low energy standard (BLE), wireless communication using a Wi-Fi standard, and wireless communication using mobile telephone standards such as for example the 3G, 4G, Long Term Evolution (LTE), 5G, etc. standard or other wireless standards. In some embodiments, electrical pathways from the electronics exit a temple via a sheath cavity and travel into a temple sheath and continue into a brow bar sheath cavity. The right interchangeable temple contains a hinge-connector 148 that fastens to the brow bar 146 and chassis frame 132.

[0009] In one or more embodiments, the right interchangeable temple attaches to the front of the frame chassis via a hinge-connector that allows for power and data transferred to the left interchangeable temple through the modular brow bar. The hinge-connector mechanically interlocks with the frame chassis and allows for power/data connectivity with electrical pin conductors. In one or more embodiments, when positioned in the open direction of wearing, the hinge-connectors sense the open state of the device allowing for power or data transfer. When in the closed position (temples folded inward), the hinge-connector in conjunction with signals received from one or more of proximity sensors and motion sensors will allow the system to sense the user-device interaction state and will deactivate the power or data transfer. Furthermore, in the open position, in some embodiments a sensor, such as, but not limited to, a proximity sensor, can detect when the device is being worn by a user and can thus operate in its active (ON) state. This function leads to reduced power consumption when folded and stowed and can lead to automatic power up while a user wears the device on his or her head. In addition to switchable data or power transfer from the hinge-connector, the hinge-connector can provide flexible circuits and wired micro-connectors that provide steady uninterrupted power and or data transfer.

[0010] In some embodiments, it is convenient to route electrical pathways within a volume of the brow bar 146. In some embodiments, the brow bar 146 is constructed to provide a channel along its length, within which the electrical pathways are routed. Thus, the brow bar 146 provides one or more sheaths, channels, etc. along its length within which electrical pathways and sensors can be contained. Examples of electrical pathways are, but are not limited to; wires, printed circuit board, flexible printed circuit board, etc. In various embodiments, it is advantageous to mount one or more sensors to the brow bar 146, thereby making an electrical sub-assembly for the frame chassis 132. In some embodiments, additional electrical pathways from the frame chassis 132 are joined with the electrical pathway contained in the brow bar 146. In some embodiments, a flexible electronic circuit is adhered to the underside top face of the brow bar and exits the brow bar via the left and right sheath cavities. Alternatively, or in combination, fully embedded flexible electronics may be cast into the brow bar with integrated contact points exiting the brow bar near each hinge. These integrated contact points on both sides of the brow bar allow transmission of data or power when in contact with the integrated contact points of the right and left temple. In addition to facilitating connection to electronics, the brow bar can conceal an optional pupil module by a securing flange and allows the user to view a micro display via the brow bar pupil aperture.

[0011] In similar fashion the left temple is configured as a left interchangeable temple connected to the front frame of the eyewear with a left hinge-connector. In various embodiments, the left

interchangeable temple can contain the same electronics configuration/functionality as the right interchangeable temple or interchangeable temples can contain different electronics configurations and different functionality.

[0012] With continued reference to **Figure 1**, a left temple 164 and right temple 174 are configured as shown at 160. Each of the temples 164 and 174 contain electronics which are configured to provide information and functionality to a user of the eyewear system. As shown at 160, the left temple 164 has a temple door (not shown) removed thereby exposing an electronics package indicated at 186. The temple door secures and protects electronics from environmental exposure and hazard. The temple door is secured to the temple assembly with suitable mechanical fasteners for a given application. In some embodiments, the temple door provides a rating with respect to water intrusion via an **IP** Code from International Protection Marking IEC standard 60529. A source of electrical power (battery) is illustrated at 184 and an audio speaker and port are illustrated at 182. The audio speaker and port 182 is generally located on a posterior end of a temple and in some embodiments is an integrated directional projection speaker that privately directs sound to a user's ear. Projection stereo speakers can communicate various audio signals to the user, such as but not limited to, voice prompts, streaming music, smart audio assistance, data, etc. Notably, the projection speaker design does not occlude the user's ear. Thus, the user can hear far field sounds and the far field sounds are not degraded as they are with currently available earbud style headphones that occlude a user's ear.

[0013] The right temple 174 is also provided with an electronics package (not shown in the view) contained within the right temple 174. The right temple is provided with an audio speaker with audio speaker port 184, which can be an integrated directional projection speaker. In one or more embodiments, the right temple 174 is configured to accommodate an external assembly 190 that contains a micro display assembly 192. Similarly, the left temple could be configured for the external assembly 190 and the micro display assembly 192.

[0014] In various embodiments, a micro display assembly, such as 192, is a head up display (HUD) Pupil™ Optics Module that houses the optics, electronics, and micro display that form the optical system. The pupil mechanism also may house cables, flexible circuit boards, or wires which exit from a housing into an electronics contact pathway. In one or more embodiments, these electrical pathways are connected to a side of the left temple 174 to enable the user with a see-through head up display external accessory to enhance a visual component of a mobile assisted and/or augmented reality experience.

[0015] In one or more embodiments, wiring which exits the brow bar is concealed in the right and left sheaths of the temples and enters into the right and left temples via the sheath cavities, thereby protecting the wiring from environmental hazards. The area near the contact pathway may also accommodate motion mechanisms for customizing the interpupillary distance of the head-up micro display module.

[0016] In different embodiments, the front frame portion, such as 102 or 132 (**Figure 1**) or any similar structure in the figures below, and the right and left temple portions, such as 104, 114, 134, 144, 164, 174 (**Figure 1**) or any similar structures in the figures below, can be part of a set of interchangeable front frame portions and temple portions each having the same or different combinations of devices, accessories, capabilities and/or functions. At least one of an electronics board, microphones, speakers, battery, camera, heads-up display module, wireless Wi-Fi radio, GPS chipset, LTE cellular radio, multiaxis inertial measurement unit, motion sensor, touch sensor, light and proximity sensors, etc. can be included in desired combinations. Electronics can be further included that permit a user to perform at least one of; wirelessly connecting to a cellular service, a smart phone, a smart watch, a smart bracelet, a mobile computer, and a sensor peripheral. The electronics can further include the ability to; view see-through augmented reality images via a modular head up display (HUD), provide stereo audio content, provide voice and audio notification including music through one or more integrated projection micro-speakers. The front frame electrical contact devices and the temple electrical contact devices can include electrical contact points in or near respective hinge connectors for removable electrical contact with each other for electrically transmitting at least one of; power, electrical signals and data between the temple portions and the front frame portion when the contact points are in an electrically closed position. In some embodiments when assembled together, the front frame hinge connectors, the front frame electrical contact devices, the temple hinge connectors and the temple electrical contact devices can form electromechanical hinges, hinge connectors, assemblies or devices. In some embodiments, system electrical power can be turned off by folding the temple portions into a storage position thereby disconnecting the contact points.

[0017] In some embodiments, at least one of the front frame electronics and the temple electronics can include at least one of a battery, camera, heads-up display module, controller, digital storage electronics, CPU, projection micro-speaker, microphone, wireless Wi-Fi radio, GPS chipset, LTE cellular radio, multiaxis inertial measurement system or unit, and sensory, motion, touch, light, proximity, temperature and pressure sensors, etc.

[0018] In some embodiments, at least one temple can include a temple module insert (TIM) containing selected temple electronics, mounted thereto. In other embodiments, a neck smart cord is electrically connected to a behind the neck electronics module. The neck smart cord has right, and left connectors or connector ends for mechanically and or electrically interconnecting the behind the neck electronics module with the right and left temples of an eyewear device.

[0019] **Figure 2** illustrates a reconfigurable component for an eyewear device, according to embodiments of the invention. With reference to **Figure 2** at 200, a temple 202 is provided with an engagement portion 204. A temple insert module, referred to in this description of embodiments as a “TIM” at 210 is configured to be releasably couplable with the engagement portion 204 of the temple 202. The TIM 210 is installed into the temple 202 as indicated by arrows 212a and 212b. In various embodiments, the engagement portion 204 is accomplished by a mechanical connection, such as but not limited to; press fit, clip, mechanical interlock, hook and loop, magnetic surface, external clamp to temple, flange and mechanical coupling to temple, etc. In yet other embodiments the engagement portion 204 and the TIM 210 utilize magnetic surfaces, thereby holding the TIM 210 secure by magnetic attraction. The form of the engagement portion shown at 204, as well as the form of any engagement portion illustrated elsewhere in the figures presented herein, is given merely for illustration and does not limit embodiments of the invention. In the view illustrated at 200, the TIM 210 only makes a mechanical connection with the temple 202 no electrical connection is provided between the TIM 210 and the temple 202.

[0020] In some embodiments, the TIM 210 is provided with a speaker and speaker port 214, which can be a micro projection speaker. The speaker provides information to a user through a directed audio broadcast. Note that the speakers provided herein are speakers that are located externally from a user’s ear and are therefore not inserted into the user’s ear like an earbud is inserted. The TIM 210 is configured with an electronics package that contains a processor, memory, electrical power, and one or more wireless communication protocols that enable the TIM 210 to communicate wirelessly 222 with one or more devices 220. The device 220 can be an external sensor such as, but not limited to; a biometric sensor or a vehicle sensor, a local user device, a network node, such as a wireless router, a remote network, or a remote user device such as a mobile phone accessed through a network. Different sensors, networks, and remote devices are described more fully in conjunction with the figures below.

[0021] Following the architecture of **Figure 2** at 200, in some embodiments, a second temple and a second TIM are provided. The two TIMs in such a system can engage in wireless communication between the device 220 and between themselves as needed to provide a level of

design functionality to a user. For example, in one embodiment, a left TIM includes wireless network capability sufficient to communicate with the remote device 220, utilizing a first network protocol. In addition, the left TIM and the right TIM are provided with wireless network capability that supports communication utilizing a second network protocol. In order to conserve electrical power, the first network protocol has a greater range than the second network protocol because a distance between the left TIM and the remote device is greater than a separation distance between the left TIM and the right TIM (nominally a width of user's head). The architecture illustrated at 200 is referred to as true wireless because there is no wired connection between the left TIM and the right TIM. In one or more embodiments, an audio stream is provided from a user device to a first TIM utilizing a first wireless network. Then a second wireless audio stream is provided from one TIM to the other TIM utilizing a second wireless network in order to provide the audio stream to each of a left and a right projection speakers of the eyewear device.

[0022] The temples and TIMs described at 200 provide reconfigurable components for eyewear devices as described in conjunction with the figures herein. A forward end 206 of the temple 202 is engageable with a frame chassis of an eyewear device as described above with or without a connector between a temple and a frame. Thus, the temple 202 can attain a fixed position relative to a frame chassis or the temple can be rotatably coupled to the frame chassis depending on a given design of the eyewear.

