

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HAAS, INC.,
Petitioner,

v.

EMERGENCY SAFETY SOLUTIONS, INC.,
Patent Owner.

IPR2027-00016

Patent No. 12,109,938

DECLARATION OF JASON JANÉT, PH.D.

TABLE OF CONTENTS

EXHIBIT LIST	v
I. INTRODUCTION	6
II. BACKGROUND AND QUALIFICATIONS.....	6
III. BASES FOR OPINIONS	14
IV. LEGAL STANDARDS	15
A. Patentability	15
1. Anticipation and Obviousness.....	15
2. Indefiniteness	21
3. Enablement.....	21
4. Written Description.....	22
B. Prior Art	23
C. Person of Ordinary Skill In the Art.....	23
D. Claim Construction	25
V. SUMMARY OF OPINIONS.....	26
VI. THE '938 PATENT.....	27
A. Specification	27
B. Prosecution History.....	32
VII. LEVEL OF ORDINARY SKILL IN THE ART.....	35
VIII. OVERVIEW OF PRIOR ART	37
A. Fields.....	37

B. Pisz	43
C. Ricci	43
D. Seifert	44
IX. CLAIM CONSTRUCTION	45
X. OPINIONS ON PATENTABILITY	46
A. The Asserted References are Analogous Prior Art.....	47
1. Fields is Analogous Prior Art.....	48
2. Pisz is Analogous Prior Art.....	49
3. Ricci is Analogous Prior Art	49
4. Seifert is Analogous Prior Art.....	50
B. Ground 1: Whether Fields Anticipates or Renders Obvious Claims 1-4 and 6.....	52
1. Claim 1	52
2. Claim 2: “The system of claim 1, wherein the second vehicle is equipped with a second microprocessor in communication with the server that provides an alert to an occupant of the second vehicle upon receipt of the third communication.”	78
3. Claim 3: “The system of claim 1, wherein the first microprocessor is in communication with a global positioning system associated with the first vehicle to determine the location of the first vehicle.”	80
4. Claim 4: “The system of claim 1, wherein the alert to the occupant of the second vehicle is a visual indication.”	82
5. Claim 6: “The system of claim 1, wherein the alert to the occupant of the second vehicle is an audio alert.”	84
C. Ground 2: Whether Fields in view of Pisz Renders Obvious Claims 1- 4 and 6.....	86

1. Pisz teaches a “microprocessor operative to receive a first communication sent from the first vehicle....” [Element 1.1]	87
2. Whether the Combination Was Obvious	90
D. Ground 3: Whether Fields (With or Without Pisz) in view of Ricci Renders Claim 5 Obvious.....	93
1. Ricci teaches providing vehicle alerts on a “heads-up display”	93
2. Whether the Combination Was Obvious	94
E. Ground 4: Whether Fields (With or Without Pisz) in view of SEIFERT Renders Claims 7 AND 8 Obvious.....	98
1. Seifert teaches the lighting features of claims 7 and 8.....	98
2. Whether the Combination Was Obvious	99
XI. CONCLUSION	105

EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 12,109,938 (“the ’938 Patent”)
1002	Declaration of Jason Janét, Ph.D.
1003	Excerpts from Prosecution History of the ’938 Patent
1004	U.S. Patent No. 9,805,601 (“Fields”)
1005	U.S. Patent No. 9,524,597 (“Ricci”)
1006	U.S. Patent No. 8,548,686 (“Pisz”)
1007	U.S. Patent Application Publication No. 2013/0141251
1008	Original Complaint (Dkt. 1) in <i>Emergency Safety Solutions, Inc. v. HAAS, Inc.</i> , 1:26-cv-00838-GBW (filed July 10, 2026)
1009	Exhibit B to Original Complaint
1010	Patterson et al., “Computer Organization and Design: The Hardware/Software Interface” (4 th Ed. 2009)
1011	Stallings, “Computer Organization and Architecture: Designing for Performance” (11 th Ed. 2019)
1012	Merriam-Webster Online Dictionary, definition of “heads-up display,” available at https://www.merriam-webster.com/dictionary/heads-up%20display (last accessed Oct. 13, 2026)
1013	U.S. Patent Application Publication No. 2014/0269542
1014	U.S. Patent No. 9,544,758
1015	Webster’s New World College Dictionary (4th Ed. 1999), definition of “microprocessor”
1016	U.S. Patent Application Publication No. 2014/0368324 (“Seifert”)

Exhibit No.	Description
1017	U.S. Patent Application Publication No. 2007/0096892
1018	BMW Group, “BMW 5 Series/Head-Up Display (04/2003),” <i>available at</i> https://www.press.bmwgroup.com/global/photo/detail/P0010346/bmw-5-series/head-up-display-04/2003?language=en (last accessed Oct. 16, 2026)

I, Jason Janét, declare as follows:

I. INTRODUCTION

1. I have been retained as a technical expert by HAAS, Inc. (“HAAS”).
2. I have been asked to study and provide my opinions concerning U.S. Patent No. 12,109,938 (“the ’938 Patent”) and the patentability of its claimed inventions in view of certain prior art references, the state of the art at the time of the claimed inventions, and the knowledge of a person of ordinary skill in the art at the time of the claimed inventions.
3. My opinions and views set forth in this declaration are based on my technical education, training, and experience, as well as Exhibits 1001 and 1003-1018, and other materials that are cited and discussed herein.

II. BACKGROUND AND QUALIFICATIONS

4. I have a Ph.D. in Electrical & Computer Engineering from North Carolina State University (“NCSU”), which I earned in 1998. Prior to that, I received an M.S. in Integrated Manufacturing Systems Engineering from North Carolina State University in 1994 and a B.S. in Mechanical Engineering from the University of Virginia in 1990.
5. Since 1991, I have been active in the robotics, autonomous vehicles, sensors, artificial intelligence, pattern analysis, computer vision, image/video processing, and automation fields. I have authored numerous publications and have

co-authored a textbook entitled Computational Intelligence. My Ph.D. dissertation is entitled Pattern Analysis, Tracking and Control for Autonomous Vehicles Using Neural Networks. It described the use of unsupervised training (i.e., the Hyper-Ellipsoid Clustering Neural Network, or “HECNN”), and supervised training (i.e., the Region Feature Neural Network, or “RFNN”) for dissimilar mobile robots to learn aspects of their common environments through multiple types of sensors (e.g., acoustic range finding, infrared proximity, tactile and imaging), build knowledge libraries, and then transfer knowledge between robots for operational use and/or refinement. Among other outputs, the robots learned to recognize spaces and landmarks within those spaces, and then plan and track motion from the accumulated and shared knowledge. Efficiency and accuracy were shown to increase significantly with the combined unsupervised and supervised learning, and knowledge transfers.

6. I have designed, built, and marketed robots, automated systems, and components thereof, including ground mobile robots, unmanned aerial vehicles (UAV), unattended sensors, automated storage and retrieval systems (ASRS), submersible mobile robots, proof-of-concept extra-terrestrial robots, manually manipulated (“twiddled”) submersible foils, wall climbing mobile robots, and augmented reality systems.

7. In the course of designing and deploying multi-agent mobile robotic systems—including collaborative MicroAUVs, wall-climbing robots, and cross-

domain vehicles—I have engineered and integrated the communications subsystems required for real-time coordination and data exchange. This work has included selection, integration, and testing of wireless transmitters and receivers, development of telematics links for vehicle-to-vehicle and vehicle-to-base communications, and implementation of protocols for sharing sensor data, location information, and control commands across distributed platforms. The systems I have fielded have operated in environments ranging from underwater acoustic networks to RF-based terrestrial and aerial links, and have required attention to latency, bandwidth, interference, and reliable delivery of safety-critical or mission-critical messages.

8. I have taught the following courses: Introduction to Robotics and Automation (Duke and NCSU); Introduction to Control Theory (Duke and NCSU); Distributed Real-Time Controls (NCSU); and numerous independent studies courses in the areas of robotics, automation, artificial intelligence, autonomy, pattern analysis, and control systems. I have also served on several M.S.- and Ph.D.-level graduate student committees, designed qualifying exam problems, served on the NCSU IMSEI Board, and participated in curriculum development for undergraduate and graduate level programs.

9. I have also started, sponsored, and advised multiple champion student teams for international robot competitions including, but not limited to, the

NASA/ASCE Extra-Terrestrial Robotics Competition, the DARPA Grand Challenge, the AUVSI/ONR Autonomous Underwater Vehicle Competition, and the European CLAWAR Wall-Climbing Robot competition.

10. I have initiated multiple unmanned aerial vehicle (UAV) projects at both academic and industry levels. Academic UAVs include, but are not limited to, Quadcopters with Hybrid Remote and Autonomous Control, Marsupial UAVs that Deploy and Recover Unmanned Ground Vehicles, and Wall-Climbing UAVs. Additionally, the AngelFish Cross-Domain Submersible UAV, a DARPA ASW program that I incubated and procured funding for at Teledyne, included a partnership with NCSU.

11. In 1999, while I was employed by Nekton Research (“Nekton”), I captured and managed multiple programs sponsored by the Department of Defense (DoD) and private-sector companies that focused primarily on autonomous underwater vehicles (AUV), remotely operated vehicles (ROV), TwiddleFish toys, and indirect-fire projectiles. During my tenure, Nekton entered into a joint venture agreement with the founders of what eventually became known as Parata Systems – a pharmacy automation solutions company, which I helped launch.

12. After leaving Nekton in March 2002, I joined a then New Jersey-based company called Avionic Instruments, Inc. (“Avionic”). While at Avionic, I continued developing and marketing robots and supported engineering related to

various design, manufacturing, quality and assembly issues on the core aerospace product lines. Avionic product lines include, but are not limited to, ducted fans, transformer rectifier units (TRU), regulated TRU (RTRU), auxiliary power unit (APU) control systems, power distribution units (PDU), frequency converters, corner clamps, and VRAM attractors/thrusters. Customers included DoD, NASA, Boeing, Sikorsky, Augusta-Westland, Dassault, and Lockheed-Martin.

13. In late 2004, soon after Avionic was sold, I, along with others from Avionic, secured funding to develop an alpha-level multi-dispenser robotic system that afforded me time to write the RxMedic business plan and raise multiple rounds of venture capital. In late 2006, RxMedic (called “APDS” until November 2006) was launched as a stand-alone, sole-focus venture. After the operational launch of RxMedic, I served as General Manager and eventually Chief Technical Officer. Through my roles at RxMedic, I oversaw the development of the RxMedic ADS robot, managed the intellectual property portfolio, coordinated sales and marketing, and provided strategic, fiscal, and operational leadership. In May 2010, J.M. Smith Corporation acquired RxMedic, and in an effort to assist in the change of ownership, I served as a director of RxMedic until May 2011.

14. Also in late 2004, after Avionic was sold, I, along with others from Avionic, secured funding for Vortex HC through DoD contracts and robot sales, to continue developing the VRAM Mobile Robot Platform (VMRP – a wall-climbing

robot), the ARTEMIS AUV (a holonomic submersible robot for counter-mine and counter-obstacle operations), the submersible crawler, the nuclear-grade boiling water reactor (BWR) inspection robot, and other robot products centered around the VRAM. Some DoD programs were (and some remain) classified, for which I maintained a SECRET clearance at both the personal and facilities level, and served as the facilities security officer (FSO). In late 2006, corresponding to the full launch of RxMedic, Vortex HC technologies were largely licensed to Teledyne SeaBotix, SeaRobotics, and HDT.

15. After the sale of RxMedic, and after fulfilling my 12-month employment obligation, I joined Teledyne Technologies in summer 2011. I served as the Senior Manager for the RTP division of Teledyne Scientific, and supported multiple DoD sponsored robotic-focused programs. Some of these programs were (and some remain) classified, for which I maintained a personal SECRET clearance. Among these programs were cargo unmanned ground vehicles (CUGV), squad-level autonomous unmanned ground vehicles (UGV), autonomous underwater vehicles (AUV), unmanned underwater vehicles (UUV), and a cross-domain autonomous vehicle capable of transitioning between air-, surface- and underwater-domains. Cross-domain vehicles that were evaluated, designed and prototyped included, but were not limited to, the AngelFish (later called “EagleRay”) submersible AUV for anti-submarine warfare, and a ball-shaped robot for countermine operations on the

ground, in the beach zone and in the surf zone. Sensor design, refinement and signal processing were major components of each program. Sensors employed include, but are not limited to: proximity sensors; ranging sensors; electro-optical imaging; long-, mid-, and short-wave infrared (IR); inertial measurement units (IMU); optical flow; LIDAR; and radiofrequency (RF). Additionally, control systems were designed, refined and integrated into the aforementioned systems. Most control systems were closed-loop, in that they utilized sensor-based feedback; others were open-loop, where states were estimated with little or no feedback.

16. In late 2013, Avionic, a Transdigm business unit at that point, requested that I return to turn around a supply-chain issue, and assume management of its Sikorsky S97 Raider and JMR helicopter programs. The S97 Raider is purported to be the fastest, most maneuverable helicopter, due to its coaxial, counter-rotating variable pitch wings, and an aft-based push-propeller. Avionic also controlled two business units named Acme Aerospace (Acme) and Aerospace Cooling Solutions (ACS). Avionic, Acme and ACS supported the S97 program. In 2013, Transdigm expanded my role to include directorship of the Avionic, Acme and ACS sales and marketing team, and to report operational and financial status at six-week intervals.

17. As CEO of Delta Five, I led a private-equity-backed, hospitality-focused venture, coordinating the company's launch and strategic path including an early-stage pivot. Initially focused on back-of-the-house robotics and automation,

Delta Five shifted to include addressing the rampant bed bug problem—a top priority for hoteliers—with a novel unattended sensor and trap, called the Telemetered Pest Monitoring System (TPMS), which is based on computer vision and internet of things (IoT), and has proven capable of scaling to other pests. In addition to the TPMS, Delta Five developed a novel means to mass produce a natural, unscented aggregation pheromone that, in concert with placement and heat, lured invertebrates to the TPMS. After leading Delta Five and serving on its Board for four years, I resigned to join Applied Research Associates, Inc. (“ARA”).

18. In 2018, I joined ARA as sector CTO. In this role, my primary responsibilities include leading the commercialization and technology transition efforts, which require technical, business and corporate development, as well as the raising of capital and managing matrixed rosters. I assumed my other current role at ARA, Corporate Director of IP and Product Commercialization, in 2020. In this role, I evaluate and support portfolios of IP, product lines, and ventures on the basis of competitive landscapes and business cases. I also spearhead investments and provide general venture oversight.