[0023] With reference to **Figure 2** at 250, a temple 252 is provided with an engagement portion 254. A temple insert module, TIM at 260, is configured to be releasably couplable with the engagement portion 254 of the temple 252. The TIM 260 is installed into the temple 252 as indicated by arrows 262a and 262b. In various embodiments, the engagement portion 204 is accomplished by a combined electrical and mechanical connection. The mechanical connection can be as described in conjunction with 210/204 such as, but not limited to; press fit, clip, mechanical interlock, hook and loop, etc. In yet other embodiments the engagement portion 254 and the TIM 260 utilize magnetic surfaces, thereby holding the TIM 260 secure by magnetic attraction. A number of electrical contacts 280 are provided for illustration with no limitation implied thereby. The electrical contacts 280 mate with corresponding electrical contacts in the temple 252 thereby providing electrical connection to one or more electrical pathways (not shown) in the temple 252. The electrical pathways within the temple 252 facilitate electrical connection between the TIM 260 and one or more sensors 272 and 274, which can also represent a source of signals provided to a display(s). The sensors 272 and 274 can be acoustic sensors such as microphones or any of the sensors described herein for use in

conjunction with electronics packages configured with eyewear devices. In one or more embodiments, one or more of 272 and 274 provide signals to a display such as a HUD.

[0024] In some embodiments, the TIM 260 is provided with a speaker and speaker port 264, which can be a micro projection speaker. The speaker provides information to a user through an open-ear audio broadcast.

[0025] Following the architecture of **Figure 2** at 250, in some embodiments, a second temple and a second TIM are provided, as shown below in **Figure 3**. The two TIMs in such a system engage in wireless communication between the device 220 and between themselves as needed to provide a level of design functionality to a user. The temples and TIMs described at 250 provide reconfigurable components for eyewear devices as described in conjunction with the figures herein. For example, a forward end 256 of the temple 252 is engageable with a frame chassis of an eyewear device as described above with or without a connector between a temple and a frame. Thus, the temple 252 can attain a fixed position relative to a frame chassis or the temple can be rotatably coupled to the frame chassis depending on a given design of the eyewear.

[0026] **Figure 3** illustrates, at 300, multiple reconfigurable components for an eyewear device, according to embodiments of the invention. With reference to **Figure 3** at 300, the left reconfigurable component 250 from **Figure 2** is illustrated with a companion right reconfigurable component for an eyewear device. A right temple 352 has an engagement portion that is not shown in **Figure 3** but is similar to the engagement portion 254 of the left temple 252. A temple insert module, TIM at 360 is configured to be releasably couplable with the engagement portion of the temple 352. The TIM 360 is coupled with the temple 352 as indicated by arrows 362a and 362b. In various embodiments, the engagement portion of the temple 352 is accomplished by a combined electrical and mechanical connection. The mechanical connection can be provided as described above in conjunction with 210/204 such as, but not limited to; press fit, clip, mechanical interlock, hook and loop, etc. In yet other embodiments the engagement portion of the temple 352 and the TIM 360 utilize magnetic surfaces, thereby holding the TIM 360 secure by magnetic attraction. Several electrical contacts 380 are provided for illustration with no limitation implied thereby. The electrical contacts 380 mate with corresponding electrical contacts in the temple 352 thereby providing electrical connection to one or more electrical pathways (not shown) in the temple 352. The electrical pathways within the temple 352 facilitate electrical connection between the TIM 360 and one or more sensors 372 and 374. The sensors 372 and 374 can be acoustic sensors such as microphones or any of the sensors or displays described herein for use in conjunction with electronics packages configured with eyewear devices. In various embodiments, the TIM 360 is

configured with an electronics package that contains a processor, memory, electrical power, and one or more wireless communication systems using protocols that enable the TIM 360 to communicate wirelessly as indicated by a wireless transmission at 222 with one or more devices 220. In addition, the TIM 360 and the TIM 260 can be configured with wireless communication capability that permits wireless communication between the TIMs as indicated by a wireless transmission at 382. In some embodiments, the TIM 360 is provided with a speaker and a speaker port indicated at 364, which can be a micro projection speaker. The speaker provides information to a user through an audio broadcast.

[0027] With reference to view 390 of **Figure 3**, electrical connectivity schematics are illustrated for each of TIM 260 and TIM 360. The TIM 260 is electrically coupled to the sensor 272 with an electrical pathway 394. Similarly, the TIM 260 is electrically coupled to the sensor 274 by an electrical pathway 392. The connectivity illustrated between the TIM 260 and the respective sensors constitutes a left temple electrical schematic 384. Note that the left temple electrical schematic 384 can be more complex or less complex than the illustration. Thus, the left temple electrical schematic is provided merely for illustration with no limitation implied thereby.

[0028] Similarly, the TIM 360 is electrically coupled to the sensor 372 with an electrical pathway 398. The TIM 360 is electrically coupled to the sensor 374 by an electrical pathway 396. The connectivity illustrated between the TIM 360 and the respective sensors constitutes a right temple electrical schematic 386. Note that the right temple electrical schematic 386 can be more complex or less complex than the illustration. Thus, the right electrical schematic is provided merely for illustration with no limitation implied thereby.

[0029] The two TIMs in such a system engage in wireless communication between the device 220 and between themselves as needed to provide a level of design functionality to a user. For example, in one embodiment, a left TIM includes wireless network capability sufficient to communicate with the remote device 220, utilizing a first network protocol. In addition, the left TIM and the right TIM are provided with wireless network capability that supports wireless communication as indicated at 382. The wireless communication 382 can be performed with a second network protocol, which is different from that used at 222. In order to conserve electrical power, the first network protocol (222) has a greater range than the second network protocol (382) because a separation distance between the left TIM 260 and the remote device 220 is greater than a separation distance between the left TIM 260 and the right TIM 360, the latter is nominally a width of user's head, and the former can be as much as a distance to a mobile telephone cellular tower.

[0030] **Figure 4** illustrates another reconfigurable modularized eyewear system, according to embodiments of the invention. With reference to **Figure 4**, one or more of sensors, power components, and computational units are distributed throughout an eyewear device, including distributed throughout a frame chassis such as 402. A frame chassis 402 is ophthalmically constructed to encircle lens 440 with frame rims thereby securing the lens 440 thereto. A left temple 404 and a right temple 414 are coupled to the frame chassis 402, thereby forming an eyewear device. The left temple 404 is configured with an engagement portion indicated at 408. A left temple insert module (TIM) 406 is configured as described above to engage with the engagement portion 408, thereby providing both mechanical and electrical connection between the TIM 406 and the temple 404. Similarly, a right temple 426 is illustrated as engaged with the engagement portion of the right temple 414. The TIM 406 contains an audio speaker and audio port indicated at 410 and the TIM 426 contains an audio speaker and audio port indicated at 430. In various embodiments, the audio speakers of 410 and 430 are projection speakers. The eyewear device includes several sensors or display(s), 462, 464, 466, 468, and 470 that are integrated into an electrical pathway that extends from the left temple 404 through the frame chassis 402 to the right temple 414. In various embodiments there can be more sensors or less sensors than those shown in **Figure 4**. The sensors and the locations of the sensors shown in **Figure 4** are provided merely as an illustration and do not limit embodiments of the invention. As described above in conjunction with the previous figures, at least one of the temple insert modules, 406 and or 426, are provided with a suite of electronics necessary to provide wireless connectivity 222 to a device 220.

[0031] In the eyewear device of 400, a high-level view of an electrical pathway schematic is shown at 480. With reference to 480, the left TIM 406 and the right TIM 426 are electrically coupled with sensors 462, 464, 466, 468, and 470 by electrical pathway elements 482, 484, 486, 488, 490, and 492. An electrical pathway element, such as 484, electrically connects the sensor 464. Together, the components shown in 480 provide a modularized reconfigurable set of components for an eyewear device. In one or more embodiments, one or more acoustic sensors are located in at least one of, the frame chassis 402, the left temple 404, and the right temple 414. Thus, acoustic sensors can be located anywhere on a temple (left or right) or a frame chassis of the eyewear device.

[0032] **Figure 5** illustrates, generally at 500, a perspective view and a top view of the modularized eyewear system from **Figure 4**, according to embodiments of the invention. With reference to **Figure 5**, a modularized eyewear device is illustrated in perspective view at 502. A modularized nose pad 504 is releasably couplable as indicated at 506 with the modularized eyewear device 502. Modularization of nose pads permits a user to swap nose pads in order to improve the fit

between the eyewear and the user's nose and facial structure. A greater level of comfort can be achieved through modularization of the nose pad of the eyewear device. In addition, other sensors such as a biometric sensor can be provided in the nose pad.

[0033] **Figure 6A** illustrates, generally at 600, a system architecture for a modularized eyewear device, according to embodiments of the invention. With reference to **Figure 6A**, in various embodiments, a modularized reconfigurable eyewear device can contain more than one wireless communication system. In various embodiments, an eyewear device 602 has a high-level block diagram architecture as shown at 604. In various embodiments, the eyewear device 602 is configured to communicate with a wireless sensor 640 and a mobile device 670. The wireless sensor 640 can contain a single sensor or a plurality of sensors. The wireless sensor 640 can contain any one or more of the sensors listed herein without limitation. For example, the wireless sensor 640 can include a biometric sensor or biomechanical sensor configured for use with a user or a sensor configured for use with a vehicle or building. Some examples of biometric sensors are, but are not limited to; a heart rate monitor, a perspiration sensor, a temperature sensor, etc. Some examples of vehicle sensors are, but are not limited to; a velocity sensor, an acceleration sensor, a global position system signal, a vehicle engine parameter, a wind speed indicator, etc. Some examples of sensors for use with a building are, but are not limited to; a temperature reading from a thermostat, a water pressure value, etc. Some non-limiting examples of vehicles are, but are not limited to; a scooter, bicycle, an automobile, a boat, a yacht, a watercraft, an airplane, a military vehicle, a wing suit, etc. In some embodiments, data is received at 640 and or 616 from a special use network. An example of a special use network, given for illustration with no imitation implied thereby, is a National Marine Electronics Association (NMEA) NMEA 2000 network designed for watercraft such as yachts (power or sail). NMEA 2000, also referred to in the art as "NMEA2k" or "N2K" is standardized as International Electrotechnical Commission (IEC) 61162-1. NMEA 200 is a plug-and-play communications standard used for connecting marine sensors and display units within ships, boats, yachts, etc. The mobile device 670 can be any one or more of the mobile devices listed herein without limitation. For example, the mobile device can be a mobile phone, a watch, a wrist band, a bracelet, a tablet computer, a laptop computer, a desktop computer, a vehicle computer, etc.

[0034] The eyewear device 602 has a high-level architecture, represented at 604, that contains a speaker 606, a central processing unit 608, a source of electrical power 610, an acoustic sensor 608, a storage device 614, and a wireless communication system 616. Wireless communication system 616 can contain one or more of the following wireless communication systems, e.g., a near-field communication system 618, a wireless communication system utilizing the Bluetooth

communication protocol 620, a wireless communication system utilizing the Wi-Fi communication protocol at 624, a mobile telephone communications protocol 622. The wireless communication protocol designated by LTE at 622 is given merely as an example for wireless devices and does not limit embodiments of the invention. Those of skill in the art will recognize that one or more antennas are included, but not shown for clarity, in the wireless communication system block 616.

[0035] The wireless sensor 640 has a high-level architecture, represented at 642, that includes one or more sensors 644 and a wireless communication system 646. The wireless communications system 646 can be a low data rate communications system such as a near-field communications system, BLE, ANT+, or the like. Or the wireless communication system 646 can be provided as a higher data rate system as required by the sensor(s) 644.

[0036] The mobile device 670 has a high-level architecture, represented at 672, that includes, a central processing unit 674, a source of electrical power 676, storage 678, and one or more wireless communication systems indicated at the block 680. The mobile device 670 can be optionally configured to reach remote networks as indicated by cloud 689. The wireless communication block 680 can include one or more of the following wireless communication systems, e.g., a near-field communication system 682, a wireless communication system utilizing the Bluetooth communication protocol 684, a wireless communication system utilizing the Wi-Fi communication protocol at 686, and a mobile telephone communications protocol at 688. The wireless communication protocol designated by LTE at 688 is given merely as an example of a communication system for mobile devices and does not limit embodiments of the invention. Those of skill in the art will recognize that one or more antennas are included, but not shown for clarity, in the wireless communication system block 680 and 642.

[0037] In some embodiments, the wireless sensor system 642 and the eyewear device 602 are configured initially by a user of the mobile device 670 and the mobile device user interface as indicated by pathways 652a and 652b. In operation, the eyewear device 602 receives data wirelessly as indicated at 650 from a suitable wireless communication system, such as for example a near-field communications system 618. Wireless data obtained from the wireless sensor system 642 can be transmitted to the user device 670/672 by another wireless communication system such as indicated at 654. The wireless communication indicated at 654 can be accomplished with a higher data rate channel using for example Bluetooth protocol at 620/684, or Wi-Fi protocols at 624/686, or mobile phone communications protocol indicated at 622/688. Data transferred from the eyewear device 602 can be stored and analyzed on the user device 670 in various embodiments and with different application programs.

[0038] **Figure 6B** illustrates, generally at 690, wireless networks corresponding to the system architecture for the modularized eyewear device of **Figure 6A**, according to embodiments of the invention. With reference to **Figure 6B**, the wireless communication block 616 can connect to a plurality of devices as shown in the figure. For example, one or more wireless sensors 640 can connect to the wireless communication block 616 utilizing low data rate near-field communication networks as indicated at 618. One or more user devices 670 can communicate wirelessly with the wireless communication block using Bluetooth communication protocols as indicated at 620. One or more wireless nodes, such as Wi-Fi nodes indicated at 692 can communicate wirelessly with the wireless communication block 616 as indicated at 624. One or more remote networks 694 can communicate wirelessly with the wireless communication block 616 using cellular communication protocols as indicated at 622. Thus, a reconfigurable eyewear device can contain one or more of the wireless communication systems shown in the illustration at 690. An eyewear device can be reconfigured for different wireless communication by swapping for example one TIM module for another. Alternatively, one or more temples can be swapped with a frame chassis as described above to provide customized functionality to an eyewear device.

[0039] **Figure 7** illustrates, generally at 700, another system architecture for the modularized eyewear device of **Figure 4**, according to embodiments of the invention. With reference to **Figure 7**, the wireless communication block 616 of the eyewear device 602 can be configured for cellular communications via mobile telephone networks directly without needing a user device to function as an intermediary. For example, in 700, the eyewear device 602 is configured for communication with a remote device 702, which can be a mobile telephone, by a wireless communication system 622 thereby connecting with the remote device 702 directly through the external networks indicated by cloud 704. No intermediary user mobile device is needed to support this line of communication. Such a configuration of an eyewear device allows a user of the eyewear device to make telephone calls from the eyewear device with the assistance of an interface, such as a voice interface, one or more tactile interface like buttons, etc. The voice interface provides command and control of the telephone call by converting the user's voice signals to commands that the device uses to facilitate the operation of the wireless network for the telephone call. Examples of such commands are, but are not limited to; select caller, place call, volume up, volume down, end call, etc.

[0040] **Figure 8** illustrates, generally at 800, a block diagram of a temple inserts module (TIM), according to embodiments of the invention. With reference to **Figure 8**, as used in this description of embodiments, a TIM can be based on a device such as a computer, in which embodiments of the invention may be used. The block diagram is a high-level conceptual representation and may be

implemented in a variety of ways and by various architectures. Bus system 802 interconnects a Central Processing Unit (CPU) 804 (alternatively referred to herein as a processor), Read Only Memory (ROM) 806, Random Access Memory (RAM) 808, storage 810, audio 822, user interface 824, and communications 830. RAM 808 can also represent dynamic random-access memory (DRAM) or other forms of memory. The user interface 824 can be in various embodiments a voice interface, a touch interface, a physical button, or combinations thereof. It is understood that memory (not shown) can be included with the CPU block 804. The bus system 802 may be for example, one or more of such buses as a system bus, Peripheral Component Interconnect (PCI), Advanced Graphics Port (AGP), Small Computer System Interface (SCSI), Institute of Electrical and Electronics Engineers (IEEE) standard number 994 (FireWire), Universal Serial Bus (USB), universal asynchronous receiver-transmitter (UART), serial peripheral interface (SPI), inter-integrated circuit (I2C), etc. The CPU 804 may be a single, multiple, or even a distributed computing resource. Storage 810 may be flash memory, etc. Note that depending upon the actual implementation of a TIM, the TIM may include some, all, more, or a rearrangement of components in the block diagram. Thus, many variations on the system of **Figure 8** are possible.

[0041] Connection with one or more wireless networks 832 is obtained via communication (COMM) 830, which enables the TIM 800 to communicate wirelessly with local sensors, local devices, as well as with remote devices on remote networks. In some embodiments, 832/830 provide access to remote voice-to-text conversion systems which can be in remote locations, for example cloud based. 832 and 830 flexibly represent wireless communication systems in various implementations, and can represent various forms of telemetry, general packet radio service (GPRS), Ethernet, Wide Area Network (WAN), Local Area Network (LAN), Internet connection, Wi-Fi, WiMAX, ZigBee, Infrared, Bluetooth, near-field communications, mobile telephone communications systems, such as 3G, 4G, LTE, 5G, etc. and combinations thereof. In various embodiments, a touch interface is optionally provided at 824. Signals from one or more sensors are input to the system via 829 and 828. Global position system (GPS) information is received and is input to the system at 826. Audio can represent a speaker such as a projection speaker or projection micro-speaker described herein.

[0042] In various embodiments, depending on the hardware configuration, different wireless protocols are used in the networks to provide the systems described in the figures above. One non-limiting embodiment of a technology used for wireless signal transmission is the Bluetooth wireless technology standard which is also commonly known as IEEE 802.15.1 standard. In other embodiments, the wireless signal transmission protocol known as Wi-Fi is used which uses the IEEE

802.11 standard. In other embodiments, the ZigBee communication protocol is used which is based on the IEEE 802.15.4 standard. These examples are given merely for illustration and do not limit different embodiments. Transmission Control Protocol (TCP) and Internet Protocol (IP) are also used with different embodiments. Embodiments are not limited by the data communication protocols listed herein and are readily used with other data communication protocols not specifically listed herein.

[0043] In various embodiments, the components of systems as well as the systems described in the previous figures (such as a temple insert module (TIM)) are implemented in an integrated circuit device, which may include an integrated circuit package containing the integrated circuit. In some embodiments, the components of systems as well as the systems are implemented in a single integrated circuit die. In other embodiments, the components of systems as well as the systems are implemented in more than one integrated circuit die of an integrated circuit device which may include a multi-chip package containing the integrated circuit.

[0044] **Figure 9** illustrates a modularized eyewear device fitted with a behind the neck module assembly, according to embodiments of the invention. With reference to **Figure 9**, at 900, a behind the neck module assembly is fitted to a passive set of eyewear. Passive eyewear indicates that there are no electronics located in the eyewear. Alternatively, the eyewear can be active or powered eyewear, as described herein, configured with electronics packaged into one or more temples or temple insert modules (TIMs). The eyewear has a frame chassis 902 that contains lens 906. Coupled to the frame chassis 902 is a left temple 904 and a right temple 914. The behind the neck module assembly includes a behind the neck electronics pod (ePOD) 924, a left temple interlock 920 a right temple interlock 922, a left smart cord 926 and a right smart cord 928. The left smart cord 926 couples electrically and mechanically the ePOD 924 to the left temple interlock 920 and the right smart cord couples electrically and mechanically the ePOD 924 to the right temple interlock 922.

[0045] The left temple interlock 920 contains an acoustic cavity, an audio speaker, and an acoustic port. The acoustic port for the left audio speaker is indicated at 930. The left smart cord 926 contains electrical conductors that provide an audio signal for the audio speaker contained within the left temple interlock 920. In one or more embodiments, the audio speaker contained in the left temple interlock is a micro-projection speaker. Similarly, the acoustic port for the right audio speaker is indicated at 932. The right smart cord 928 contains electrical conductors that provide an audio signal for the audio speaker contained within the right temple interlock 922. In one or more embodiments, the audio speaker contained in the right temple interlock is a micro-projection speaker.

[0046] In various embodiments, the ePOD 924 contains an electronics unit. The electronics unit contains the electronic components and functionality described herein for a temple insert module (TIM). In other words, the electronics unit is a TIM mechanically and electrically packaged for use in a behind the neck module assembly.

[0047] Electronics units having different electronic configuration and functionality can be swapped in and out of the ePOD in similar fashion to the way different TIMs are swapped into and out of a temple of an eyewear device.

[0048] At 950 a length adjustment is provided to shorten or lengthen the right smart cord and the left smart cord. A behind the neck electronics pod (ePOD) 954 is configured with a left smart cord 956 and a right smart cord 958 exiting the same end of the ePOD 954. Such a configuration of the smart cords 956 and 958 permit a slider 960 to move either away from the ePOD or toward the ePOD. Moving the slider 960 away from the ePOD 954 shortens the available free length of the smart cords 956/958. Moving the slider 960 towards the ePOD 954 increases the available free length of smart cords 956/958.

[0049] In one or more embodiments, in operation when in an “on” state, audio data is streamed to the electronics unit in the ePOD 924 and is directed to the left and right speakers for broadcast to a user when the behind the neck module assembly is installed on an eyewear device and the user wears the eyewear device.