19. My curriculum vitae is attached as Appendix A to this declaration, and provides further information about my experience, expertise, and presentations.

20. Through my professional experience, I have gained extensive expertise in robotics, autonomous vehicles, sensors, artificial intelligence, automation,

computer vision, and image/video processing, as well as wireless communications, vehicle telematics, and networked embedded systems.

21. I am being compensated at my standard rate of \$500/hour. My compensation is in no way contingent upon my opinions or the outcome of this proceeding.

III. BASES FOR OPINIONS

22. The opinions set forth in this declaration are my own. In forming the opinions herein, I have considered the exhibits to the Petition cited herein, as well as any additional materials cited in this declaration, and my education, training, and experience.

23. My analysis of the materials relating to this matter is ongoing and I will continue to review any new material that is provided to me. This declaration represents certain opinions that I have formed to date and the bases for those opinions. I reserve the right to revise, supplement, and/or amend my opinions based on new information presented to me and on my continuing analysis of the materials cited herein or later provided to me.

IV. LEGAL STANDARDS

24. I am not an attorney. For purposes of this declaration, I have been informed about certain aspects of the law that are relevant to my opinions, as set forth below.

A. PATENTABILITY

25. I understand that there are various aspects of patentability that are examined from the perspective of a person of ordinary skill in the art. *Infra* Section IV.C.

1. Anticipation and Obviousness

26. I understand that for an invention claimed in a patent to be valid and patentable, it must be, among other things, new and not obvious in light of what was known and came before it. That which was known or came before the invention claimed is generally referred to as “prior art.”

27. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can be shown to “anticipate” the claim. Second, the prior art can show that the claim was obvious to a person of ordinary skill in the field of the invention before the effective filing date of the claimed invention.

28. I understand that for a patent claim to be “anticipated” by the prior art, each and every element or requirement of the claim must be found, expressly or inherently, in a single prior art reference.

29. I understand that if a prior art reference does not expressly set forth a particular claim element, the prior art may still disclose that element if it is “inherent” in its disclosure. To establish inherency, it is my understanding that evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill in the art. It is my understanding that inherency may not be established by probabilities or possibilities. In other words, it is my understanding that the mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish inherency.

30. I understand that under the principles of inherency, a prior art system anticipates a claimed system if each limitation of the claim is necessarily present in the prior art system, even if the prior art reference does not expressly describe that limitation. I also understand that inherency cannot be based on probabilities or possibilities. The fact that a prior art system might, or even probably would, include a claimed feature is not enough. The missing feature must necessarily be present in the prior art system as described. I further understand that when a prior art system is structurally the same as the claimed system, or the same as a system described in the

specification, it can be presumed that the prior art system inherently has the claimed properties, functions, or capabilities, including any functional limitations recited in the claim.

31. It is my understanding that whether a claimed invention is obvious is a question of law, with underlying factual inquiries that are determined from the perspective of a person of ordinary skill in the art at the time of the claimed invention.

32. It is my understanding that a claimed invention is obvious if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art (a “POSITA”).

33. It is my understanding that obviousness requires consideration of the following underlying factual inquiries:

- determining the scope and content of the prior art;
- ascertaining the differences between the claimed invention and the prior art;
- resolving the level of ordinary skill in the art; and
- evaluating objective evidence or “secondary considerations” of non-obviousness, such as commercial success, long-felt but unresolved needs, failure of others, industry praise, and unexpected results.

34. It is my understanding that a reference must be analogous art to the claimed invention in order to be properly considered for use in an obviousness inquiry. It is my understanding that a reference is analogous art to the claimed invention if:

- the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or
- the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention).

35. It is my understanding that whether a reference is reasonably pertinent turns on how the problem faced by the inventor is reflected, either explicitly or implicitly, in the specification.

36. It is my understanding that the following are exemplary rationales that may support a conclusion of obviousness:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of known techniques to improve a similar method or product in the same way;
- Applying a known technique to a known method or product ready for

improvement to yield predictable results;

- Obvious to try – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

37. In addition to the above, I understand that a person of ordinary skill in the art may resort to logic, judgment and common sense available to him or her at the time of the invention to find a claim feature obvious, even if the prior art relied on does not explicitly state or teach that feature. I understand that when common sense is relied on to find a feature obvious, the reasoning for that conclusion must be articulated with sufficient clarity.

38. I also understand that a patent claim is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. An obviousness determination requires finding both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable

expectation of success in doing so. I understand that it is important to be careful not to allow hindsight reconstruction of references to produce the claimed invention, without any explanation as to how or why the references would be combined to produce the claimed invention.

39. Regarding “objective evidence” or “secondary considerations,” I understand that for such evidence to be relevant to the obviousness of a claim, there must be a causal relationship (called a “nexus”) between the claim and the evidence. I also understand that such objective evidence may include: commercial success of products covered by the patent claims; long-felt need for the invention; failed attempts by others to solve the problem addressed by the invention; copying of the invention by others in the field; unexpected results achieved by the invention; praise of the invention; the taking of licenses under the patent by others; expressions of surprise by experts and those skilled in the art at the making or use of the invention; and that the patentee proceeded contrary to the accepted wisdom of the prior art.

40. I understand that a person of ordinary skill is also a person of ordinary creativity. I further understand that the obviousness analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, but instead can take account of the inferences and creative steps that a person of ordinary skill in the art would employ, including “ordinary innovation” that does no more than yield predictable results.

41. I understand that sometimes it will be necessary to look to interrelated teachings of multiple patents and publications; the effects of demands known to the relevant field or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art. I understand that all these issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

2. Indefiniteness

42. I understand that a claim is indefinite, and thus invalid, when the claim (read in light of the specification and the prosecution history) fails to inform with reasonable certainty those skilled in the art about the scope of the invention. I also understand that, while “absolute precision” is not required, a claim must still provide enough certainty to one of skill in the art when read in the context of the invention.

3. Enablement

43. I understand that a claimed invention must be enabled—that is, that the patent specification must describe the invention in such terms that one skilled in the art can make and use the claimed invention. I understand that enablement is a legal determination. To be enabling, a patent’s specification must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation. However, a patent need not teach what is well known in the art.

Thus, I understand an inventor need not explain every detail since he is speaking to those skilled in the art such that what amounts to conventional knowledge will be read into the disclosure.

4. Written Description

44. I understand that the full scope of the claimed invention must have sufficient written description support, which means the specification must reasonably convey to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date based on an objective inquiry into the four corners of the specification. The written description requirement is satisfied when the specification sets forth enough detail to allow a person of ordinary skill in the art to understand what is claimed and to recognize that the inventor invented what is claimed. I also understand that the level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology. Factors used to evaluate the sufficiency of a disclosure include: 1) the existing knowledge in the particular field; 2) the extent and content of the prior art; 3) the maturity of the science or technology; and 4) the predictability of the aspect at issue.

B. Prior Art

45. I understand that for purposes of this proceeding, prior art includes patents and printed publications in or outside the United States before the effective filing date of the claimed invention. I also understand that prior art includes U.S. patents, published U.S. patent applications, and published international applications (pursuant to the Patent Cooperation Treaty) that themselves have an effective filing date before the effective filing date of the claimed invention, as long as they name another inventor.

46. I also understand that prior art may also include any public disclosure, including any products in public use, on sale, or otherwise available to the public, before the effective filing date of the claimed invention. I understand that information that constitutes prior art generally must be information that was publicly disclosed before the effective filing date of the claimed invention. I understand that there may be exceptions to what is prior art but have been instructed that they are not relevant for purposes of my opinions here.

C. PERSON OF ORDINARY SKILL IN THE ART

47. I understand that “a person of ordinary skill in the art” or POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. Such a person would necessarily have the capability of understanding any scientific and engineering principles applicable to the pertinent art.

48. I understand that factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the following:

- a. the educational level of the inventor;
- b. the type of problems encountered in the art;
- c. prior art solutions to those problems;
- d. the rapidity with which innovations are made;
- e. the sophistication of the technology; and
- f. the educational level of active workers in the field.

49. I understand that a person of ordinary skill in the art is not a real person, but rather is a hypothetical individual having the qualities reflected by the factors above. This hypothetical person has knowledge of all prior art in the relevant field as if it were arranged on a workshop wall and takes from each reference what it would teach to a person of ordinary skill in the art.

50. I understand that a person of ordinary skill in the art is a person of ordinary creativity, not an automaton. In many cases a person of ordinary skill will be able to fit the teachings of multiple prior art references together like pieces of a puzzle.

51. I understand that a person of ordinary skill in the art can collaborate with one or more other persons of ordinary skill in the art for one or more aspects

with which the other person may have superior expertise, experience, and/or knowledge.

D. CLAIM CONSTRUCTION

52. I have been informed that in an inter partes review, claims are construed under the same standard used in civil actions in federal district court—their ordinary and customary meaning as understood by a POSITA as of the effective filing date, in light of the specification and the prosecution history. It is my understanding that claim construction, or the interpretation of the claims of a patent, is ultimately a question of law. I have been informed that claim terms are generally presumed to carry their ordinary and customary meaning. However, I understand that a patent applicant may act as his or her own lexicographer and is entitled to provide alternate definitions of words in common usage, but if the patent applicant uses a term that is in common usage without providing an alternate definition, then that term should generally be understood as having its common meaning.

53. I understand that a person of ordinary skill in the art is deemed to read a claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent specification and the “file history” of the patent developed during examination by the Patent Office.

54. I understand that the claims, the specification, and the file history are referred to as “intrinsic evidence,” and are to be read as a person of ordinary skill in the art would have read them as of the effective filing date of the claimed invention.

55. In addition to the intrinsic evidence, I understand that the court or tribunal may also consider other relevant evidence, which is called “extrinsic evidence,” concerning relevant scientific principles, the meaning of technical terms, and the state of the art. Such evidence includes the testimony of expert witnesses. Although extrinsic evidence may be used to resolve ambiguities that may exist after reviewing the intrinsic evidence, I understand that extrinsic evidence cannot be used to contradict a claim construction that is clear from the intrinsic evidence.

56. I understand that some claims are independent, and that those independent claims are complete by themselves. Other claims refer to these independent claims, or other dependent claims, and are “dependent” on those claims. The dependent claims include all of the limitations of the claims on which they depend.

V. SUMMARY OF OPINIONS

57. My opinions, each of which I explain in detail in the sections that follow, may be summarized as follows:

58. **Ground 1**: U.S. Patent No. 9,805,601 (“Fields,” Ex. 1004) anticipates claims 1-4 and 6 or, in the alternative, renders those claims obvious.

59. **Ground 2**: Claims 1-4 and 6 would have been obvious to a POSITA over the combination of Fields and U.S. Patent No. 8,548,686 (“Pisz,” Ex. 1006).

60. **Ground 3**: Claim 5 would have been obvious to a POSITA over Fields, alone or as modified by Pisz, when further combined with U.S. Patent No. 9,524,597 (“Ricci,” Ex. 1005).

61. **Ground 4**: Claims 7 and 8 would have been obvious to a POSITA over Fields, alone or as modified by Pisz, when further combined with U.S. Patent Application Publication No. 2014/0368324 (“Seifert,” Ex. 1016).

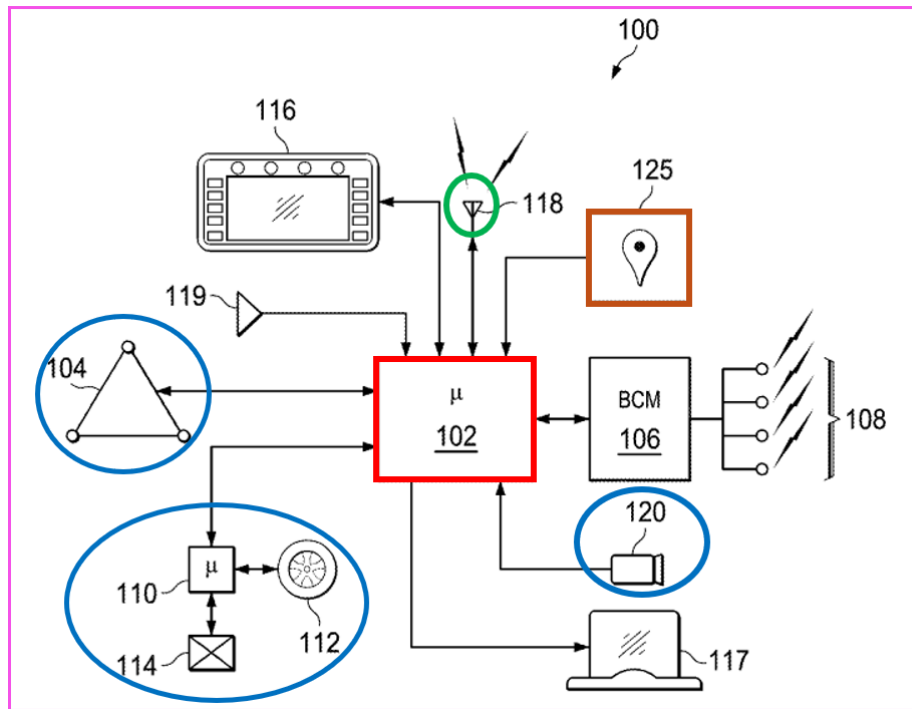
62. It is therefore my opinion that claims 1-8 of the ’938 Patent would have been anticipated or obvious to a POSITA.

VI. THE ’938 PATENT

A. SPECIFICATION

63. The ’938 Patent, titled “System for Communication of Hazardous Vehicle and Road Conditions,” was filed on August 12, 2020, and issued on October 8, 2024. Ex. 1001. The face of the patent indicates that it claims priority to provisional application No. 62/885,659, filed August 12, 2019. *Id.*

64. Based on my review, the ’938 Patent is generally directed to a system for relaying hazard information between vehicles. Figure 1, which I have annotated below, depicts an embodiment of a hazard detection system 100 (pink) that is installed in a vehicle. *Id.* at 5:1-5.