[0050] **Figure 10** illustrates, generally at 1000, a behind the neck module assembly in perspective view configured with a wearable device, according to embodiments of the invention. With reference to **Figure 10**, a first sensor 1050 is illustrated on the ePOD 924. A second sensor 1052 is illustrated incorporated into the right temple interlock 922. A third sensor 1054 is illustrated incorporated into the left temple interlock 920. The sensors 1050, 1052, and 1054 can be any of the sensors described herein previously described for use in a TIM or directly in electronics built into a temple.

[0051] In the embodiment shown in **Figure 10**, each temple interlock module, i.e., 920 and 922 contains a through hole into which a temple of the eyewear is inserted. In this embodiment, the temple interlock modules 920 and 922 are made from a compliant material such as an elastomer or rubber that permits elongation sufficient for a temple to be inserted therethrough. For example, the left temple interlock 920 contains a through hole 1040 into which the left temple 904 is inserted. The right temple interlock 922 contains a through hole 1042 into which the right temple 914 is inserted. Each of the temple interlocks 920 and 922 are positioned on a pair of compatible eyewear such that each of the speaker ports 930 and 932 are positioned in front of and near to a user's ear. Compatible

eyewear is eyewear that is compatible with the mechanical attachment provided by the temple interlocks.

[0052] **Figure 11** illustrates, generally at 1100 and 1150, coupling a temple interlock to a temple according to embodiments of the invention. With reference to **Figure 11**, at 1100 a magnetic temple interlock is illustrated. The magnetic temple interlock includes a magnetic region 1108 on a temple 1102 of an eyewear device. A temple interlock 1104 has a corresponding magnetic region 1106. In operation, the magnetic regions 1106 and 1108 are brought together, thereby causing the magnetic regions 1106 and 1108 to attract each other which provides a clamping force between the temple interlock 1104 and the temple 1102. A port of an acoustic cavity that contains a speaker is illustrated at 1110.

[0053] Another method of clamping is illustrated at 1150. A temple interlock 1152 contains a slot 1158 between a first side 1156a and a second side 1156b of compliant material. The geometry of 1158, 1156a, and 1156b forms a U shape into which a temple of an eyewear device can be inserted. The elasticity of the material 1152 provides a releasable coupling between the temple interlock 1152 and the temple of the eyewear (not shown). An acoustic port of an acoustic cavity that houses a speaker is indicated at 1154.

[0054] **Figure 12** illustrates, generally at 1200, coupling a behind the neck module to electronics contained within a temple, according to embodiments of the invention. With reference to **Figure 12**, a behind the neck module assembly is coupled to electronics contained within a temple. A portion of a behind the neck module assembly is illustrated with a behind the neck electronics pod (ePOD) 1220, a left smart cord 1222, and a left temple interlock 1210. Any of the electronics contained with a temple, as previously described, can be contained directly within a temple without a temple insert module (TIM). Or alternatively, the electronics contained with the temple can be electronics that are part of a TIM, as indicated optionally at 1204. In either situation, a temple 1202 is provided with a number of electrical contacts indicated at 1206. A corresponding number of electrical contacts 1208 are provided in the left temple interlock 1210. A mechanical interlock between the temple 1202 and the left temple interlock 1210 is provided to make the connection between 1210 and 1202 releasably couplable. In one or more embodiments a magnetic coupling is provided near or at the location of 1206/1208 to provide a releasable coupling thereto.

[0055] **Figure 13** illustrates, generally at 1300, a schematic for combining a behind the neck module assembly with temple electronics, according to embodiments of the invention. With reference to **Figure 13**, an outline of an eyewear device is indicated at 1302. The eyewear device 1302 contains electronics and or electronic pathways in a left temple, a right temple, and a frame

chassis. The outline 1302 encompasses the frame chassis, left temple, and right temple. In the system depicted in the figure, an electronics path 1308 extends between the left temple and the right temple of the eyewear device 1302.

[0056] The eyewear device contains a left temple insert module (TIM) 1304 located in a left temple and a right TIM 1306 located in a right temple. A behind the neck module assembly with electronics unit (ePOD) is indicated at 1310. A left smart cord 1312 provides an electrical pathway between the ePOD 1310 and the left TIM 1304. A right smart cord 1314 provides an electrical pathway between the ePOD 1310 and the right TIM 1306. In various embodiments both the left TIM 1304 and the right TIM 1306 are configured with one or more wireless communication network systems that permit wireless communication between the left TIM 1304 and the right TIM 1306 as indicated at 1316. A remote device 1320 is representative of one or more wireless sensors or wireless user devices as described above in conjunction with the preceding figures. Wireless communication 1322 is accomplished between the remote device 1320 and at least one of the left TIM 1304, the right TIM 1306, and the ePOD 1310. All of the electronic system functionality described above with respect to a TIM is applicable to an ePOD such as ePOD 1310.

[0057] In some embodiments, a left temple is not electrically connected to a right temple, in such as case the electrical path 1308 is removed from the electrical schematic shown in 1300.

[0058] **Figure 14** illustrates, generally at 1400, a user interface on a behind the neck module assembly, according to embodiments of the invention. With reference to **Figure 14**, a behind the neck electronics pod (ePOD) is illustrated at 1402. The ePOD 1402 has a display interface 1404. The display interface 1404 can be implemented in various ways in different embodiments. In some embodiments the user interface is a tactile surface button. In some embodiments, the user interface is implemented with a touch screen, such as a capacitive touch screen presenting one or more controls to a user. In some embodiments, the user interface communicates information to a user. In yet other embodiments, the user interface communicates information to a person who views the user interface 1404 from behind the user who is wearing the ePOD 1402. An example of such information is, but is not limited to, an emoji, mood status, icon, etc. as indicated at 1406.

[0059] **Figure 15** illustrates, generally at 1500, a block diagram for an electronics unit configured for a behind the neck electronics pod (ePOD), according to embodiments of the invention. With reference to **Figure 15**, as used in this description of embodiments, a behind the neck electronics unit can be based on a device such as a computer, in which embodiments of the invention may be used. The block diagram is a high-level conceptual representation and may be implemented in a variety of ways and by various architectures. Bus system 1502 interconnects a

Central Processing Unit (CPU) 1504 (alternatively referred to herein as a processor), Read Only Memory (ROM) 1506, Random Access Memory (RAM) 1508, storage 1510, audio 1522, user interface 1524, and communications 1530. RAM 1508 can also represent dynamic random-access memory (DRAM) or other forms of memory. The user interface 1524 can be in various embodiments a voice interface, a touch interface, a physical button, or combinations thereof. It is understood that memory (not shown) can be included with the CPU block 1504. The bus system 1502 may be for example, one or more of such buses as a system bus, Peripheral Component Interconnect (PCI), Advanced Graphics Port (AGP), Small Computer System Interface (SCSI), Institute of Electrical and Electronics Engineers (IEEE) standard number 994 (FireWire), Universal Serial Bus (USB), universal asynchronous receiver-transmitter (UART), serial peripheral interface (SPI), inter-integrated circuit (I2C), etc. The CPU 1504 may be a single, multiple, or even a distributed computing resource. Storage 1510 may be flash memory, etc. Note that depending upon the actual implementation of a behind the neck electronics unit, the behind the neck electronics unit may include some, all, more, or a rearrangement of components in the block diagram. Thus, many variations on the system of **Figure 15** are possible.

[0060] Connection with one or more wireless networks 1532 is obtained via communication (COMM) 1530, which enables the behind the neck electronics unit 1500 to communicate wirelessly with local sensors, local devices, as well as with remote devices on remote networks. In some embodiments, 1532/1530 provide access to remote voice-to-text conversion systems which can be in remote locations, for example cloud based. 1532 and 1530 flexibly represent wireless communication systems in various implementations, and can represent various forms of telemetry, general packet radio service (GPRS), Ethernet, Wide Area Network (WAN), Local Area Network (LAN), Internet connection, Wi-Fi, WiMAX, ZigBee, Infrared, Bluetooth, near-field communications, mobile telephone communications systems, such as 3G, 4G, LTE, 5G, etc. and combinations thereof. In various embodiments, a touch interface is optionally provided at 1524. An optional display is provided at 1520. Signals from one or more sensors are input to the system via 1529 and 1528. Global position system (GPS) information is received and is input to the system at 1526. Audio can represent a speaker such as a projection speaker or projection micro-speaker described herein.

[0061] In various embodiments, depending on the hardware configuration, different wireless protocols are used in the networks to provide the systems described in the figures above. One non-limiting embodiment of a technology used for wireless signal transmission is the Bluetooth wireless technology standard which is also commonly known as IEEE 802.15.1 standard. In other

embodiments, the wireless signal transmission protocol known as Wi-Fi is used which uses the IEEE 802.11 standard. In other embodiments, the ZigBee communication protocol is used which is based on the IEEE 802.15.4 standard. These examples are given merely for illustration and do not limit different embodiments. Transmission Control Protocol (TCP) and Internet Protocol (IP) are also used with different embodiments. Embodiments are not limited by the data communication protocols listed herein and are readily used with other data communication protocols not specifically listed herein.

[0062] In various embodiments, the components of systems as well as the systems described in the previous figures (such as a behind the neck electronics unit) are implemented in an integrated circuit device, which may include an integrated circuit package containing the integrated circuit. In some embodiments, the components of systems as well as the systems are implemented in a single integrated circuit die. In other embodiments, the components of systems as well as the systems are implemented in more than one integrated circuit die of an integrated circuit device which may include a multi-chip package containing the integrated circuit.

[0063] In various embodiments, the descriptions of embodiments provided herein provide reconfigurable components for head wearable devices. Reconfigurable components for head wearable devices include, but are not limited to, removable temples, removable temple insert modules (TIMs), a behind the neck module assembly, an electronics pod ePOD for a behind the neck module assembly and removable electronics units for ePOD.

[0064] In various embodiments, running on the data processing system(s) created with respect to various TIMs (800 in **Figure 8**) or with respect to various behind the neck electronics units (1500 in **Figure 15**) are one or more algorithms that provide useful functionality to a user. These algorithms are described below in conjunction with the following figures as procedures or synonymously methods and it will be understood by those of ordinary skill in the art that the algorithms may be run on hardware that is distributed across the systems in different ways. For example, in some embodiments, the algorithm will run on the hardware contained within a TIM or within a behind the neck electronics unit. In other embodiments, the algorithm or parts of the algorithm will run on a combination of a TIM and a device such as the devices 220, 670, 702, 1320, etc., shown in the figures above, or on a combination of a TIM, a device (220, 670, 702, 1320, etc.), and cloud based hardware and services available through one or more communication networks as described above in conjunction with the preceding figures. Similarly, in other embodiments, an algorithm or parts of the algorithm will run on a combination of a behind the neck electronics unit and a device such as the devices 220, 670, 702, 1320, etc., shown in the figures above, or on a combination of a behind the

neck electronics unit, a device (220, 670, 702, 1320, etc.), and cloud based hardware and services available through one or more communication networks as described above in conjunction with the preceding figures.

[0065] **Figure 16** illustrates, generally at 1600, a procedure for providing assistance to a user of an eyewear device, according to embodiments of the invention. With reference to **Figure 16**, a process starts at a block 1602. At a block 1604, data is received from one or more sensors associated with an eyewear device. The eyewear device can be any of the eyewear devices described above, such as a modular reconfigurable eyewear device utilizing one or more temple insert modules (TIM) or a modularized eyewear device fitted with a behind the neck module assembly. In addition, the eyewear device need not be a modularized device, the eyewear device can be an eyewear device designed without modularity.

[0066] The one or more sensors in the block 1604 can be, for example, without limitation any sensor or combination of sensors described above, including camera(s), microphone(s), global position system (GPS) receiver, a multiaxis inertial measurement unit(s) containing accelerometers, gyroscopes, magnetometers, proximity sensor(s), motion sensor(s), gyroscope(s), magnetometer(s), display(s), temperature sensor(s), pressure sensor(s), infrared sensor(s), biometric sensor(s), biomechanical sensor(s), such as but not limited to Electrodermal Activity (EDA) sensor(s) including but not limited to Galvanic Skin Response (GSR) sensor(s), heart rate sensor(s), breathing rate sensor(s), etc. Thus, in various embodiments, roll, pitch, heading, position, and velocity of a user wearing an eyewear device are available through data output from sensors in the block 1604.

[0067] At a block 1606 a context of the user is determined. As used in this description of embodiments, a context of a user includes one or more of a physical orientation, an activity, and an environment that the user is in. A user's context can change as a function of time and can be a dynamic property or it can be a static property. Context of a user is described more fully below in conjunction with **Figure 18**. The context is determined with the data received in the block 1604. In the block 1608, assistance is provided to the user in a form of feedback through the eyewear device. The feedback can be one or more of audio feedback through a speaker embedded in the eyewear device, vibration imparted to the user through the eyewear device, and feedback from a device located in the user's environment mediated by the eyewear device. At the block 1606, data from the one or more sensors is analyzed, for example, tracking head posture and or movement of the user or lack of user movement. Based on the analysis of the data, assistance is provided to the user at the block 1608 through, for example, a communication to the user. The assistance can be in the form of an audio message broadcast from a speaker embedded in the eyewear device to remind the user of a

negative condition that the user is experiencing based on an analysis of the context and the data from the sensor(s). Negative conditions are conditions in which some detriment to the user might result either imminently or at some future time, such as, but not limited to, lack of sufficient frequency of movement or maintaining a stationary position of the head for too long a period of time. In this example, the detriment is an impairment to the user's biomechanical function. Assistance can also be assistance that affirms a positive condition, such as acknowledgment that sufficient head movement is occurring, or that sufficient physical activity is occurring. The assistance can be broadcast to the user through a speaker or speakers incorporated with the eyewear device. Control of an algorithm implementing the process of 1600 can continuously loop as indicated at 1610 to continuously receive data at the block 1604, analyze context at the block 1606, and provide assistance as needed at the block 1608. Thereby providing real-time assistance to the user based on the user's changing context as a function of time.

[0068] The process stops at the block 1612. A trigger to stop the process at the block 1612 can be when the user removes the eyewear device from the user's head. Such an event can be ascertained by the system through an output from a proximity sensor, indicating that the user's head is no longer proximate to the eyewear device. In another nonlimiting example, the process stops at the block 1612 when the user moves the temples of an eyewear device into a closed position, thereby shutting the system off through a switch triggered by closing a temple(s). Alternatively, the system can be powered down by voice command. These examples of initiating the block 1612 are given merely for illustration and do not limit embodiments of the invention.

[0069] **Figure 17** illustrates, generally at 1700, receiving data from sensors associated with an eyewear device, according to embodiments of the invention. With reference to **Figure 17**, receiving data from sensors 1604 can include, in various embodiments, data from sensors that are embedded in the eyewear device at 1702. In addition, data can be received from sensors that are external to the eyewear device at 1704. An example of an external sensor is, but is not limited to, a sensor on a user's shirt button, measuring tension on the button or a sensor measuring pressure against a user's belt estimating abdominal expansion due to food intake. Similarly, an ingestible sensor that more accurately estimates caloric intake throughout a period of time can be used in some embodiments. Such sensors can be used to provide data that is used by the system to provide assistance to the user such as for example, "I think that you might have had enough to eat."

[0070] **Figure 18** illustrates, generally at 1800, context analysis of a user of an eyewear device, according to embodiments of the invention. With reference to **Figure 18**, context analysis is illustrated at 1802. Context analysis 1802 includes one or more of a physical orientation indicated at

1804, a user activity indicated at 1806, and an environment that the user is in, indicated at 1808. Some non-limiting examples of a physical orientation 1804 of a user are, but are not limited to, sitting, standing, lying prone, inverted, etc. Some non-limiting examples of an activity 1806 of a user are, but are not limited to, walking, running, eating, etc. Some non-limiting examples of an environment 1808 that a user is located in are, but are not limited to, automobile, truck, plane, train, bicycle, wheelchair, social setting, etc. Some non-limiting examples of social setting are, but are not limited to, a solitary setting, a public, etc.

[0071] **Figure 19** illustrates generally at 1900, another procedure for providing assistance to a user of an eyewear device, according to embodiments of the invention. With reference to **Figure 19**, a process starts at a block 1902. At a block 1904, data is received from one or more sensors associated with an eyewear device. The eyewear device can be any of the eyewear devices described above, such as a modular reconfigurable eyewear device utilizing one or more temple insert modules (TIM) or a modularized eyewear device fitted with a behind the neck module assembly. In addition, the eyewear device need not be a modularized device, the eyewear device can be an eyewear device designed without modularity.

[0072] The one or more sensors in the block 1904 can be, for example, without limitation any sensor or combination of sensors described above, including camera(s), microphone(s), global position system (GPS) receiver, a multiaxis inertial measurement unit(s) containing accelerometers, gyroscopes, magnetometers, proximity sensor(s), motion sensor(s), gyroscope(s), magnetometer(s), display(s), temperature sensor(s), pressure sensor(s), infrared sensor(s), biometric sensor(s), biomechanical sensor(s), such as but not limited to Electrodermal Activity (EDA) sensor(s) including but not limited to Galvanic Skin Response (GSR) sensor(s), heart rate sensor(s), breathing rate sensor(s), etc. Thus, in various embodiments, roll, pitch, heading, position, and velocity of a user wearing an eyewear device are available through data output from sensors in the block 1904.

[0073] At a block 1906 a state of the user is determined. A user's state can change as a function of time and can be a dynamic property or it can be a static property. A state of a user is described more fully below in conjunction with **Figure 20** and **Figure 21**. The state is determined with the data received in the block 1904. In the block 1908, assistance is provided to the user in a form of feedback through the eyewear device. The feedback can be one or more of audio feedback through a speaker embedded in the eyewear device, vibration imparted to the user through the eyewear device, and feedback from a device located in the user's environment mediated by the eyewear device. At the block 1906, data from the one or more sensors is analyzed, for example, tracking head posture and or movement of the user or lack of user movement. Based on the analysis of the data, assistance

is provided to the user, at the block 1908, through for example, a communication to the user. The assistance can be in the form of an audio message broadcast from a speaker embedded in the eyewear device to remind the user of a negative condition that the user is experiencing based on an analysis of the state and the data from the sensor(s). A negative condition is one in which some detriment to the user might occur either imminently or at some future time, such as, but not limited to, lack of sufficient frequency of movement or maintaining a stationary position of the head for too long a period of time. In this example, the detriment is an impairment to the user's biomechanical function. Assistance can also be assistance that affirms a positive condition, such as acknowledgment that sufficient head movement is occurring, or that sufficient physical activity is occurring. The assistance can be broadcast to the user through a speaker or speakers incorporated with the eyewear device. Control of an algorithm implementing the process of 1900 can continuously loop as indicated at 1910 to continuously receive data at the block 1904, determine state at the block 1906, and provide assistance as needed at the block 1908. Thereby providing real-time assistance to the user based on the user's changing state as a function of time.

[0074] The process stops at the block 1912. A trigger to stop the process at the block 1912 can be when the user removes the eyewear device from the user's head. Such an event can be ascertained by the system through an output from a proximity sensor, indicating that the user's head is no longer proximate to the eyewear device. In another nonlimiting example, the process stops at the block 1912 when the user moves the temples of an eyewear device into a closed position, thereby shutting the system off through a switch triggered by closing a temple(s). Alternatively, the system can be powered down by voice command. These examples of initiating the block 1912 are given merely for illustration and do not limit embodiments of the invention.

[0075] The procedure of 1900, ultimately providing assistance to a user, is accomplished without actually determining the user's context. For example, in the example given above, the user might be in one or more different social settings (different contexts) which were not determined by the system. However, the procedure is sufficient to allow the system to determine that the user was experiencing a negative condition due to insufficiency of movement and to produce relevant assistance for the user that is delivered through the eyewear in order to avoid impairing the user's biomechanical function through inactivity.

[0076] **Figure 20** illustrates, generally at 2000, user state analysis of a user of an eyewear device, according to embodiments of the invention. With reference to **Figure 20**, a process starts at a block 2002. At a block 2004 a state of a user is determined through utilizing sensors embedded in an eyewear device and, in some embodiments, through using sensors that are external to the eyewear

device. At a block 2006, assistance is provided to the user by one or more of a synthetic smart agent or a real person. Examples of both are provided in conjunction with the discussion below.

[0077] **Figure 21** illustrates, generally at 2100, different user states, according to embodiments of the invention. With reference to **Figure 21**, given for illustration, with no limitation implied thereby a user state analysis 2102 can have subcategories of Health 2104, Well Being 2106, Safety 2108, Cognitive 2110, Physical 2112, and Emotion 2114. **Figure 19**, **Figure 20**, and **Figure 21**, taken together form a system that provides a plurality of assistance to a user. For example, a user of an eyewear device can be living at his or her home, on a boat, in a recreational vehicle, in an assisted living facility, etc. The system so configured with a medication timetable for the user can provide assistance to the user in a form of audio communication to remind the user to take medication at appointed times. In one non-limiting example, provided merely for illustration, at 11 AM the system produces an audio message that instructs the user to take his or her noon time medication before lunch. This is one non-limiting example of providing assistance relative to the state of Health 2104.

[0078] Continuing with an example provided herein, merely for illustration, with no limitation implied thereby, the system monitors the user's activity or inactivity. After a predetermined time of inactivity is logged by one or more sensors in the eyewear device at a time of day where activity is normally recorded, the system makes a determination that the user could be suffering from a physical or mental condition (e.g., depressive state, flu, etc.) because of the activity and or inactivity patterns that are recorded and analyzed, e.g., sleeping during the day, and notifies the user's son or daughter to call the user. The eyewear calls the son or daughter and communicates that the user has not moved in a period of time. The user's son or daughter calls the user and the user's state is checked or mood is lifted by the personal (physical) contact. The call could be made through a telephone in the user's room or directly through the eyewear device configured for telephone calls. Alternatively, a synthetic smart agent could be generated by the system to provide a communication to the user in such an instance suggesting to the user that it would be a good idea for the user to get up and move around. This is one non-limiting example of providing assistance relative to the state of Well Being 2106.