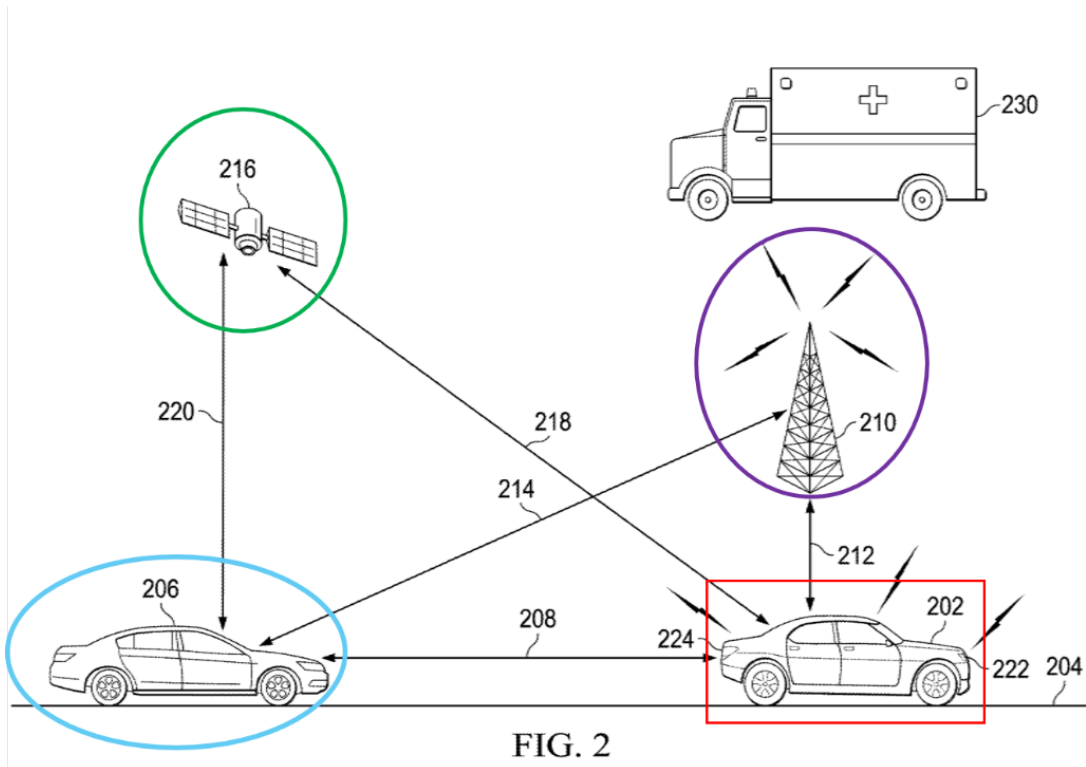
Ex. 1001, FIG. 1 (Annotated)

65. As I understand the disclosure, the system's microprocessor 102 (**red**) is configured to receive information from various hazard-indicating elements (**blue**), including hazard switch 104 (*id.* at 5:61-62), forward-looking camera or radar 120 (*id.* at 6:59-67), and airbag monitoring system 110 (*id.* at 6:50-52, 8:7-15). Microprocessor 102 obtains the vehicle's position from GPS unit 125 (**brown**) (*id.* at 7:61-8:3) and communicates with external systems through antenna 118 (**green**). *Id.* at 7:53-60.

66. Figure 2 illustrates how this system operates between vehicles. In that embodiment, a first vehicle 202 (**red**) equipped with system 100 (**pink**) experiences a hazardous condition (e.g., a collision) and communicates its location and hazard

status via a “network . . . represented here by tower 210” (**purple**) or “satellite network 216” (**green**). *Id.* at 8:61-64, 9:15-33, 9:43-67.

Ex. 1001, FIG. 2 (Annotated)

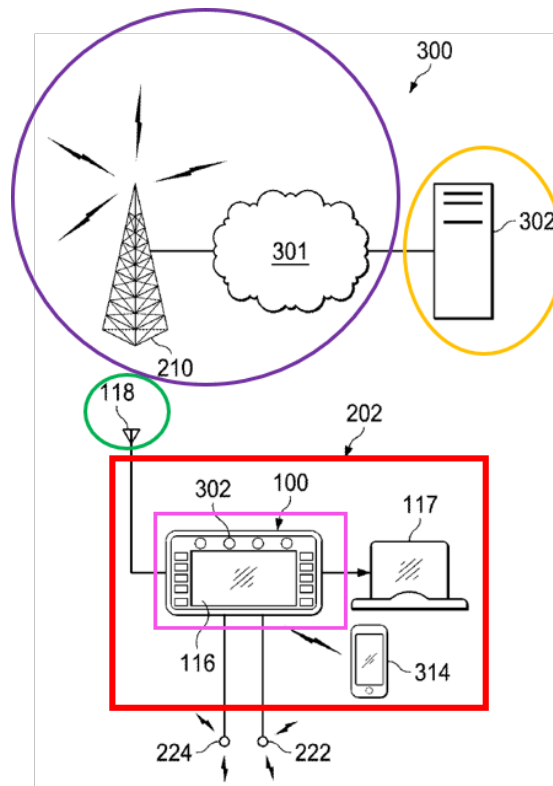


Through the network, first vehicle 202 communicates with second vehicle 206 (**blue**) and provides a hazard alert to the second vehicle if certain predetermined requirements are satisfied (e.g., the vehicles are within a certain distance of one another), which I discuss further below. *Id.* at 9:7-18, 9:43-59.

67. The Challenged Claims appear to relate to the embodiment of Figure 3, which is similar to the Figure 2 embodiment except that a server is used to communicate between vehicles. *See id.* at 10:17-19 (“The system 300 shares the vehicle installed components with the system 100, but not all are shown for purposes

of clarity.”). As shown in annotated Figure 3 below, the system 100 (pink) is in a particular vehicle 202 (red) and may use the antenna 118 (green) to communicate with server 302 (orange) through the Internet 301 (i.e., a network) via tower 210 (purple). *Id.* at 10:15-21, 10:30-33, 10:39-58.

Ex. 1001, FIG. 3 (Annotated)



68. The specification describes this server-based arrangement as follows:

The network 210 may send and receive communications to and from the vehicle 202 and other vehicles as previously described. Here, however, the network 210 sends data via the internet 301, using TCP/IP or another suitable protocol. . . . Data from the vehicle 202 is ultimately provided to a data server 302. The server 302 may track vehicles based upon GPS location or other data. *Thus the server 302 may then*

discriminate as to which other vehicles any received hazard or emergency condition notification should be relayed to.

Ex. 1001 at 10:39-49.¹ From a technical standpoint, then, the server knows the locations of the first and second vehicles, receives an indication of a hazardous condition from the first vehicle, and alerts the second vehicle if one or more predetermined conditions are satisfied. The written description explains that a second vehicle may be alerted “only when the first vehicle is located within a roadway path and within a threshold distance of the second vehicle” (Ex. 1001 at 4:4-9; *see also id.* at 3:47-60, 12:35-67), and that server 302 “may then discriminate as to which other vehicles any received hazard or emergency condition notification should be relayed to” (*id.* at 10:45-49).

69. I have annotated independent claim 1 below to show how, in my view, its elements correspond to the embodiments of Figures 1-3 discussed above:

1. **[Preamble]** A system for providing real time indication of a hazardous vehicle condition comprising:

[1.1] a server [**element 302**, FIG. 3] in communication with a first microprocessor [**element 102**, FIG. 1] of a first vehicle [**element 202**, FIGS. 2 and 3], the first microprocessor operative to receive a first communication sent from the first vehicle to the server

¹ I have added all ***bold-italics*** emphasis and alterations herein unless I specifically indicate otherwise.

indicating the first vehicle is in a hazardous condition and a location of the first vehicle;

[1.2] wherein the server [element 302, FIG. 3] receives a second communication sent from a second vehicle [element 206, FIG. 2] to the server indicative of a location of the second vehicle; and

[1.3] wherein the server [element 302, FIG. 3] provides a third communication to the second vehicle [element 206, FIG. 2] when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another.

Id. at 14:51-65.

B. PROSECUTION HISTORY

70. Based on my review of the prosecution history, U.S. Patent Application No. 16/991,595 is the nonprovisional application that issued as the '938 Patent; it was filed on August 12, 2020, and claims the benefit of Provisional Application No. 62/885,659, filed on August 12, 2019. Ex. 1001, p. 1. The Challenged Claims (claims 1–8) were originally presented as claims 26–28, 30–33, and 35. Ex. 1003 at 36, 664-66. As originally presented, claim 26 (which became challenged claim 1) was directed to embodiments in which “the first microprocessor [is] operative to receive a signal from the first vehicle indicating a hazardous condition; wherein the server receives the indication of the hazardous condition from the first microprocessor and provides the indication to a second vehicle.” *Id.* at 664. As I read

it, the original claim therefore required the first vehicle's microprocessor to receive a signal from another component within the vehicle (e.g., an airbag sensor) indicating a hazardous condition.

71. During prosecution, these claims were rejected as obvious (*id.* at 412, 414-417, 427-434). The applicant then amended them, explaining that “the claimed system provides alerts based on *vehicle* hazards before they are necessarily road hazards, and before they have necessarily become an immediate or near immediate threat” (*id.* at 388, emphasis in original), and adding the requirement to claim 26 that “the server provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another.” *Id.* at 387.

72. After the claims were again rejected as obvious (*id.* at 334), the applicant argued that the “claimed server receives both an indication of a hazard condition and a location of the transmitting vehicle because the claimed server was the intended recipient and not a part of the wireless carrier network programmed to intercept messages or information that were bound for elsewhere.” *Id.* at 328. The applicant also made the following amendments to the claims:

26. (Currently amended) A system for providing real time indication of a hazardous vehicle condition comprising:

a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a first communication sent from the first vehicle to the server indicating the first vehicle is in a hazardous condition and a location of the first vehicle;

wherein the server receives a second communication sent from a second vehicle to the server indicative of a location of the second vehicle; and

wherein the server provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another.

Id. at 325. From a technical perspective, this amendment defined the directionality of communications with the server. Although I understand the amendment was intended to emphasize that the server is the intended recipient of the first communication, the resulting language is somewhat awkward as written, because it states that the microprocessor receives a communication “sent” to the server. In my opinion, a POSITA (as I define in Section VII below) would understand the phrase to mean that the microprocessor is operative to receive a hazardous condition indication and location of the first vehicle for a communication to the server. This reading is consistent with the specification, which explains that microprocessor 102 acquires information from the hazard-indicating elements (e.g., airbag monitoring system 110) and GPS unit 125 of first vehicle 202 indicating that it is in a hazardous condition and the vehicle’s location and sends a message to the server indicating the

first vehicle's location and hazardous condition (Ex. 1001 at 3:43-47, 5:61-62, 6:50-52, 7:13-19, 7:61-64, 8:7-11, 10:43-45, 12:36-40)—i.e., “the first microprocessor [is] operative to receive a first communication sent from the first vehicle to the server indicating the first vehicle is in a hazardous condition and a location of the first vehicle.” A POSITA would also understand this to be consistent with the abstract, which states that “[i]n response to receiving *the signal indicative of a hazardous event*, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition.” Ex. 1001, Abstract.

VII. LEVEL OF ORDINARY SKILL IN THE ART

73. I explained earlier my understanding that a POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. It is also my understanding that, in analyzing patentability, the invention's effective filing date can be no earlier than August 12, 2019—the filing date of the provisional patent application to which the '938 Patent claims priority. Ex. 1001, p. 1 (60). I have used that date as the relevant time frame for the POSITA. I have not, however, been asked to analyze or determine whether the '938 Patent is actually entitled to the 2019 date.

74. It is my opinion that, at the relevant time, a POSITA would have held a bachelor's degree in electrical engineering, computer science, mechanical engineering, or a related discipline, and would have had at least two years of

experience working with networked electronics such as mobile phones and transceivers. Practical experience can make up for less education, and additional education can make up for less experience. Even if the '938 Patent were entitled only to its own August 12, 2020 filing date, my opinion on the level of skill would be the same.

75. My background, described in Section II, exceeds that of a POSITA. My degrees include a Bachelor of Science in Mechanical Engineering, a Master of Science in Integrated Manufacturing Systems Engineering, and a Ph.D. in Electrical and Computer Engineering, and I have worked extensively with vehicles and with the networking of electronics. Taken together, this education and my substantial design and development experience qualify me to testify about the knowledge and understanding a POSITA would have had as of the earliest possible effective filing date of the '938 Patent.

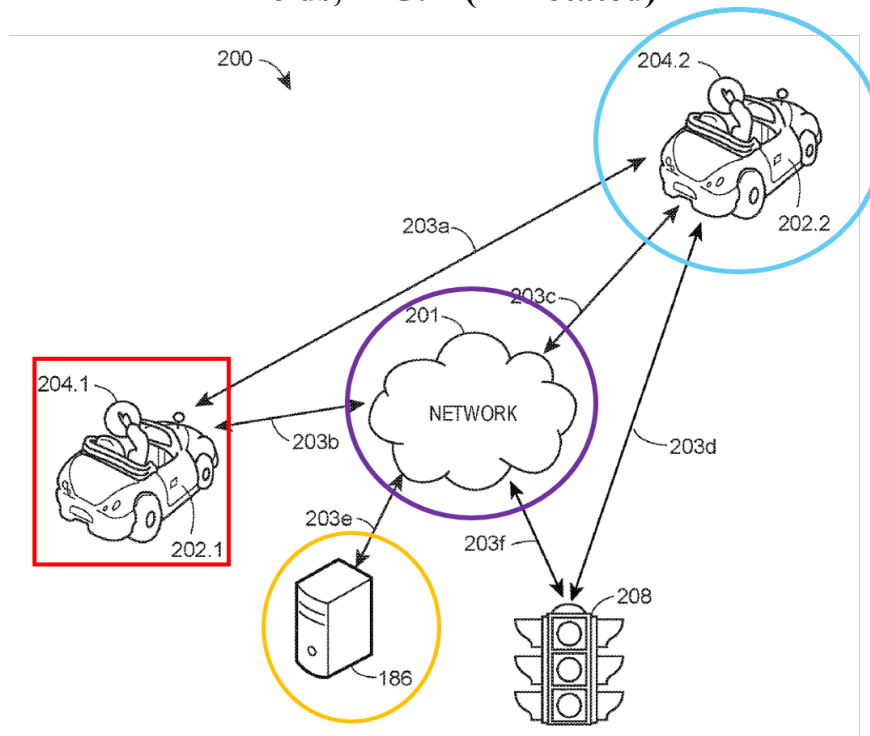
76. Each opinion I offer in this declaration is given from the perspective of a POSITA as of the '938 Patent's earliest possible effective filing date. As I noted earlier, I understand that date to be no earlier than August 12, 2019 (the filing date of the earliest application cited in the related application data on the face of the patent).