[0079] Continuing with an example provided herein, merely for illustration, with no limitation implied thereby, following the telephone contact from the son or the daughter or via the smart agent, the user could get up, trip, and then fall. A sensor in the eyewear device, such as for example and with no limitation implied thereby a multi-axis inertial measurement unit with embedded accelerometers would register a signal from the fall. This signal can be used to alert an appropriate person that the user has fallen and needs help. For example, if the user is living in an assisted living

facility or nursing home with staff on call, appropriate notification of the fall is lodged with the staff. If the user is living independently, a call can be placed to 911 emergency services. Depending on a level of system complexity, a user's context can be entered as a setup parameter, determined by sensor data, or remain unknown which then requires the system to execute a default response to sensor data. This is one non-limiting example of providing assistance relative to the state of Safety 2108.

[0080] The system can evaluate the cognitive state of a user through one or more techniques such as, but not limited to, comparing an error rate of the voice recognition system while processing the user's speech against an historical error rate metric for a given user. If the error rate is exceptionally high, this can be an indication that the user has suffered a negative health event such as a stroke. A stroke can negatively impact a user's speech such the speech is unintelligible to a voice recognition system in the worst case. In addition, thereto, the system can test a user's cognitive state by propounding a number of questions to a user. Based on known answers to the questions, the system can make an assessment of the user's cognitive state. This is one non-limiting example of providing assistance relative to the Cognitive state at 2110.

[0081] Analysis of a user's posture through sensor data recorded as a function of time permits analysis of a user's posture, biomechanics, activity level, etc. Such analysis permits a system to compare a user's performance against that of a healthy user in order to render an analysis of the user's physical state. Based on such an analysis, corrective assistance can be generated by the system and communicated to the user. In the alternative if the user's path in life is consistent with that of a healthy state, a form of positive assistance can be generated and communicated to the user, such as, but not limited to: "you had a good day today marked by frequent breaks from sitting with 15,000 steps. Keep up the good work!" This is one non-limiting example of providing assistance relative to the state of Physical at 2112.

[0082] Analysis of a user's emotional state can be quantified through output of one or more biometric sensors, such as, but not limited to; heart rate, breathing rate, galvanic skin response, etc. Galvanic skin response measures changes in emotional state of a user through changes in skin conductivity. These data can be transmitted to and analyzed by health care workers during an evaluation of a user's emotional state. Such evaluation can be part of athletic training, administering a medical procedure such as a dental procedure, etc. In one or more embodiments, a frequency of heightened emotional state might be an indication of mental instability warranting medical intervention in order to prevent a negative outcome such as, in a worst case, suicide. A provider of medical services could use data on a user's emotional state during, for example, a dental procedure

to make the user feel calmer and more relaxed. A galvanic skin response sensor can be located at the spots of the eyewear device that come into contact with the user's skin, such as, but not limited to, the nose bridge. These are some non-limiting examples of providing assistance relative to the state of Emotional at 2114.

[0083] **Figure 22** illustrates, generally at 2200, a procedure that combines user context and state for providing assistance to a user of an eyewear device, according to embodiments of the invention. With reference to **Figure 22**, the process 2200 includes both determination of context for the user and analysis of a state of the user before assistance is rendered to the user. A process starts at a block 2202. At a block 2204, data is received from one or more sensors associated with an eyewear device. The eyewear device can be any of the eyewear devices described above, such as a modular reconfigurable eyewear device utilizing one or more temple insert modules (TIM) or a modularized eyewear device fitted with a behind the neck module assembly. In addition, the eyewear device need not be a modularized device, the eyewear device can be an eyewear device designed without modularity.

[0084] The one or more sensors in the block 2204 can be, for example, without limitation any sensor or combination of sensors described above, including camera(s), microphone(s), global position system (GPS) receiver, a multiaxis inertial measurement unit(s) containing accelerometers, gyroscopes, magnetometers, proximity sensor(s), motion sensor(s), gyroscope(s), magnetometer(s), display(s), temperature sensor(s), pressure sensor(s), infrared sensor(s), biometric sensor(s), biomechanical sensor(s), such as but not limited to Electrodermal Activity (EDA) sensor(s) including but not limited to Galvanic Skin Response (GSR) sensor(s), heart rate sensor(s), breathing rate sensor(s), etc. Thus, in various embodiments, roll, pitch, heading, position, and velocity of a user wearing an eyewear device are available through data output from sensors in the block 2204.

[0085] At a block 2206 a context of the user is determined. As used in this description of embodiments, context of a user includes one or more of, a physical orientation, an activity, and an environment that the user is in. A user's context can change as a function of time and can be a dynamic property or it can be a static property. Context of a user has been described more fully above in conjunction with **Figure 18**. The context is determined with the data received in the block 2204.

[0086] At a block 2208 a state of the user is determined. A user's state can change as a function of time and can be a dynamic property or it can be a static property. A state of a user has been described more fully above in conjunction with **Figure 20** and **Figure 21**. The state is determined with the data received in the block 2204. In the block 2210, assistance is provided to the user in a

form of feedback through the eyewear device. The feedback can be one or more of audio feedback through a speaker embedded in the eyewear device, vibration imparted to the user through the eyewear device, and feedback from a device located in the user's environment mediated by the eyewear device. At the blocks 2206 and 2208, data from the one or more sensors is analyzed, for example, tracking head posture and or movement of the user or lack of user movement. Based on the analysis of the data, assistance is provided to the user, at the block 2210, through for example, a communication to the user. The assistance can be in the form of an audio message broadcast from a speaker embedded in the eyewear device to remind the user of a negative condition that the user is experiencing based on an analysis of the state and the data from the sensor(s). A negative condition is one in which some detriment to the user might occur either imminently or at some future time, such as, but not limited to, lack of sufficient frequency of movement or maintaining a stationary position of the head for too long a period of time. In this example, the detriment is an impairment to the user's biomechanical function. Assistance can also be assistance that affirms a positive condition, such as acknowledgment that sufficient head movement is occurring, or that sufficient physical activity is occurring. The assistance can be broadcast to the user through a speaker or speakers incorporated with the eyewear device. Control of an algorithm implementing the process of 2200 can continuously loop as indicated at 2212 to continuously receive data at the block 2204, determine context at the block 2206, analyze a user's state at the block 2208, and provide assistance as needed at the block 2210. Thereby providing real-time assistance to the user based on the user's changing context and state as a function of time.

[0087] The process stops at the block 2214. A trigger to stop the process at the block 2214 can be when the user removes the eyewear device from the user's head. Such an event can be ascertained by the system through an output from a proximity sensor, indicating that the user's head is no longer proximate to the eyewear device. In another nonlimiting example, the process stops at the block 2214 when the user moves the temples of an eyewear device into a closed position, thereby shutting the system off through a switch triggered by closing a temple(s). Alternatively, the system can be powered down by voice command. These examples of initiating the block 2214 are given merely for illustration and do not limit embodiments of the invention.

[0088] The procedure of 2200, ultimately providing assistance to a user, is accomplished with determining the user's context. Determining user context can increase the relevance of assistance that the system provides to the user. For example, in the example given above in conjunction with **Figure 19**, the user might be in one or more social settings (context) which were not determined by the system. However, the process of **Figure 22** can determine context. Ultimately, the analysis might

conclude that indeed the user has been inactive for a prolonged period of time, e.g., the user is experiencing a negative condition due to insufficiency of movement. The system might further conclude that the user's context justifies the inactivity, and that no assistance is required at the present time. In one non-limiting example, given merely for illustration, the system may determine that the user is taking an examination and that this is the reason for the inactivity. In such a case, the system would not provide the assistance provided in conjunction with the example of **Figure 19**. The system would continue to loop at 2212, acquiring and processing further data at 2204 and determining context at 2206 until the context changed, for example the exam ended. Then if the user continued the inactivity the system would produce relevant assistance for the user that is delivered through the eyewear in order to avoid impairing the user's biomechanical function through further inactivity. Thus, in various embodiments, the assistance rendered to the user by the system is refined through context determination and user state analysis before assistance is rendered to a user.

[0089] **Figure 23** illustrates, generally at 2300, a procedure that provides different levels of assistance to a user of an eyewear device, according to embodiments of the invention. With reference to **Figure 23**, the process 2300 includes both determination of context for the user and analysis of a state of the user before assistance is rendered to the user. A process starts at a block 2302. At a block 2304, data is received from one or more sensors associated with an eyewear device. The eyewear device can be any of the eyewear devices described above, such as a modular reconfigurable eyewear device utilizing one or more temple insert modules (TIM) or a modularized eyewear device fitted with a behind the neck module assembly. In addition, the eyewear device need not be a modularized device, the eyewear device can be an eyewear device designed without modularity.

[0090] The one or more sensors in the block 2304 can be, for example, without limitation any sensor or combination of sensors described above, including camera(s), microphone(s), global position system (GPS) receiver, a multiaxis inertial measurement unit(s) containing accelerometers, gyroscopes, magnetometers, proximity sensor(s), motion sensor(s), gyroscope(s), magnetometer(s), display(s), temperature sensor(s), pressure sensor(s), infrared sensor(s), biometric sensor(s), biomechanical sensor(s), such as but not limited to Electrodermal Activity (EDA) sensor(s) including but not limited to Galvanic Skin Response (GSR) sensor(s), heart rate sensor(s), breathing rate sensor(s), etc. Thus, in various embodiments, roll, pitch, heading, position, and velocity of a user wearing an eyewear device are available through data output from sensors in the block 2304.

[0091] At a block 2306 a context of the user is determined. As used in this description of embodiments, context of a user includes a physical orientation, an activity, and an environment that

the user is in. A user's context can change as a function of time and can be a dynamic property or it can be a static property. Context of a user has been described more fully above in conjunction with **Figure 18**. The context is determined with the data received in the block 2304.

[0092] At a block 2308 a state of the user is analyzed. A user's state can change as a function of time and can be a dynamic property or it can be a static property. A state of a user has been described more fully above in conjunction with **Figure 20** and **Figure 21**. The state is analyzed with the data received in the block 2304. At the block 2310, the algorithm determines whether or not the context/state combination requires assistance. If the answer is no, then control transfers at 2312 and additional data is collected at 2304 and the context and state blocks are revisited until a context and state analysis together with current data justifies rendering assistance to the user at 2314. Control then passes to the block 2316 and the algorithm determines a level of assistance to render to the user.