VIII. OVERVIEW OF PRIOR ART

A. Fields

77. U.S. Patent No. 9,805,601 (Ex. 1004, “Fields”), which was filed on August 19, 2016 and issued on October 31, 2017, discloses a comprehensive system for generating and communicating vehicular traffic alerts to help vehicles avoid abnormal traffic conditions and vehicle accidents. Ex. 1004, Abstract; *id.* at 2:53-56. As shown in Figure 2, Fields, like the ’938 Patent, discloses a first vehicle 202.1 (red) and a second vehicle 202.2 (blue) communicating with a server 206/186 (orange) through a network 201 (purple). *Id.* at 9:36-42, 11:38-44.

Fields, FIG. 2 (Annotated)

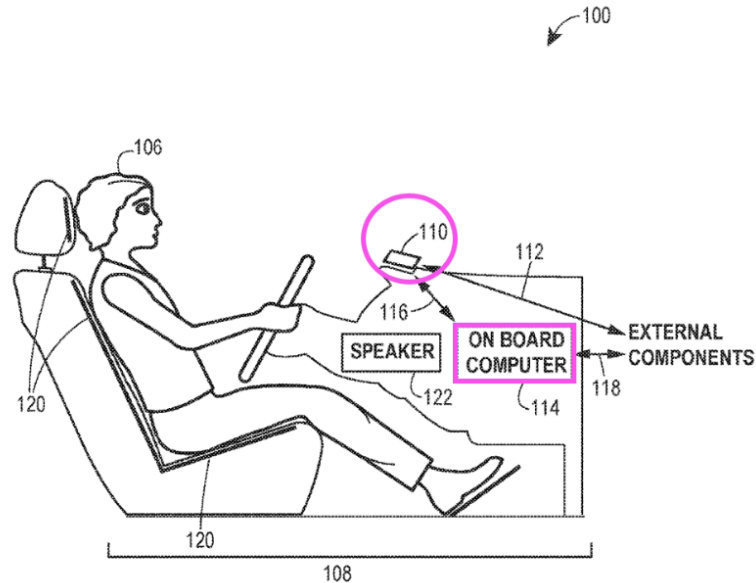


78. Notably, the “external computing device” is labeled “186” in the figure, but a POSITA would understand that label to be a drafting error referring to element

“206,” the “external computing device.” This is because no component “186” is referenced in the specification, and the specification states that device “206” may be a server (as depicted in Figure 2). Ex. 1004 at 11:40-44. The element labeled “186” thus matches the description and functionality of element “206.” The Fields specification never mentions element “186” but repeatedly references “external computing device 206” with respect to Figure 2. *See, e.g.*, Ex. 1004 at 9:36-42, 9:53-64, 10:31-34. Indeed, the specification states that “smart infrastructure component 208 may communicate with external computing device 206 **via links 203e and 203f utilizing network 201**”—a function that only the computing device labeled “186” can perform. Ex. 1004 at 12:2-5; *see also id.* at 10:31-34. A POSITA would thus understand that element 186 in Figure 2 is actually supposed to refer to element 206 repeatedly discussed in the specification.

79. To accomplish the communication above, Fields teaches that each vehicle 202 may have a telematics collection system 100 comprising a mobile computing device 110 and/or on-board computer 114 (**pink** below):

Fields, FIG. 1 (Annotated)



Id. at 7:56-61. Telematics and communication functions can be performed by mobile computing device 110, by on-board computer 114, or by both devices in coordination with one another. *Id.* at 8:8-9:15.

80. In describing Figure 3, Fields provides specific details of computing device 300 (pink), which “may be implemented as ... a mobile computing device (e.g., mobile computing device 100, as shown in FIG. 1)”² or “as an on-board vehicle computer (e.g., on-board vehicle computer 114, as shown in FIG. 1).” *Id.* at 12:60-66.

Fields, FIG. 3 (Annotated)

² This erroneously refers to mobile computing device “100,” rather than intended element “110” as shown in Figure 1.

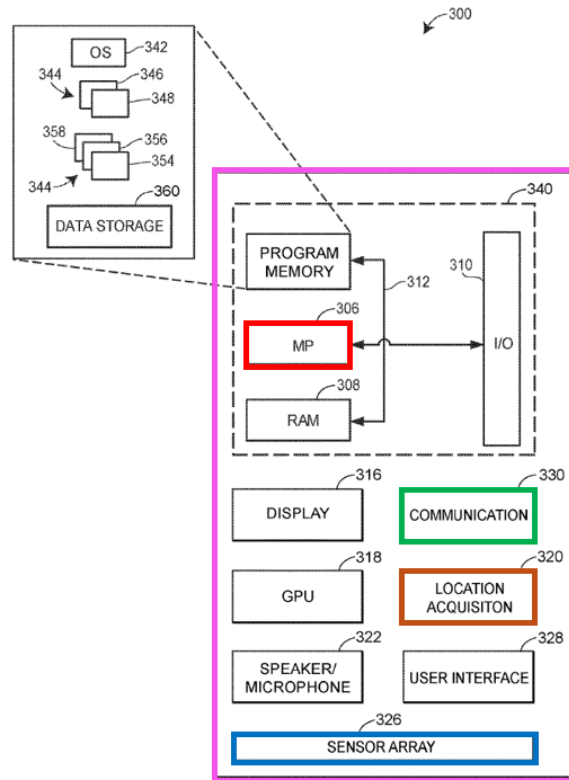


FIG. 3

As shown, device 300 has a controller 340 that includes a microprocessor 306 (**red**) in communication with sensors (**blue**). Those sensors gather telematics data from sources such as cameras, accelerometers, gyroscopes, magnetometers, and airbag sensors, which the system can use to identify an anomalous condition, such as an airbag deployment or rollover indicating that the vehicle has been in an accident. *Id.* at 13:31-38, 16:10-26, 17:46-53, 19:44-63. Location acquisition unit 320 (**brown**) may rely on GPS to track the vehicle's location. *Id.* at 15:36-59. Thus, computing device 300 is configured to communicate with external components of the system (*id.* at 8:3-7, 8:13-15), receive signals indicating airbag deployment and crash detection (*id.* at 8:54-59) and location data (*id.* at 8:48-54), and transmit those signals

to external computing device 206 (*id.* at 20:51-56, 48:23-29, 48:55-59).

81. In a passage salient to the Challenged Claims, Fields teaches:

[A]spects may include computing device 300 broadcasting the telematics data and geographic location data to an external computing device (e.g., to external computing device 206 via network 201, as shown in FIG. 2). In addition, the second computing device 300 associated with the second vehicle may likewise broadcast telematics data and geographic location data to the external computing device. In accordance with such aspects, the external computing device may determine whether an anomalous condition exists and is relevant to each of the first and second devices 300 based upon a geographic relationship between the first and second devices 300. When relevant, external computing device may be configured to send alert notifications to the first and/or second devices 300.... Upon receiving the notification from the external computing device, the first and/or second computing device 300 may generate an alert indicating a description of the anomalous condition and/or its location.

The geographic relationship between two or more devices **300** may be utilized in several ways to determine the relevance of the anomalous condition. For instance, current speed, location, route, destination, and/or direction of travel of a first vehicle (collecting and/or associated with the telematics data) may be individually or collectively compared with current speed, location, route, destination, and/or direction of travel of a second vehicle traveling on the road.

[T]he geographic location data may be correlated with a map database to associate the anomalous condition with a road and to determine the relevance of the anomalous condition based upon other vehicles sharing the road. The map database may be stored, for example, in a suitable portion of computing device 300 (e.g., data storage 360) or retrieved via communications with one or more external computing devices. To provide an illustrative example, a computing device 300 may be implemented as an external computing device. The external computing device may determine, from telematics data and geographic location data received from a first computing device 300, that a first vehicle is located on a highway at a certain geographic location. ***If the external computing device determines that a second computing device 300 in a vehicle travelling on the same highway is within a threshold distance approaching the first vehicle, then the external computing device may issue an alert notification to the second vehicle.***

Id. at 20:51-21:15, 21:36-54. Thus, Fields teaches that computing device 300 (which may be implemented as the on-board computer) of a first vehicle collects data related to the vehicle's hazardous condition (e.g., airbag deployment (Ex. 1004 at 19:47-50)) and location and provides that data to external computing device 206 (e.g., a server) via network 201. External computing device 206 then obtains location information for surrounding vehicles and determines whether to notify those vehicles of the first vehicle's hazardous condition based on, *inter alia*, whether a surrounding vehicle is within a threshold distance of the first vehicle and/or traveling on the same highway as the first vehicle.

B. Pisz

82. U.S. Patent No. 8,548,686 (Ex. 1006, “Pisz”), filed October 11, 2007 and issued October 1, 2013, is directed to an “automatic crash notification system” that may include a “crash detection system configured to detect a crash of a vehicle” and a “wireless communication system configured to wirelessly transmit a message to and wirelessly receive a message from a remote location.” Ex. 1006, Abstract. The system may include processing system 101, which may “have only a single processor” (*id.* at 6:8-10), that may “receive notice of” a crash from the crash detection system 103 (*id.* at 6:40-43) and then “cause the wireless communication system 105 to transmit notice of the crash to a call center at a remote location” (*id.* at 6:55-58), along with “information about the location of the vehicle at the time of the crash” that the processor obtained from location detection system 111 (*id.* at 7:11-16).

C. Ricci

83. U.S. Patent No. 9,524,597 (Ex. 1005, “Ricci”), filed April 15, 2014 and issued December 20, 2016, is directed to, among other things, a “method for communication of safety information comprising: detecting at least one road hazard; categorizing the at least one road hazard; associating a GPS coordinate with the road hazard; and forwarding information about the road hazard to one or more entities.” Ex. 1005 at 8:56-62. Ricci further explains that “the information is communicated

directly to one or more other drivers based on the one or more other driver's proximity to the road hazard" and that the road hazard may be "an accident." *Id.* at 9:4-11. Ricci also discloses that alerts, such as an alert to a driver about the presence of an emergency vehicle, may be displayed "in a heads-up display of the vehicle." *Id.* at 10:58–11:13, 96:57-58 (claim 6), 97:24-25 (claim 12).

D. Seifert

84. Seifert is directed to a "rear end collision apparatus" with "a first warning light to capture a driver's attention indicating a slow down or stop event is about to occur or is occurring and re-focuses a drivers' visual attention point" and "a different type of second warning light indicating the vehicle has not yet started re-accelerating after a slowing or stop event." Ex. 1016, Abstract. The first warning light may be "a *very bright, directional strobe light*," and the second may also be a strobe. *Id.* ¶¶ [0112]–[0113], [0128]. The lights are "installed in a *rear portion* of the vehicle" so as to be visible to the vehicle "directly behind," and may be integrated into the stop lamp or brake lights. *Id.* at ¶¶ [0139]–[0142], claim 1.

85. Seifert's lights activate automatically upon detection of a hazard ahead—e.g., when front end monitor 22 detects that vehicle 28 "comes within a certain distance of any vehicle in front of it"—or when the vehicle has stopped completely due to an emergency event. *Id.* ¶¶ [0106], [0108], [0156]–[0157]. In

Figure 10, vehicle 28, approaching a vehicle ahead, activates its rear strobe so that it is visible to following vehicle 30. *Id.* ¶ [0177], FIG. 10.

IX. CLAIM CONSTRUCTION

86. It is my understanding that claims are construed by the United States Patent and Trademark Office and the Patent Trial and Appeal Board (“PTAB”) only to the extent necessary to resolve any underlying controversy between a petitioner and patent owner.

87. One phrase in element [1.1] is awkwardly worded, and I believe it is useful to explain its plain and ordinary meaning: “the first microprocessor operative to receive a first communication *sent from* the first vehicle to the server indicating the first vehicle is in a hazardous condition and a location of the first vehicle.” In my view, a POSITA would read this phrase as meaning that the microprocessor is operative to receive a hazardous condition indication and location of the first vehicle for a communication to the server. This is because, in the context of the ’938 Patent, the first vehicle’s microprocessor is the source of that communication, not a recipient of it after transmission; a reading that required the microprocessor to receive a communication after it had already been “sent” to the server would make little technical sense in light of the specification. The clarifying explanation above is consistent with both the specification and the express claim language itself. In the specification, the microprocessor 102 acquires information from the hazard-

indicating elements (e.g., airbag monitoring system 110) and GPS unit 125 of first vehicle 202 indicating that it is in a hazardous condition and the vehicle location, and then sends a communication to the server indicating the first vehicle's location and hazardous condition. Ex. 1001 at 3:43-47, 5:61-62, 6:50-52, 7:13-19, 7:61-64, 8:7-11, 10:43-45, 12:36-40. This is also consistent with the abstract, which states that “[i]n response to receiving *the signal indicative of a hazardous event*, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition.” Ex. 1001, Abstract.

88. It is my opinion that no other claim term requires construction to resolve the patentability issues discussed in my Declaration. As I explain in Sections X.B.4, X.B.5, and X.E.2.a, claims 4, 6, and 7 appear to depend erroneously from claim 1 when they were intended to depend from claim 2; in my opinion, however, the prior art renders those claims unpatentable whether the dependency is read as written or as corrected. I reserve the right to offer opinions regarding any terms that Patent Owner may propose for construction.

X. OPINIONS ON PATENTABILITY

89. This section sets out my analysis of where the prior art references disclose the limitations of the challenged claims, and of why a POSITA would have regarded those claims as obvious in light of that prior art. My discussion of a dependent claim may not always refer back expressly to my analysis of the claim

from which it depends; that earlier analysis is nonetheless part of my testimony as to each dependent claim.

90. As I explain below, claims 1–8 are, in my opinion, unpatentable under Grounds 1–4.

A. The Asserted References are Analogous Prior Art

91. I begin by explaining why I consider each of Fields (U.S. Patent No. 9,805,601, Ex. 1004), Pisz (U.S. Patent No. 8,548,686, Ex. 1006), Ricci (U.S. Patent No. 9,524,597, Ex. 1005), and Seifert (U.S. Patent Application Publication No. 2014/0368324, Ex. 1016) to be “analogous” prior art. My understanding, as noted earlier, is that a reference is “analogous” if it is either (a) from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (b) reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention).