[0093] The algorithm determines at 2318 a level of risk associated with a user's context, the user's state, and the current data to determine appropriate assistance to render to the user. This determination is done with respect to a combination of predetermined ranges for variables associated with the user and in some embodiments, artificial intelligence methods including machine learning techniques are applied to a user and the data to improve and to update a personalized analysis framework for an individual user. Based on the analysis, a determination of a level of assistance to provide to the user is made at the block 2320. The assistance can be in the form of an audio message broadcast from a speaker embedded in the eyewear device to remind the user of a negative condition that the user is experiencing based on an analysis of the context, state, and the data from the sensor(s) and or provided digitally through a compatible application on a smart mobile device or computing platform. In addition, thereto, assistance can be in a form of personal assistance, whereby the user is contacted by telephone, or personal assistance whereby a person actually comes to the user in person based on the context, state, and current form of the data. For example, a user whose context is sitting in a wheelchair, activity is eating, environment is indoor setting and whose velocity is 15 miles/per/hour (MPH) presents a high level of risk, a runaway wheelchair, thereby justifying an all hands-on deck response. For example, audio assistance to the eyewear device and an immediate personal visit.

[0094] Control of an algorithm implementing the process of 2300 can continuously loop as indicated at 2322, to receive data at the block 2304, determine context at the block 2306, analyze a user's state at the block 2308, and provide assistance as needed at the block 2310/2316. Thereby providing real-time assistance to the user based on the user's changing context and state as a function of time. Alternatively, criteria can arise at 2324 which stops the process.

[0095] The process stops at the block 2324. A trigger to stop the process at the block 2324 can be when the user removes the eyewear device from the user's head. Such an event can be ascertained by the system through an output from a proximity sensor, indicating that the user's head is no longer proximate to the eyewear device. In another nonlimiting example, the process stops at the block 2324 when the user moves the temples of an eyewear device into a closed position, thereby shutting the system off through a switch triggered by closing a temple(s). Alternatively, the system can be powered down by voice command. These examples of initiating the block 2324 are given merely for illustration and do not limit embodiments of the invention.

[0096] **Figure 24** illustrates, generally at 2400, a system for providing assistance to a user of an eyewear device, according to embodiments of the invention. With reference to **Figure 24**, an eyewear device is illustrated at 2402. The eyewear device 2402 is configured with embedded sensors 2404, 2406, through 2408. An optional local sensor 2412 is illustrated that can function as part of the sensors that are in communication with the eyewear device 2402. In one or more embodiments sensor 2404 is a camera pointing to a left direction relative to a user, sensor 2406 is a camera pointing forward of the user, and sensor 2408 is a camera pointing to a right side of a user. Individually or together, outputs from one or more cameras are used to determine a context for the user through image analysis. Image analysis along with other sensor data such as microphone data can be used by a system to determine a context for a user, such as but not limited to a football game, a bar, a library, etc. Remote hardware and services are illustrated by 2414 that can engage one or more persons 2416 to provide assistance to a user of the eyewear 2402. Assistance to a user is indicated as audio feedback 2410 that is broadcast to the user via one or more speakers embedded in the eyewear 2402.

[0097] The one or more persons 2416 can be a family member(s), a professional person such as doctor, nurse, nursing home personnel, etc. providing assistance to the user responsive to the system's output from analysis of sensor data with one or more of user context, user state or the combination of sensor data with user context and user state as described above in conjunction with the preceding figures.

[0098] As described herein, in various embodiments, eyewear devices are described that provide various types of assistance to a user. By using one sensor or a plurality of sensors embedded within an eyewear device or sensors used within the eyewear device's sensor system (embedded as well as external sensors) a user's context and or state are determined, and relevant assistance is generated and provided to the user to correct a negative condition or to enhance a positive condition. Within several nonlimiting examples, provided merely for illustration, and with no limitation implied

thereby, an eyewear device tracks posture and movement of a user's head and then provides reminders (assistance) to the user for the context of: (1) the user is playing a video game and his or her head is nodding down while playing resulting in incorrect posture that can harm the neck. The system provides a reminder (assistance) of the potential harm and makes a suggestion to alleviate a negative health outcome from the activity. (2) The user's head is leaning to one side and is not centered. The user might not even be aware of such a misalignment. The system provides a reminder (assistance) of the potential harm and makes a suggestion aimed at alleviating a negative health outcome from the activity. (3) Incorrect posture is detected for a period of time. The system provides a reminder (assistance) to the user recommending periodic stretches to alleviate potential negative health outcome from the activity. (4) Reminders (assistance) can be generated in preventive fashion to avoid a negative future outcome. Such as when a user is engaged in an activity that spans a long time. In order to avoid fatigue, in one or more embodiments, the system provides assistance to the user such as placing a phone call to the user. For example, in one non-limiting example provided only for illustration, the system can generate an audio communication that is broadcast in the embedded speaker that communicates: "you have been driving for seven hours I think that you might need a cup of coffee, there is an exit coming up in 10 miles it might be a good idea to take a break at that exit." (5) Movements and positions of a user's head are monitored during driving. Certain head angles held for a prolonged period of time can indicate an unsafe condition, such as the user has fallen asleep, in various embodiments, the system provides assistance to "wake the user up." Such assistance can be in a form of an audio broadcast through an embedded speaker(s), vibration of the eyewear through a built-in transducer that provides vibration. Illumination of the user's eye, via a display incorporated with the eyewear. In some embodiments, the eyewear is in communication with one or more of the vehicle's systems, such as a horn, configured as external sensors or external device. The algorithm, in such a case, uses the vehicle's horn to wake the user up in order to avoid a negative condition such as an accident. Accordingly, in various embodiments, the reminders (assistance) can be audio reminders broadcast to the user through embedded speaker(s) and or reminders via a display such as a heads-up display described above, or reminders provided through external sensors that are in communication with the eyewear system.

[0099] Accordingly, the procedures described herein describe a user by a number of dimensions that are expressed by the data, the context, and the state of the user as a function of time. Within a range of a given set of dimensions, positive conditions or safe zones exist. Similarly, within the range of possible dimensions, negative conditions and potentially unsafe zones exist. In some embodiments, the safe zones and the unsafe zones are known *a priori*. In other embodiments, the

safe zones and the unsafe zones are learned over time and are not known *a priori*. And in some embodiments, the safe zones and unsafe zones are a combination of information that is known *a priori* and is learned information over time. The safe zones and unsafe zones are used during analysis of the data to formulate relevant assistance to a user based on data collected, and one or more of a user's context and a user's state. The procedures are flexible and can be used for any context and or state, and any data relevant to a user.

[00100] For purposes of discussing and understanding the different embodiments, it is to be understood that various terms are used by those knowledgeable in the art to describe techniques and approaches. Furthermore, in the description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of an embodiment. It will be evident, however, to one of ordinary skill in the art that an embodiment may be practiced without these specific details. In some instances, well-known structures and devices are shown in block diagram form, rather than in detail, in order to avoid obscuring various embodiments. These embodiments are described in sufficient detail to enable those of ordinary skill in the art to practice the invention, and it is to be understood that other embodiments may be utilized, and that logical, mechanical, electrical, and other changes may be made without departing from the scope of the present invention.

[00101] Some portions of the description may be presented in terms of algorithms and symbolic representations of operations on, for example, data bits within a computer memory. These algorithmic descriptions and representations are the means used by those of ordinary skill in the data processing arts to most effectively convey the substance of their work to others of ordinary skill in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of acts leading to a desired result. The acts are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

[00102] It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the discussion, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, can refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories

into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission, or display devices.

[00103] An apparatus for performing the operations herein can implement the present invention. This apparatus may be specially constructed for the required purposes, or it may comprise a general-purpose computer, selectively activated or reconfigured by a computer program stored in the computer. Such a computer program may be stored in a computer readable storage medium, such as, but not limited to, any type of disk including floppy disks, hard disks, optical disks, compact disk-read only memories (CD-ROMs), and magnetic-optical disks, read-only memories (ROMs), random access memories (RAMs), dynamic random access memories (DRAM), electrically programmable read-only memories (EPROMs), electrically erasable programmable read-only memories (EEPROMs), FLASH memories, magnetic or optical cards, RAID, etc., or any type of media suitable for storing electronic instructions either local to the computer or remote to the computer.

[00104] The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general-purpose systems may be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the required method. For example, any of the methods according to the embodiments can be implemented in hard-wired circuitry, by programming a general-purpose processor, or by any combination of hardware and software. One of ordinary skill in the art will immediately appreciate that the embodiments can be practiced with computer system configurations other than those described, including hand-held devices, multiprocessor systems, microprocessor-based or programmable consumer electronics, digital signal processing (DSP) devices, set top boxes, network PCs, minicomputers, mainframe computers, and the like. The embodiments can also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network.

[00105] The methods herein may be implemented using computer software. If written in a programming language conforming to a recognized standard, sequences of instructions designed to implement the methods can be compiled for execution on a variety of hardware platforms and for interface to a variety of operating systems. In addition, the embodiments are not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of the embodiments as described herein. Furthermore, it is common in the art to speak of software, in one form or another (e.g., program, procedure, application, driver...), as taking an action or causing a result. Such expressions

are merely a shorthand way of saying that execution of the software by a computer causes the processor of the computer to perform an action or produce a result.

[00106] It is to be understood that various terms and techniques are used by those knowledgeable in the art to describe communications, protocols, applications, implementations, mechanisms, etc. One such technique is the description of an implementation of a technique in terms of an algorithm or mathematical expression. That is, while the technique may be, for example, implemented as executing code on a computer, the expression of that technique may be more aptly and succinctly conveyed and communicated as a formula, algorithm, or mathematical expression. Thus, one of ordinary skill in the art would recognize a block denoting $A+B=C$ as an additive function whose implementation in hardware and/or software would take two inputs (A and B) and produce a summation output (C). Thus, the use of formula, algorithm, or mathematical expression as descriptions is to be understood as having a physical representation in at least hardware and/or software (such as a computer system in which the techniques of the present invention may be practiced as well as implemented as an embodiment).

[00107] Non-transitory machine-readable media is understood to include any mechanism for storing information (such as program code, etc.) in a form readable by a machine (e.g., a computer). For example, a machine-readable medium, synonymously referred to as a computer-readable medium, includes read only memory (ROM); random access memory (RAM); magnetic disk storage media; optical storage media; flash memory devices; except electrical, optical, acoustical or other forms of transmitting information via propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.); etc.

[00108] As used in this description, "one embodiment" or "an embodiment" or similar phrases means that the feature(s) being described are included in at least one embodiment of the invention. References to "one embodiment" in this description do not necessarily refer to the same embodiment; however, neither are such embodiments mutually exclusive. Nor does "one embodiment" imply that there is but a single embodiment of the invention. For example, a feature, structure, act, etc. described in "one embodiment" may also be included in other embodiments. Thus, the invention may include a variety of combinations and/or integrations of the embodiments described herein.

[00109] While the invention has been described in terms of several embodiments, those of skill in the art will recognize that the invention is not limited to the embodiments described but can be practiced with modification and alteration within the spirit and scope of the appended claims. The description is thus to be regarded as illustrative instead of limiting.