92. In my view, a POSITA would identify the ’938 Patent’s field of endeavor as vehicle-to-vehicle and vehicle-to-infrastructure communication systems that detect and communicate hazardous vehicle and road conditions in order to enhance driver safety. The patent’s Abstract describes “[a] system for signaling a hazard condition of a vehicle [that] includes a microprocessor configured to receive an electronic signal from the vehicle that is indicative of a hazardous condition” that, “[i]n response to receiving the signal indicative of a hazardous event . . . sends a first

wireless signal . . . that indicates the vehicle is involved in the hazardous condition.” Ex. 1001, Abstract. Similarly, independent claim 1 recites a system for providing “real time indication of a hazardous vehicle condition,” in which a server receives hazard and location information from a first vehicle and sends hazard alerts to a second vehicle when the vehicles “lie on a common roadway path and within a predetermined distance of one another.” Ex. 1001, 14:51–65. These disclosures show that one clear problem the inventors faced was how to most efficiently and effectively alert nearby drivers to abnormal or hazardous conditions—including how to decide which drivers should receive those alerts.

1. Fields is Analogous Prior Art

93. Fields, titled “Vehicular Traffic Alerts for Avoidance of Abnormal Traffic Conditions,” expressly concerns a system for “generating and collecting data at a connected vehicle, and using the data and/or vehicle-to-other device . . . wireless communication (e.g., vehicle-to-vehicle or vehicle-to-infrastructure) and data transmission to facilitate safer vehicle travel . . .” Ex. 1004 at 1:44-50. As in the ’938 Patent, a first vehicle in Fields detects a hazardous condition (such as an airbag deployment indicating an accident, or a rollover event), collects its location via GPS, and wirelessly sends that information to an external computing device (server). Ex. 1004 at 19:47–50, 19:55–63, 15:36–59, 14:32-36, 13:45-60. The server, in turn, decides whether to send hazard alerts to second vehicles depending on whether a

second vehicle is “within a threshold distance approaching the first vehicle” and “travelling on the same highway.” *Id.* at 21:46–54. I therefore consider Fields to be in the same field of endeavor as the claimed invention. It also addresses the same problems as the ’938 Patent, such as how most effectively to alert drivers of dangerous conditions.

2. Pisz is Analogous Prior Art

94. Pisz, too, falls within the same field and addresses the same problems as the ’938 Patent. It describes an “automatic crash notification system” designed to “detect a crash of a vehicle” and “wirelessly transmit a message to and wirelessly receive a message from a remote location,” including a “notice of a crash.” Ex. 1006, Abstract. Just as in the ’938 Patent, Pisz detects a hazardous condition (e.g., a vehicle crash) and relays that information to a remote location. *Id.* For these reasons, I consider Pisz to be in the same field of endeavor as the claimed invention, and, at a minimum, to be reasonably pertinent to a problem the ’938 Patent addresses—how a vehicle’s on-board processor detects a hazardous condition (such as a crash) and reports it, together with the vehicle’s location, to a remote recipient.

3. Ricci is Analogous Prior Art

95. Ricci bears the title “Radar Sensing and Emergency Response Vehicle Detection.” Ex. 1005 at 1. It expressly describes “[a] system for communication of

safety information comprising: a sensor adapted to detect at least one road hazard; a safety module adapted to categorize the at least one road hazard; a navigation subsystem adapted to associate a GPS coordinate with the road hazard; and a message module adapted to forward information about the road hazard to one or more entities.” Ex. 1005 at 8:20–28. Ricci also explains that “the information is communicated directly to one or more other drivers based on the one or more other driver’s proximity to the road hazard” and that such hazard information “is pushed automatically to one or more other vehicles and displayed on the one or more other vehicle’s displays.” *Id.* at 8:38–40, 8:51–53. A POSITA would readily recognize that Ricci—like Fields and the ’938 Patent—concerns networked vehicle communication systems that detect hazardous conditions and wirelessly convey those hazards to nearby drivers. I therefore consider Ricci to be in the same field of endeavor as the claimed invention and to seek to address the same problems as the ’938 Patent, such as how most effectively to alert drivers of dangerous conditions.

4. Seifert is Analogous Prior Art

96. Seifert is within the same field of endeavor as the claimed invention—vehicle-to-vehicle and vehicle-to-infrastructure systems that detect and communicate hazardous vehicle and road conditions to enhance driver safety, as I explained in ¶¶ 84-85 above. Seifert’s apparatus detects a hazardous condition and

communicates it to other drivers, and it may be triggered by wired or wireless network signals (Ex. 1016 ¶¶ [0041], [0067]). *Supra* Section VIII.D (providing an overview of Seifert’s high-conspicuity alert system).

97. A POSITA would understand that the ’938 Patent is also specifically concerned with “high conspicuity visual indicators,” such as rear signal lights that “may be strobing at a high rate” (Ex. 1001 at 8:64–9:1), and indicators differentiable from ordinary lights “based on a variable or increased flash rate, a variable or increased contrast, a variable or increased brightness, an altered or variable color, and/or a combination of these” (*id.* at 5:10–17). A POSITA would understand that the purpose of these high conspicuity visual indicators is to alert nearby drivers of the presence of a nearby hazardous condition or traffic anomaly, which can prevent additional accidents from occurring due to the condition or anomaly.

98. Seifert similarly “relates to preventing vehicle accidents”—more specifically, rear-end collisions—by warning following drivers when a vehicle is slowing, stopping, or closing on a vehicle or object ahead, noting that roughly one-third of highway accidents are rear-end crashes. Ex. 1016 ¶¶ [0002], [0004]. A POSITA would readily understand that Seifert, like the ’938 Patent and Fields, is directed to detecting hazardous roadway conditions and warning nearby drivers of them. Seifert is also reasonably pertinent to the problem addressed by claims 7 and 8—making a vehicle conspicuous to other drivers when a hazard is present—

because it teaches a rear-mounted strobe for that very purpose. *Id.* ¶¶ [0112]–[0113], [0127]. Thus, Seifert is analogous art.

B. GROUND 1: WHETHER FIELDS ANTICIPATES OR RENDERS OBVIOUS CLAIMS 1-4 AND 6

99. Fields discloses every element of claims 1-4 and 6, and in my opinion it therefore anticipates those claims. In the alternative, I believe these claims would have been obvious based on Fields for two reasons.

100. First, if the teachings of Fields on which I rely would have been viewed as distinct embodiments, a POSITA would still have found it obvious to combine them in the way I describe. *Infra* Section X.B.1.a.ii.

101. Second, even if Fields were found not to disclose “the first microprocessor operative to receive a first communication sent from the first vehicle to the server” (element [1.1]), that limitation would, in my opinion, have been obvious based on Fields in view of a POSITA’s general knowledge. *Infra* Section X.B.1.b.³

1. Claim 1

a. [1.0] (Preamble): “A system for providing real time indication of a hazardous vehicle condition comprising:”

102. Assuming the preamble is limiting, Fields discloses it, in my opinion.

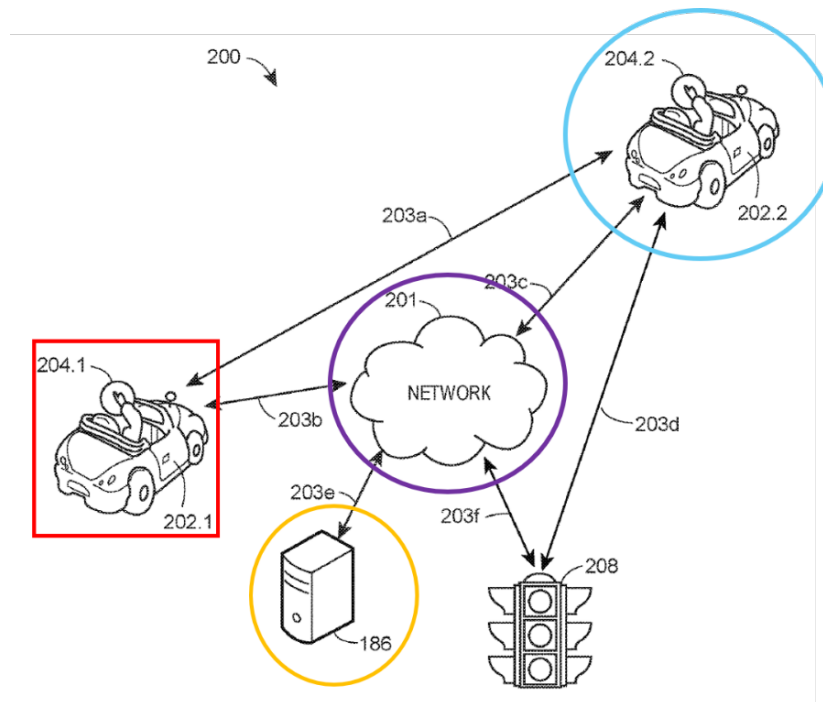
³ As I explain in connection with Ground 2, it is also my opinion that element [1.1] would have been obvious based on Fields further in view of Pisz. *Infra* Section X.C.

i. A POSITA Would Understand That Fields Teaches a Single Embodiment With All Relevant Features.

103. My claim mappings below draw on what a POSITA would view as one continuous disclosure in Fields—namely, the server-mediated alert-notification system shown in FIGS. 1–3 and 11, among others, and described in the accompanying text, including the discussion of geographic relationships.

104. Annotated Figure 2 below shows that Fields discloses a system 200, including first vehicle 202.1 (**red**) and second vehicle 202.2 (**blue**), for providing real-time indication of a “hazardous vehicle condition.”

Fields, FIG. 2 (Annotated)



Specifically, Fields describes an “alert notification system 200” that includes “N” vehicles 202.1–202.N, external computing device 206 (e.g., a server, **orange**)

(incorrectly labeled “186”),⁴ and network 201 (**purple**) for detecting and communicating about abnormal traffic conditions—including hazardous vehicle conditions—in real time. Ex. 1004 at 9:35-65 (describing alert notification system 200 as including network 201 interconnecting external computing device 206 with one or more vehicles 202 and their respective mobile computing devices 204, each of which may also have an on-board computer that may be an implementation of on-board computer 114). Fields itself characterizes this arrangement as follows: “FIG. 2 illustrates a block diagram of an *exemplary* alert notification system 200 in accordance with an *exemplary* aspect of the present disclosure.” *Id.* at 9:36-38.

105. Figures 11 and 12 of Fields illustrate methods “of determining, generating, transmitting, receiving, and presenting *alerts or notifications related to anomalous or abnormal conditions*.” *Id.* at 46:54-56. Figure 11 is used “to detect

⁴ “External computing device” 206 is labeled in FIG. 2 of Fields as element “186.” A POSITA would understand that label to be a drafting error referring to element “206,” the “external computing device.” This is because the specification states that device 206 may be a server and only component matching the description and functionality of device 206 in the figure is labeled 186. Ex. 1004 at 9:36-42, 10:31-34, 11:38-44. Additionally, element 186 is never discussed in the specification, but element 206 is repeatedly discussed as performing the function of the element labeled 186 in FIG. 2.

such anomalous conditions and to generate and transmit messages to inform other vehicles.” *Id.* at 46:57-59.

Fields, FIG. 11 (Annotated)

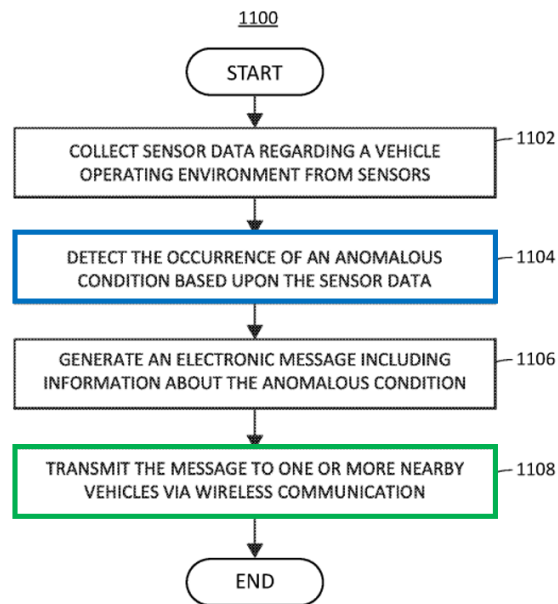


FIG. 11

Although the method is “described as being performed by mobile computing devices 110 and/or on-board computers 114 associated with vehicles,” Fields explains that “vehicle 108 may similarly transmit the electronic message *to an external computing device 206 via the network 201*, which external computing device 206 may *redirect the electronic message to appropriate vehicles 202* via the network 201.” *Id.* at 46:61-64, 48:55-59; *see also id.* at 46:54-67 (“[S]ome embodiments may instead perform some or all actions using one or more external computing devices 206, such as *servers communicatively connected to the vehicles via the network 201*”). From an engineering standpoint, these passages indicate that the processing

steps of method 1100 may be distributed between the vehicle-side devices and the server. Figure 1 depicts mobile computing device 110 and on-board computer 114, and Figure 3 depicts details of a computing device 300, which Fields states “may be implemented as” the mobile computing device or on-board computer of Figure 1, and which comprises a microprocessor. *Id.* at 12:58-13:2; 13:31-32.⁵

106. Fields further explains that these systems are capable of performing the above “exemplary traffic condition broadcast method 1100.” *Id.* at 46:54-47:4. Fields specifically discloses collecting sensor data (step 1102) and detecting an “anomalous condition” (step 1104, **blue**) based on that sensor data (*id.* at 47:53-55), where “an anomalous condition may be identified when the one or more sensor metrics indicate **that an airbag has been deployed**, and thus the vehicle associated with computing device 300 **has been in an accident**” (*id.* at 19:47-50). The anomalous condition may also be “sensor metrics indicative of a **rollover condition**, [or] a sudden stop (**indicating a collision**).” *Id.* at 19:55-63. With respect to Figure 6, Fields explains that the computing device “may process the data in **real-time** as it is received to determine whether an anomalous condition has occurred” *Id.* at 34:23-29; *see also id.* at 6:20-33; *id.* at 19:40-43 (“because each vehicle may sample

⁵ This passage refers to “mobile computing device 100, as shown in FIG. 1,” but a POSITA would understand this is a clear error intending to refer to element 110, which is in fact the “mobile computing device” of that figure.

and/or broadcast geographic location data and/or telematics data *in real time*, the anomalous conditions may be detected with minimal delay as they occur”). The system then generates (step 1106 above) and transmits (step 1108, **green**) electronic messages regarding detected hazardous conditions to external computing device 206 (the server). *Id.* at 48:23-64. In my opinion, the system thus provides a “real time indication of a hazardous vehicle condition,” such as an airbag deployment or vehicle rollover.

107. Fields presents its teachings across multiple figures and “aspects.” Even so, a POSITA reading Fields would, in my opinion, understand these to be complementary features of one integrated alert notification system—not discrete, mutually exclusive inventions—and would at once envisage them operating together. Fields itself repeatedly signals that its features are meant to be combined. Its concluding remarks, for instance, state that “[t]hose of ordinary skill in the art will recognize that a *wide variety of modifications, alterations, and combinations can be made with respect to the above described embodiments* ... and ... such modifications, alterations, and *combinations are to be viewed as being within the ambit of the inventive concept.*” Ex. 1004 at 74:24-29. In the same vein, Fields explains that “[s]tructures and functionality presented as separate components in example configurations *may be implemented as a combined structure or component,*” and that “[t]hese and other variations, modifications, additions, and

improvements fall within the scope of the subject matter herein.” *Id.* at 72:47-53. For these reasons, a POSITA would read Fields’ teachings regarding the complementary aspects of the figures discussed here as a single embodiment and, based on those figures and teachings, would immediately envisage the claimed arrangement or combination.

ii. Alternatively, the Combination of Features into a Single Embodiment Would Still Have Been Obvious.

108. Even if some of the Fields teachings I rely on were found to come from separate embodiments, I believe a POSITA would have found it obvious to combine them into one system. My understanding is that obviousness can rest on a single reference when a POSITA would have been motivated to combine its teachings and would have reasonably expected success. Here, Fields itself provides both the motivation and the basis for expecting success, which makes the combination technically straightforward and obvious.

109. The system that would have been obvious to a POSITA combines: (1) telematics collection system 100 of Figure 1, in which mobile computing device 110 and/or on-board computer 114 in each vehicle collect telematics data and generate alerts (Ex. 1004 at 7:56-9:15); (2) alert notification system 200 of Figure 2, in which vehicles 202.1–202.N communicate via network 201 with external computing device 206, implemented as a server (*id.* at 9:35-11:49); (3) computing device 300 of Figure 3, including microprocessor 306/controller 340, sensor array 326, location

acquisition unit 320, communication unit 330, display 316, and speaker 322, together with the anomalous-condition detection and threshold-distance/same-road relevance determinations performed by device 300 when implemented as the external server (*id.* at 12:58-21:54); and (4) traffic condition broadcast method 1100 of Figure 11, which detects an anomalous condition from sensor data (e.g., airbag deployment or rollover) and transmits an electronic message to external computing device 206 for redirection to appropriate vehicles (*id.* at 46:54-48:64).

110. There are at least four reasons a POSITA would have been motivated to combine these features. First, Fields expressly invites combination of its embodiments: “a wide variety of modifications, alterations, and ***combinations can be made with respect to the above described embodiments,***” and “such modifications, alterations, and ***combinations are to be viewed as being within the ambit of the inventive concept.***” *Id.* at 74:24-29. It adds that “[s]tructures and functionality presented as separate components in example configurations may be implemented as a combined structure or component.” *Id.* at 72:47-53. To a POSITA, an explicit suggestion of this kind in the reference itself is a strong reason to combine—especially where, as with Fields, the features are complementary and their combination would have predictably advanced Fields’ expressly stated goals.

111. Second, the features are complementary and depend on one another functionally. Each figure contributes a component that the others benefit from and,

in some cases, require. For example, the alert notification system of Figure 2 relies on the vehicle-side devices of Figure 1 to generate the data it relays, and Fields states that each vehicle may have a mobile computing device 110 and/or on-board computer 114 for this purpose. Ex. 1004 at 7:56-61, 9:36-52. Figure 3's computing device 300 is, in turn, described as the implementation of those same devices—the mobile device 110 and on-board computer 114. *Id.* at 12:60-13:2. And the method of Figure 11 is carried out by those same components. *Id.* at 46:54-67. In fact, Fields' single alert notification application 346 installs the telematics collection, location determination, and anomalous-condition detection routines together to execute “one or more embodiments described herein.” *Id.* at 17:64-18:20. Based on my experience, a POSITA implementing any one of these figures would naturally have turned to the others for the components and steps that Fields says they use.

112. Third, Fields identifies concrete benefits that, as I see it, arise when the server-based architecture of Figures 2 and 3 is paired with the vehicle-side detection of Figures 1 and 11. According to Fields, vehicle devices may “send the data to external computing device 206 for remote processing instead of processing the data locally” (*id.* at 11:50-62); a mobile device may route alerts through other components “to conserve battery power of the mobile device” (*id.* at 7:8-15); and the server's road-based relevance determination “may prevent false alert notifications from being sent to other vehicles travelling in close proximity to the

first vehicle, but on nearby roads unaffected by the detected anomalous condition” (*id.* at 22:43-47). To obtain these stated benefits—less processing and power burden on vehicle devices, and more accurate, targeted alerts—a POSITA would have been motivated to feed the vehicle-side detection of Figure 11 into the server-based relevance determination of Figures 2 and 3.

113. Fourth, the combination simply joins familiar elements according to known methods and, in my opinion, yields nothing more than predictable results. Each feature does the same job in the combined system that Fields describes it doing on its own. The sensors detect; the location unit locates; the communication unit transmits; the server determines relevance; and the display and speaker alert. Bringing these complementary features together in a single system directly advances Fields’ overarching objective—to “facilitate safer vehicle travel” by alerting vehicles to abnormal conditions (Ex. 1004 at 1:44-50).

114. I also believe a POSITA would reasonably have expected this combination to succeed. In effect, Fields has already done the integration work. It teaches that “features depicted in multiple Figures are designated with consistent reference numerals” (Ex. 1004 at 3:36-39), identifies which component of one figure implements which component of another (*see, e.g., id.* at 9:42-46, 12:60-13:2), and describes the communication links among them (*id.* at 10:27-11:11). Fields also explains that processing “may be performed locally, remotely, or any suitable

combination of local and remote processing techniques” (*id.* at 13:3-7)—confirmation that its vehicle-side and server-side features were designed to work together. The underlying technology was mature and well understood: GPS location, accelerometer and airbag sensing, cellular and Wi-Fi communication, and server-side comparison of location data to thresholds. Fields describes implementing all of it with conventional, commercially available hardware, operating systems, and communication protocols. *Id.* at 11:3-11, 14:4-18, 15:36-59. Since the combination requires only arranging Fields’ own compatible components as Fields describes, a POSITA would have expected predictable operation.

115. For the reasons above, if Fields were found not to disclose the relied-upon features arranged in a single embodiment, I believe a POSITA would nonetheless have found it obvious to combine those features in a single embodiment.

- b. [1.1] “a server in communication with a first microprocessor of a first vehicle, the first microprocessor operative to receive a first communication sent from the first vehicle to the server indicating the first vehicle is in a hazardous condition and a location of the first vehicle”**

116. Referring to Figures 2 and 3, and as explained further below, Fields discloses an external computing device 206/186 (“a server,” orange) that communicates with controller 340 and its microprocessor 306 (individually or jointly “a first microprocessor,” red) of a computing device 300 (pink) located in vehicle 202.1 (“a first vehicle,” red).

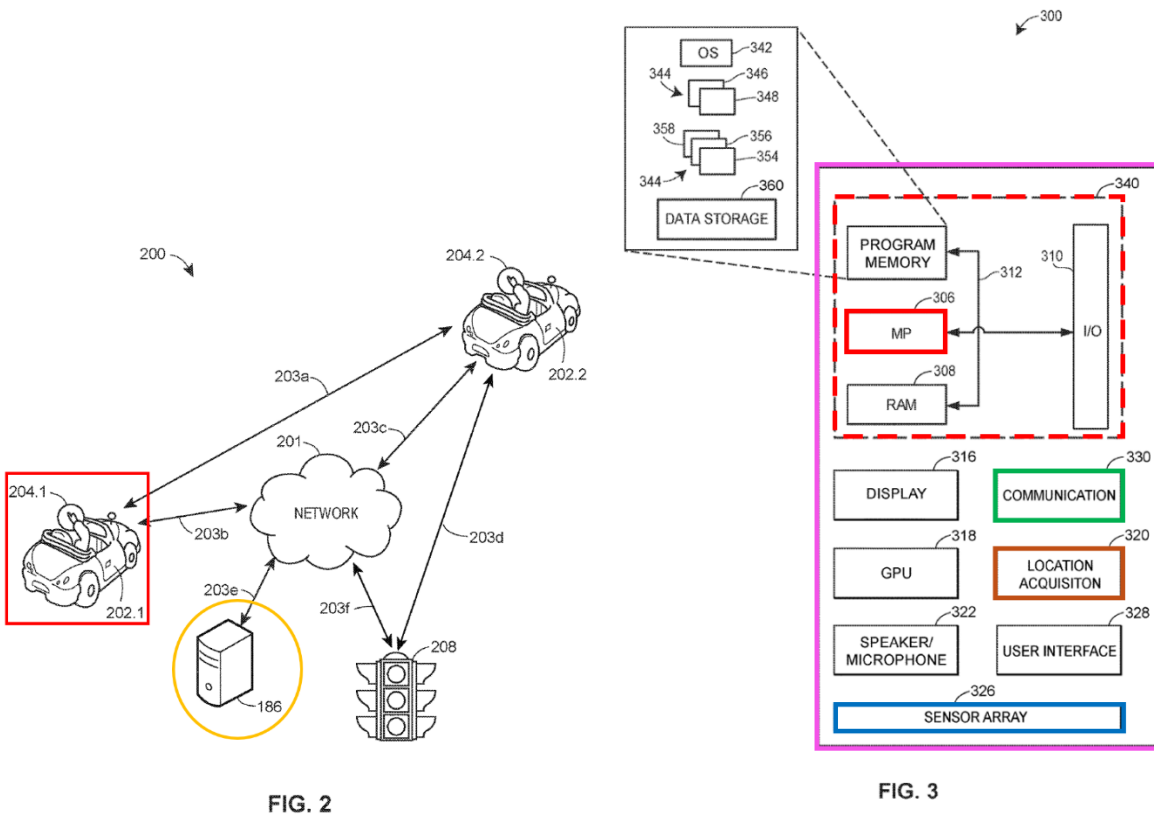


FIG. 2

FIG. 3

With respect to the “server,” Fields states that “external computing device 206 [orange] may be implemented as a network *server*, a web-*server*, a database *server*....” Ex. 1004 at 11:40-44.

117. With respect to the “microprocessor,” Fields explains that “computing device” 300 (pink) may be incorporated into the on-board vehicle computer 114 (FIG. 1) of vehicle 202.1 or may be a mobile computing device 110 “permanently installed in vehicle.” *Id.* at 7:56-9:2; 12:58-13:2. As Fields explains, the computing device 300 has a “*microprocessor* (MP) 306” (red) that is part of “controller” 340

(red), which itself can “be implemented as *any suitable type and/or number of processors*”:

In one aspect, controller 340 may include a program memory 302, a *microprocessor (MP) 306* [red], a random-access memory (RAM) 308, and/or an input/output (I/O) interface 310, each of which may be interconnected via an address/data bus 312. Controller 340 may be implemented *as any suitable type and/or number of processors*, such as a host processor for the relevant device in which computing device 300 is implemented, for example. In some aspects, controller 240 [sic] may be configured to communicate with additional data storage mechanisms that are not shown in FIG. 3 for purposes of brevity (e.g., one or more hard disk drives, optical storage drives, solid state storage devices, etc.) that reside within or are otherwise associated with mobile computing device 200 [sic].

Id. at 13:31-44. A POSITA would understand that a microprocessor refers broadly to a chip containing logical elements for performing calculations and carrying out stored instructions, among other functions. Ex. 1015 (defining “microprocessor” as “a chip containing the logical elements for performing calculations, carrying out stored instructions, etc.”). The ’938 Patent also states that “the microprocessor 102 may be considered a microcontroller....” Ex. 1001 at 5:39-40. Based on the passage above, a POSITA would, in my view, understand Fields to disclose “a first microprocessor” in either or both of two forms: microprocessor 306 (red), and controller 340 (red) implemented as a microprocessor (i.e., a “suitable type” of

processor to control the on-board vehicle system 114).

118. Server 206 (**orange**) also, in my opinion, “is in communication with a first microprocessor [**red**] of a first vehicle.” As Fields explains:

Program memory 302 may store data used in conjunction with one or more functions performed by computing device 300 *to facilitate the interaction between computing device 300 and one or more other devices*. For example, if computing device 300 is implemented as a mobile computing device (e.g., mobile computing device 204.1, as shown in FIG. 2), then program memory 302 may store one or more programs, applications, algorithms, etc. that, *when executed by controller 340 [**red**], facilitate the interaction between mobile computing device 204.1* and (i) one or more networks (e.g., network 201), (ii) other mobile computing devices (e.g., mobile computing device 204.2), (iii) *external computing devices (e.g., external computing device 206)*, (iv) vehicles (e.g., vehicle 108), (v) vehicle on-board computers (e.g., on-board computer 114), infrastructure components (e.g., smart infrastructure component 208), etc.

Ex. 1004 at 13:45-60. Technically speaking, when computing device 300 is implemented as the first vehicle’s mobile computing device 204.1 or on-board computer 114 and controller 340 “facilitate[s] the interaction between” computing device 300 and “external computing devices (e.g., external computing device 206),” a POSITA would understand that microprocessor 306 and controller 340 must both be “in communication” with server 206. That communication takes place through communication unit 330 (**green**), which “facilitate[s] communications between

computing device 300 and one or more other devices, such as . . . external computing devices.” *Id.* at 14:32-36. Controller 340 and microprocessor 306, as I discuss next, communicate with server 206 (via communication unit 330) to inform it of the vehicle’s location and hazardous condition.