What is claimed is:

1. A method to provide assistance to a user through an eyewear device, comprising:
receiving first data from a first sensor, the first sensor is incorporated into the eyewear device, the first sensor measures a parameter related to the user;
analyzing a state of the user, wherein the analyzing uses the first data; and
providing assistance to the user, the assistance is in a form of feedback, and the feedback is related to the state.
2. A method to provide assistance to a user through an eyewear device, comprising:
receiving first data from a first sensor, the first sensor is incorporated into the eyewear device, the first sensor measures a parameter related to the user;
determining a context of the user, wherein the determining uses the first data during the determining; and
providing assistance to the user, the assistance is related to the context.
3. The method of claim 2, wherein a first element of the context is a physical orientation of the user.
4. The method of claim 3, wherein a second element of the context is an activity that the user is doing.
5. The method of claim 3, wherein a third element of the context is the user's environment.
6. The method of claim 2, wherein the assistance is in a form of audio communication for the user.
7. The method of claim 2, further comprising:
receiving second data from a second sensor, the second sensor is an external sensor and the determining uses both the first data and the second data.
8. A computer readable storage medium storing program code for causing a data processing system to perform steps comprising:
receiving first data from a first sensor, the first sensor is incorporated into an eyewear device, the first sensor measures a parameter related to a user;
determining a context of the user, wherein the determining uses the first data; and
providing assistance to the user, the assistance is related to the context.
9. The computer readable storage medium of claim 7, wherein a first element of the context is a physical orientation of the user.
10. The computer readable storage medium of claim 8, wherein a second element of the context is an activity that the user is doing.

11. The computer readable storage medium of claim 8, wherein a third element of the context is the user's environment.
12. The computer readable storage medium of claim 7, wherein the assistance is in a form of audio communication to the user.
13. The computer readable storage medium of claim 7, further comprising:
analyzing a state of the user, wherein the analyzing uses the first data and the assistance is related to both the state and the context.
14. The computer readable storage medium of claim 12, further comprising:
receiving second data from a second sensor, the second sensor is an external sensor and the determining uses both the first data and the second data.
15. A system for execution by a data processing system to provide assistance to a user through an eyewear device, comprising:
a voice interface, the voice interface has a microphone and a speaker, the voice interface to receive user commands and to provide assistance to the user;
a sensor data input, the sensor data input to receive sensor data;
a processor, the processor is in electrical communication with the voice interface and the sensor data; and
a computer program for processing the sensor data, the computer program and the processor to cause the data processing system to perform steps comprising:
receiving first data from a first sensor, the first sensor is incorporated into the eyewear device, the first sensor measures a parameter related to the user;
determining a context for the user wherein the determining uses the first data;
analyzing a state of the user, wherein the analyzing uses the first data; and
providing assistance to the user, the assistance is related to the context and the state.
16. The system of claim 14, wherein the analyzing considers a category selected from the group consisting of health, wellbeing, safety, cognitive, physical, and emotional.
17. The system of claim 15, wherein the assistance is designed to help the user correct a negative condition.
18. The system of claim 15, wherein the assistance is designed to help the user by encouraging a positive condition.
19. The system of claim 17, the system further comprising:

a device, the device is external to the eyewear device, the device is in electrical communication with the eyewear device and the device is used to provide the assistance to the user.

20. The system of claim 14, the steps further comprising:
receiving second data from a second sensor, the second sensor is an external sensor, the determining uses both the first data and the second data and the analyzing uses both the first data and the second data.
21. The system of claim 14, the steps further comprising:
receiving third data from a plurality of embedded sensors, the determining uses both the first data and the third data and the analyzing uses both the first data and the third data.

Abstract of the Disclosure:

Systems, apparatuses, and methods are taught that provide assistance to a user through an eyewear device. Data is received from a first sensor. The first sensor is incorporated into an eyewear device. The first sensor measures a parameter related to the user. A state of the user is analyzed using the data. Assistance is provided to the user. The assistance is in a form of feedback, and the feedback is related to the state of the user. The assistance can also be related to a context of the user and a state of the user. The context of the user is determined from the data.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		
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		
	Ernesto	Carlos Martinez	Villalpando			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Shrewsbury	State/Province	MA	Country of Residence	US	
Mailing Address of Inventor:						
Address 1		125 North Drive				
Address 2						
City	Westborough	State/Province	MA			
Postal Code	01581	Country i	US			
Inventor 2					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Chiu	Ming	So			
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service						
City	Hong Kong	Country of Residence i	HK			
Mailing Address of Inventor:						
Address 1		Flat D, 15/F, Welland BLDG, no. 368				
Address 2		Queen's RD Central, Sheung Wan				
City	Sheung Wan	State/Province				
Postal Code		Country i	HK			
Inventor 3					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Kwok	Wah	Law			

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		

Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service

City	Hong Kong	Country of Residence ⁱ	HK
-------------	-----------	--	----

Mailing Address of Inventor:

Address 1	Flat C, 16/F, Tower 2, Green Code
------------------	-----------------------------------

Address 2	No. 1 Ma Sik Road, Fanling
------------------	----------------------------

City	New Territories	State/Province	
-------------	-----------------	-----------------------	--

Postal Code		Country ⁱ	HK
--------------------	--	-----------------------------	----

Inventor 4	Remove
-------------------	-------------------

Legal Name	
-------------------	--

Prefix	Given Name	Middle Name	Family Name	Suffix
---------------	-------------------	--------------------	--------------------	---------------

	Wai	Kuen	Cheung	
--	-----	------	--------	--

Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service

City	Hong Kong	Country of Residence ⁱ	HK
-------------	-----------	--	----

Mailing Address of Inventor:

Address 1	1A, Block 15
------------------	--------------

Address 2	Constellation Cove, Taipo
------------------	---------------------------

City	New Territories	State/Province	
-------------	-----------------	-----------------------	--

Postal Code		Country ⁱ	HK
--------------------	--	-----------------------------	----

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	145340
------------------------	--------

Email Address	docketing@caldwellllaw.com	Add Email	Remove Email
----------------------	----------------------------	----------------------	-------------------------

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		

Application Information:

Title of the Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		
Attorney Docket Number	1537-003USC1	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	25	Suggested Figure for Publication (if any)	0

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	145340		

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		

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						Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)			
	Continuation of	16736593	2020-01-07			
Prior Application Status	Patented					Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)	
16736593	Continuation in part of	16711340	2019-12-11	11796833	2023-10-24	
Prior Application Status	Expired					Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)			
16711340	Claims benefit of provisional	62778709	2018-12-12			
Prior Application Status						Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)			
16711340	Claims benefit of provisional	62873889	2019-07-13			
Prior Application Status						Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)			
16736593	Claims benefit of provisional	62789818	2019-01-08			
Prior Application Status						Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)			
16736593	Claims benefit of provisional	62873889	2019-07-13			
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.						Add

Foreign Priority Information:

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		

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).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
	US		

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

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	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		

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.

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		

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	Solos Technology Limited		
Mailing Address Information For Applicant:			
Address 1		Unit 211, 2/F, Photonics Center	
Address 2		No. 2 Science Park East Avenue, Hong Kong Science	
City		Hong Kong	State/Province
Country	HK	Postal Code	
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.

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		

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. ☒			
Organization Name	Solos Technology Limited		
Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1		Unit 211, 2/F, Photonics Center	
Address 2		No. 2 Science Park East Avenue, Hong Kong Science	
City		Hong Kong	State/Province
Country ⁱ	HK	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	/KEEGAN CALDWELL/			Date (YYYY-MM-DD)	2023-11-22
First Name	Keegan	Last Name	Caldwell	Registration Number	73731
Additional Signature may be generated within this form by selecting the Add button. Add					

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	1537-003USC1
		Application Number	
Title of Invention	EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER		

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.**

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.



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/517,910

RECEIPT DATE / TIME
11/22/2023 04:03:28 PM Z ET

ATTORNEY DOCKET #
1537-003USC1

Title of Invention

EYEWEAR SYSTEMS, APPARATUS, AND METHODS FOR PROVIDING ASSISTANCE TO A USER

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 8339

FILED BY Rachel Riley

PATENT CENTER # 63362044

FILING DATE -

CUSTOMER # 145340

FIRST NAMED INVENTOR Ernesto Carlos Martinez Villalpando

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Keegan Caldwell

Documents

TOTAL DOCUMENTS: 5

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1537-003USC1_WebADS.pdf	10	Application Data Sheet	2175 KB
1537-003USC1_Continuation_Application.pdf	44	-	234 KB
1537-003USC1_Continuation_Application-SPEC.pdf	(1-40) 40	Specification	210 KB
1537-003USC1_Continuation_Application-CLM.pdf	(41-43) 3	Claims	67 KB

1537-003USC1_Continuation_Application-ABST.pdf	(44-44)	1	Abstract	49 KB
1537-003USC1_Drawings.pdf		25	Drawings-other than black and white line drawings	2012 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
1537-003USC1_WebADS.pdf	46728867D3213369431CAA9C407DC9B63A4FEBEEB01A0CB29A51018E495B7940A3744C594954F3044C5A24F51EEDDE055F44F0E8656E9A857C8854B6FC684828
1537-003USC1_Continuation_Application.pdf	2493DA1836A256A377D439DE1FA80A5D7286C040CD41DBBFE E83F0E7E1DD005035ECBCB2ABFECAD791915B2879811C1FA0975F0BC6D142AE9B3282BC527B4CDE
1537-003USC1_Continuation_Application-SPEC.pdf	5E7ECEFE87EAB66C27009E055D48AF9E08689F394BEAA1F641385FEABEA42A03426D08A81341EC262E2F9E2407DB0B563BFC0DEFC67C075F4715369DB2F485421
1537-003USC1_Continuation_Application-CLM.pdf	0AFB635357C8E607340FE36E73F3D49192953658C9846F447FAEC8069AC3F1E5A6AC95698D1807EB64C66E28999BD814A5E1ACD00149CB7F02DBBA239955EEB1
1537-003USC1_Continuation_Application-ABST.pdf	1ACCBFE94261E36BB4E97D269665363DA4236158693B1268BBE745CD6EB536D259076DBD6AB39C4C62A63D9853E12C151408103EE74989043A8B87F7F4996CEC
1537-003USC1_Drawings.pdf	575D1DF88208FE6260AE5C3C60F13901B82C7F2F2804467DCAA1182717B4E709BE76C1A196CAB3BB2D989BDA757E7636E23A46E0CEB78EAB5DEB28F7185BD4FE

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.

SCORE Placeholder Sheet for IFW Content

Application Number: 18517910

Document Date: 11/22/2023

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

- Drawing

At the time of document entry (noted above):

- USPTO employees may access SCORE content via DAV or via the SCORE web page.
- External customers may access SCORE content via PAIR using the Supplemental Content tab.