119. In my opinion, Fields discloses the claim requirement of “a first communication sent from the first vehicle [vehicle 202.1, red] to the server [external computing device 206, orange] indicating the first vehicle is in a hazardous condition and a location of the first vehicle.” Specifically, Fields describes detection of a hazardous condition by the first vehicle when “the one or more sensor metrics indicate that an airbag has been deployed, and thus the vehicle associated with computing device 300 has been in an accident” (*id.* at 19:47-50) or when a “rollover” condition is detected (*id.* at 19:60-63). Fields further explains that it is the vehicle that detects the occurrence of an anomalous condition based upon the sensor data and transmits a notification to the server. *Id.* at 47:1-48:59 (discussing Figure 11). Fields also discloses that computing device 300 gathers “geographic location data” and “telematics data” via location acquisition unit 320 (e.g., using GPS) (brown). *Id.* at 15:36-59, 18:59-63. For example, Fields describes that, upon determination of an anomalous condition:

[T]he external computing device [server 206, orange] may determine, *from telematics data and geographic location* data received from a first computing device 300 [pink], that a first vehicle is located on a

highway at a certain geographic location. If the external computing device determines that a second computing device 300 in a vehicle travelling on the same highway is within a threshold distance approaching the first vehicle, then the external computing device may issue an alert notification to the second vehicle.

Id. at 21:46-54. From this passage, a POSITA would understand that Fields' first computing device 300 sends the server 206 both an indication of the first vehicle's hazardous condition and the first vehicle's location. Fields goes further, expressly stating that "[t]his anomalous condition may also be **correlated** to the geographic location associated with the geographic location data due to synchronization between the geographic location data and the sampled telematics data." Ex. 1004 at 20:10-13. Although this passage arises in Fields' traffic-slowdown example (*id.* at 19:64-20:13), a POSITA would understand that the same synchronization applies when the vehicle itself experiences the hazardous condition (e.g., an accident or airbag deployment). In that situation, the controller/processor correlates the vehicle location with that condition so that when the communication is sent to the server, the server knows not only what the hazardous condition is but also its location.

120. A POSITA would also understand Fields to disclose that the "first microprocessor" (**red**) is "*operative to receive*" the "*first communication sent from the first vehicle to the server*" that indicates the vehicle location and hazardous condition. Specifically, Fields assigns to controller 340 the processing of the data

provided by the sensor array 326 and location acquisition unit 320 prior to transmission to the server via communication unit 330. *Id.* at 15:14-21 (“Controller 340 may determine whether data has been sampled since the last transmission by, for example, *analyzing a memory address range (e.g., in data storage 360, RAM 308, etc.) associated with the storage of the telematics data....*”); *id.* at 18:54-63 (explaining that telematics collection routine 354 includes instructions that, “when executed *by controller 340*, facilitate sampling, monitoring, measuring, *collecting*, quantifying, *storing*, encrypting, *transmitting*, and/or broadcasting *of telematics data*,” including data collected “via sensor array 326, location acquisition unit 320, controller 340, etc.”); *id.* at 19:6-12 (explaining that geographic location determination routine 356 includes instructions that, “when executed *by controller 340*, facilitate sampling, measuring, *collecting*, quantifying, *storing*, *transmitting*, and/or broadcasting of geographic location data (e.g., . . . GPS data)”); *id.* at 19:21-28 (Anomalous condition detection routine 358, “when executed *by controller 340*, facilitate[s] the determination of whether an anomalous condition exists *based upon the telematics data, the geographic location data, and/or image and/or video data captured by one or more cameras or other imaging devices*”); *See also id.* at 48:23-27 (explaining that the mobile computing device 110 or on-board computer 114 “may generate an electronic message based upon the detected anomalous condition”

and that the message “may include information regarding the *type* and *location* of the anomalous condition”).

121. In short, Fields describes controller 340 executing routines that process both sensor data (e.g., airbag deployment and/or rollover detection data) and GPS data, and that transmit that data to the server through the communication unit. It follows that controller 340 and microprocessor 306 are operative to receive the hazardous-condition indication (e.g., sensor metrics from sensor array 326 indicating airbag deployment or rollover) and the location (from location acquisition unit 320), thereby satisfying the requirement of a “first communication sent from the first vehicle to the server indicating the first vehicle is in a hazardous condition and a location of the first vehicle.” As annotated Figure 3 below illustrates, the controller 340 and microprocessor 306 receive the sensor communications before passing them to communication unit 330 for transmission to the server:

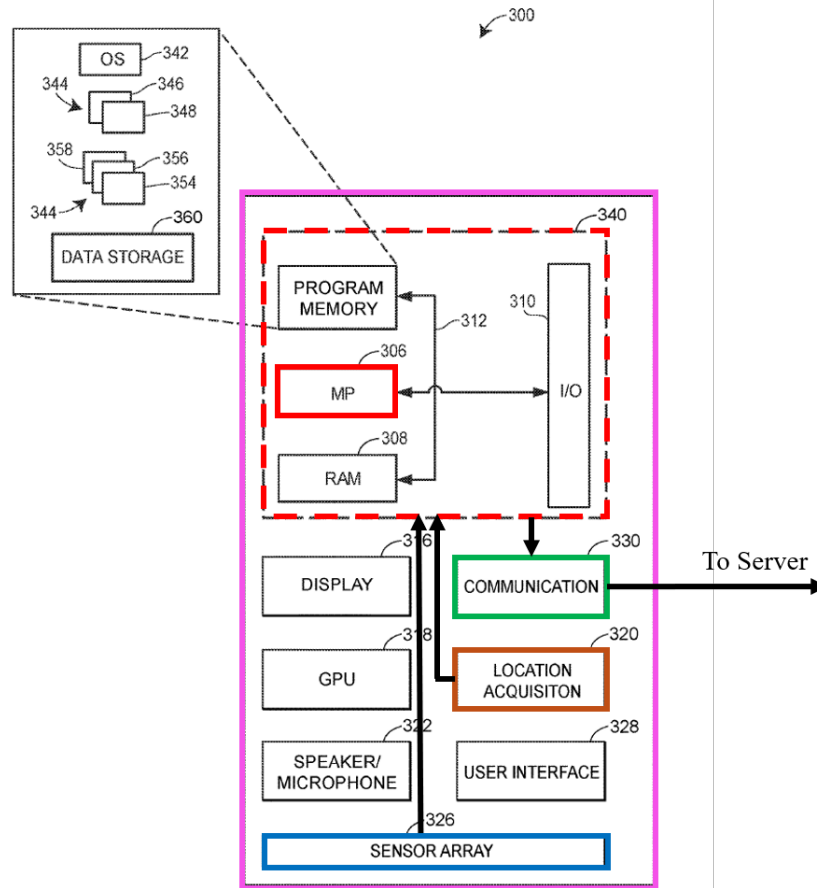


FIG. 3

122. Setting these express teachings aside, a POSITA would still understand that microprocessor 306, as part of controller 340, coordinates every computer-related task of the vehicle alert system. Microprocessor 306 and controller 340 would therefore be understood to receive communications from sensor array 326 and location acquisition unit 320 into memory (e.g., program memory, RAM, and/or cache or register of the microprocessor 306), and to process and analyze those communications before sending them to communication unit 330 for transmission

over the network to server 206/186. This is part of a POSITA's background knowledge, as numerous sources show. For example:

- Ex. 1010 at 15 explains that “[b]oth polling and interrupt-driven transfers put the burden of moving data and managing the transfer on the processor,” and that the processor “loads data from I/O device *registers and stores* them into memory.” *See also id.* at 12 (“Polling is the simplest way for an I/O device to communicate with the processor. The I/O device simply puts the information in *a Status register*, and the processor must come and get the information.”). The “registers” are a type of memory associated with the microprocessor in which information is stored for processing;
- Ex. 1011 at 14 explains that, in interrupt-driven I/O, “the processor reads the word of data from the I/O module and stores it in memory.” *See also id.* at 11 (“With both programmed and *interrupt* I/O, the processor is responsible for extracting data *from main memory for output* and storing data in main memory for input.”); *id.* at 6 (external devices include “sensors and actuators”);
- Ex. 1006 at 6:40-44, 6:55-60 explains that a “crash detection system” in a vehicle detects a crash and provides notice to processing system 101, which then “cause[s] the wireless communication system 105 to transmit notice of the crash to a . . . remote location”;
- Ex. 1007 ¶ [0039] explains that an on-board microprocessor detects GPS-sensed movement and “then causes the relevant signal to be transmitted.”

Together, these references confirm that basic signaling and processing of sensor-based alerts and notifications involves a microprocessor that receives telematics data

(e.g., airbag deployment data, GPS data) and processes it before handing it off to a transmitter for communication.

123. This understanding is consistent with the specification of the '938 Patent, which describes that microprocessor 102 (corresponding to microprocessor 306 and/or controller 340 of Fields) “may have access to GPS data for use in providing data about the vehicle in which it is installed” via “GPS unit 125” (corresponding to location acquisition unit 320 of Fields) and may “receive an electronic signal from the vehicle that is indicative of a hazardous condition.” Ex. 1001 at 7:61-66, 2:16-25, Abstract. For example, airbag deployment is detected by microprocessor/microcontroller 110 (e.g., an “airbag controller or sensor”) and relayed to microprocessor 102. *Id.* at 6:45-55; 7:13-19. The microprocessor then sends the deployment signal to the server via a transmitter. *Id.* at 2:16-25, 10:39-45 (“In response to receiving the signal indicative of a hazardous event, the microprocessor sends a first wireless signal via the first radio transmitter that indicates the vehicle is involved in the hazardous condition.”), Abstract (“a microprocessor configured to receive an electronic signal from the vehicle that is indicative of a hazardous condition involving the vehicle, and a first radio transmitter in operative communication with the microprocessor”).

124. Fields also describes communication unit 330 as capable of communicating with the server “via cellular communications” (Ex. 1004 at 14:46-

55), and a POSITA would understand from this that the communication unit would include a cellular modem. Before August 2019, it was known to a POSITA that a cellular modem necessarily included, or was implemented as, a baseband processor, and that baseband processors commonly included or operated alongside a digital signal processor (DSP). *See* Ex. 1013 ¶ [0026]; Ex. 1014 at 10:14-19. A baseband processor is a dedicated microprocessor within a wireless device; it manages all cellular radio and network communication functions, including packaging information before it is transmitted over the network. A DSP, by contrast, is a specialized microprocessor built to rapidly process digitized signals (e.g., modulation, demodulation, filtering, and error coding) in real-time. In the cellular communication embodiments, a POSITA would have understood the baseband processor and the DSP of communication unit 330 each to be a “microprocessor” that receives communications (via controller 340/microprocessor 306) from the sensors (e.g., airbag deployment sensor) and location acquisition unit, and then processes them for transmission to the server over the radio airwaves. Thus, the baseband processor and DSP would also have been understood to satisfy the “microprocessor operative to receive” limitation, in addition to controller 340/microprocessor 306.

125. Even if Fields alone were found not to meet this limitation, a POSITA would have found it obvious for the microprocessor, as part of its telematics-

collection duties, to receive the communications from the airbag deployment sensor and location acquisition unit so that those telematics could be analyzed and packaged together for transmission by the communication unit. Likewise, it would have been obvious to include a baseband processor with a DSP in the communication unit to process the communication received from the microprocessor before it is sent to the server. As I noted earlier, ordinary microprocessor and transmitter architecture has the processor receive sensor and location inputs before the communication unit forms and transmits an outbound message, and a cellular communication unit includes a baseband processor with a DSP. *See* Ex. 1010 at 12, 15; Ex. 1011 at 12, 14 (processor receives input data); Ex. 1013 ¶ [0026]; Ex. 1014 at 10:14-19 (baseband processor and DSP). Drawing on the general knowledge in the field, a POSITA would have found it obvious—consistent with standard computer architecture and design practices—for controller 340 and microprocessor 306 to receive, process, and combine all telematics data before passing it to the communication unit. That step, in my view, would have been no more than the application of a known technique to improve Fields’ system, ensuring that all relevant telematics are combined and synchronized (e.g., hazard condition tied to location and time data) and thereby improving communication efficacy.

c. [1.2] “wherein the server receives a second communication sent from a second vehicle to the server indicative of a location of the second vehicle”

126. Fields also discloses, as illustrated below, that the external computing device 206/186 (“the server,” orange) receives from vehicle 202.2 (“a second vehicle,” blue) a second communication indicative of the second vehicle’s location.

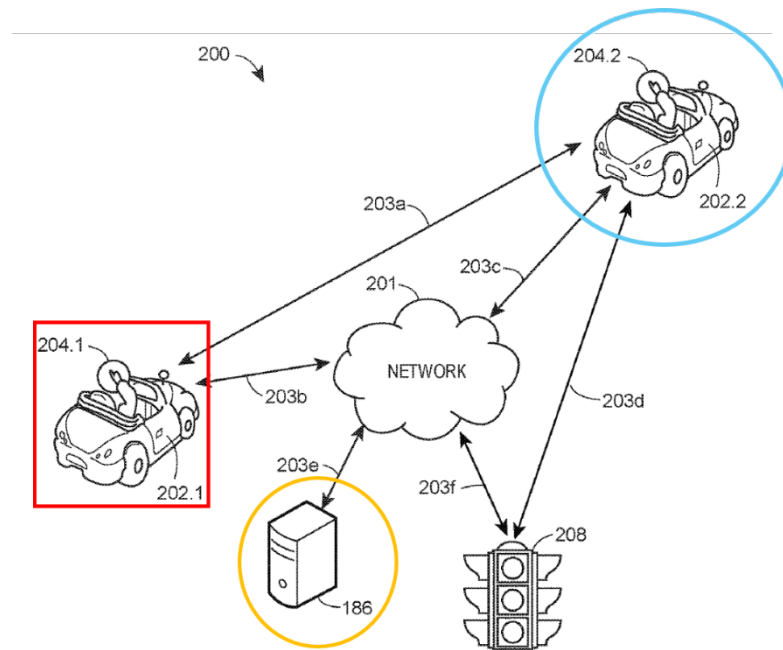


FIG. 2

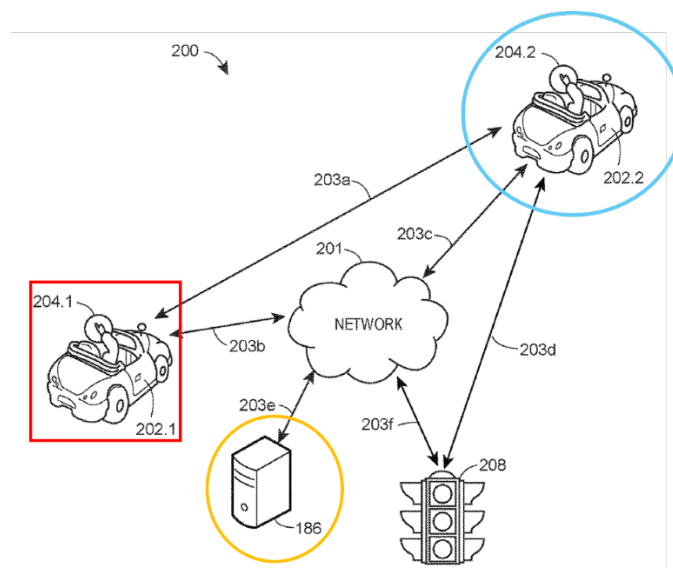
As with the first vehicle (vehicle 202.1, red), the second vehicle (vehicle 202.2, blue) has its own associated computing device 300. Ex. 1004 at 9:46-49, 12:60-66. Each computing device 300 gathers location data for its vehicle (here, second vehicle 202.2) from location acquisition unit 320. *Id.* at 10:40-52; 15:36-46. Fields expressly states that “the second computing device 300 associated with the second vehicle may likewise broadcast telematics data and geographic location data to the external

computing device.” *Id.* at 20:56-59.

127. Fields thus discloses a server (external computing device 206) that receives, from a second vehicle (vehicle 202.2), a second communication sent to the server indicative of the second vehicle’s location.

d. [1.3] “wherein the server provides a third communication to the second vehicle when it is determined that the locations of the first and second vehicle lie on a common roadway path and within a predetermined distance of one another.”

128. In Fields, the external computing device 206/186 (**orange**) decides whether to send a hazard alert (“a third communication”) to vehicle 202.2 (“the second vehicle,” **blue**) based on two factors: (i) the second vehicle’s proximity to vehicle 202.1 (i.e., “the first vehicle”) and (ii) whether the two vehicles are on the same highway (“a common roadway path”).



129. Fields explains:

To provide additional examples, mobile computing devices 204.1 and 204.2 may be configured to communicate with one another via radio links 203b and 203c by each communicating with network 201 utilizing a cellular communication protocol. As an additional example, mobile computing devices 204.1 and/or 204.2 may be configured to communicate with external computing device 206 via radio links 203b, 203c, and/or 203e.

The external computing device [server 206/186, orange] may determine, from telematics data and geographic location data received from a first computing device 300, that a first vehicle [red] is located on a highway at a certain geographic location. **If the external computing device determines that a second computing device 300 in a vehicle [202.2, blue] travelling on the same highway is within a threshold distance approaching the first vehicle [202.1, red], then the external computing device [server 206/186, orange] may issue an alert notification to the second vehicle.**

Id. at 10:27-34, 21:46-54. A POSITA would understand that, when second vehicle 202.2 is “travelling on the same highway” as first vehicle 202.1, the two vehicles are on a “common roadway path.” A POSITA would likewise regard determining whether the vehicles are within “a threshold distance” of one another as the same thing as determining whether they are within a “predetermined distance” of one another. As an engineering matter, the “threshold distance” that Fields’ alert system uses to decide whether to notify the second vehicle is necessarily a predetermined

parameter. Ex. 1004 at 21:24-35 (providing a “half mile” as an example “threshold distance”).

130. Each requirement of this claim element is therefore, in my opinion, expressly disclosed by Fields.

2. Claim 2: “The system of claim 1, wherein the second vehicle is equipped with a second microprocessor in communication with the server that provides an alert to an occupant of the second vehicle upon receipt of the third communication.”

131. According to Fields, each vehicle 202 (including “second vehicle” 202.2) may have its own computing device 300 (pink), so vehicle 202.2 (“the second vehicle”) has one as well. Ex. 1004 at 9:36-65, 12:60-66. That device, as I explained earlier and as shown below, includes microprocessor 306 and controller 340 (which may also be implemented as a microprocessor) (red). Both are necessarily in communication with external computing device 206/186 (“the server”) in order to “facilitate the interaction between mobile computing device 204.1 and . . . external computing devices (e.g., external computing device 206).” Ex. 1004 at 13:45-60; *supra* Section X.B.1.b.

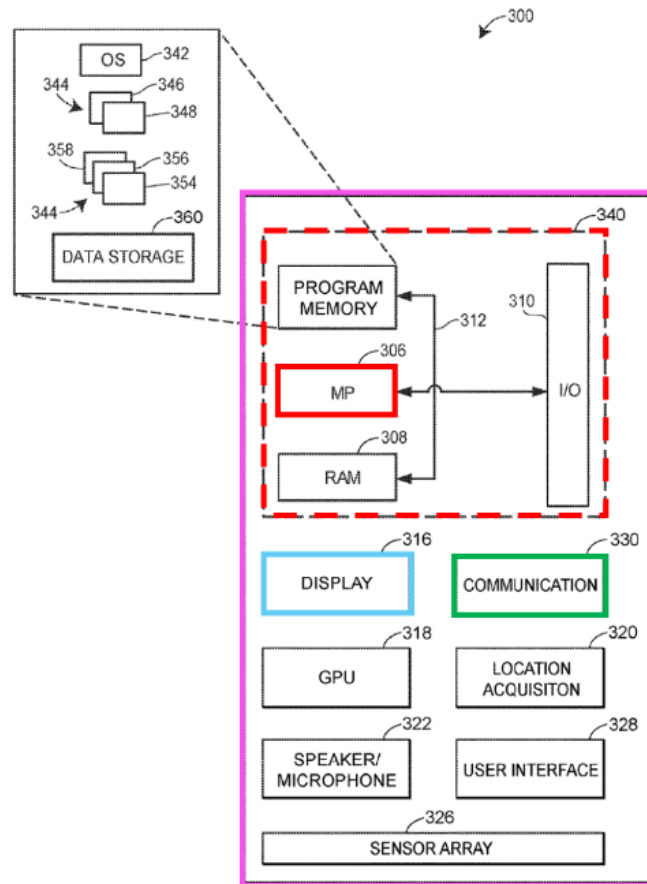


FIG. 3

Accordingly, Fields discloses that “the second vehicle [202.2] is equipped with a second microprocessor [MP 306/controller 340, **red**] in communication with the server [external computing device 206/186, **orange**].”

132. MP 306/controller 340 (“second microprocessor,” **red**) also “provides an alert to an occupant of the second vehicle upon receipt of the third communication.” Fields describes real-time detection of hazardous conditions and vehicle-location information and real-time alerting of drivers of those conditions. Ex. 1004 at 34:23-29; *see also id.* at 6:20-33 and 19:40-43. “[T]he second computing

device 300 may further process the telematics data and take the appropriate relevant action if an anomalous condition is found (e.g., *issue an alert notification, generate an alert, display a warning message*, etc.).” *Id.* at 20:43-50 (describing an embodiment in which the second device receives the first device’s broadcast). Fields further explains:

When relevant, external computing device may be configured to *send alert notifications* to the first and/or second devices 300, which may include any suitable type of communications such as push notifications, a short messaging service (SMS) message, an email, a notification that used [sic] in conjunction with the OS running on each receptive computing device 300, etc. *Upon receiving the notification* from the external computing device, the first and/or second computing device 300 may *generate an alert indicating a description of the anomalous condition and/or its location*.

Id. at 20:63-21:6. Based on these teachings, the MP 306/controller 340 (“second microprocessor”) of the second vehicle “provides an alert to an occupant of the second vehicle upon receipt of the third communication.”

3. Claim 3: “The system of claim 1, wherein the first microprocessor is in communication with a global positioning system associated with the first vehicle to determine the location of the first vehicle.”

133. In Fields, MP 306/controller 340 (“the first microprocessor,” **red**) communicates with location acquisition unit 320 (a global positioning system,

green), which is associated with the first vehicle (202.1), to determine the first vehicle's location.

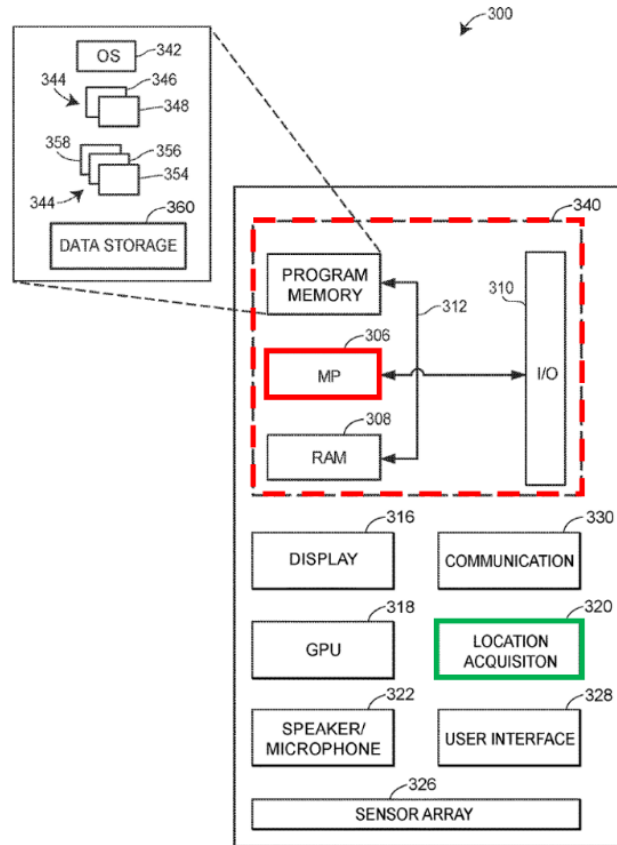


FIG. 3

Specifically, Fields describes that “[c]omputing device 300 may include . . . a location acquisition unit 320” (green). *Id.* at 13:26-30. Fields further explains that “[l]ocation acquisition unit 320 may be configured to generate geographic location data utilizing any suitable global positioning techniques . . . to determine a location of computing device 300 . . . [such as] ‘Assisted Global Positioning System’ (A-GPS), satellite GPS, or any other suitable global positioning protocol . . . to

determine a geographic location of computing device 300.” *Id.* at 15:36-46.

134. Computing device 300, including MP 306/controller 340, sits within vehicle 202.1 (“the first vehicle”). Fields therefore discloses that “the first microprocessor is in communication with a global positioning system associated with the first vehicle to determine the location of the first vehicle.”

4. Claim 4: “The system of claim 1, wherein the alert to the occupant of the second vehicle is a visual indication.”

135. Although claim 4 depends from claim 1, it refers to “*the* alert to the occupant of the second vehicle”—a phrase whose only antecedent basis appears in dependent claim 2.

136. A POSITA would, in my view, recognize claim 4’s dependence on claim 1 as a latent error, one that resulted when the original claim from which issued claim 4 depended was cancelled during prosecution. The prosecution history shows that issued claim 4 was pending as claim 30, which depended on then-pending claim 29. Ex. 1003 at 36, 665. Then-pending claim 29 was later cancelled, and then-pending claim 30 was amended to refer back to then-pending claim 26 (issued independent claim 1)—even though claim 26 provided no antecedent basis for “the alert.” *Id.* at 380-82. The error apparently went unnoticed during prosecution, leaving claim 4 without proper dependency. A POSITA would understand, however, that the applicant meant for then-pending claim 30 to depend from then-pending claim 27, which ultimately issued as dependent claim 2. Seeing the dependency on

claim 1 as an obvious error, a POSITA would instead read claim 4 as depending on claim 2. I have been informed by counsel that the Board may correct an obvious error of this kind in a claim, where the correction is not subject to reasonable debate and the prosecution history does not suggest a different interpretation. The dependency errors here qualify for such correction in my opinion.

137. Whether or not the antecedent-basis error is corrected, Fields discloses this limitation in my opinion. According to Fields, computing devices 300 (pink) include a “display 316 [blue] [that] may be configured to work in conjunction with controller 340 [red] and/or GPU 318 to *display alerts* and/or notifications *received from other devices* indicative of detected anomalous conditions,” and these displayed alerts may take the form of a “*visual warning* to be presented on a screen.” Ex. 1004 at 14:28-31, 50:40-47.

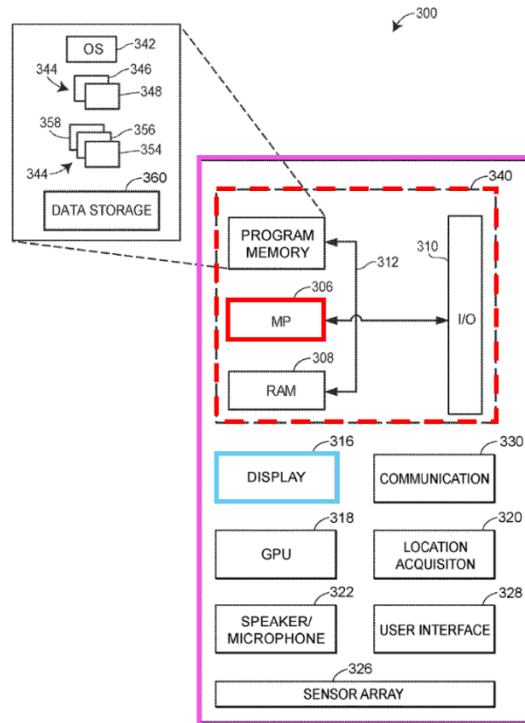


FIG. 3

138. Therefore, Fields discloses that “the alert to the occupant of the second vehicle is a visual indication.” As I explained above, this is true whether the dependency is read as written or as corrected to depend from claim 2. *See supra* ¶ 136.

5. Claim 6: “The system of claim 1, wherein the alert to the occupant of the second vehicle is an audio alert.”

139. Claim 6 has the same antecedent-basis problem as claim 4: claim 1 provides no antecedent basis for “*the* alert.” The cause is also the same. Claim 6 (then-pending claim 32) originally depended from then-pending claim 29, which was cancelled. Ex. 1003 at 36, 381-382, 665. For that reason, I believe a POSITA

would understand claim 6 as intended to depend from claim 2 (then-pending claim 27 (*id.* at 381)) and would interpret it accordingly.

140. Here too, Fields discloses the limitation in my opinion, whether or not the antecedent-basis error is corrected. Each computing device 300 (**pink**) in Fields has a speaker/microphone 322 [**blue**] which “may additionally or alternatively include a speaker *configured to play sound in response to data received from one or more components of computing device 300.*” Ex. 1004 at 15:64-67.

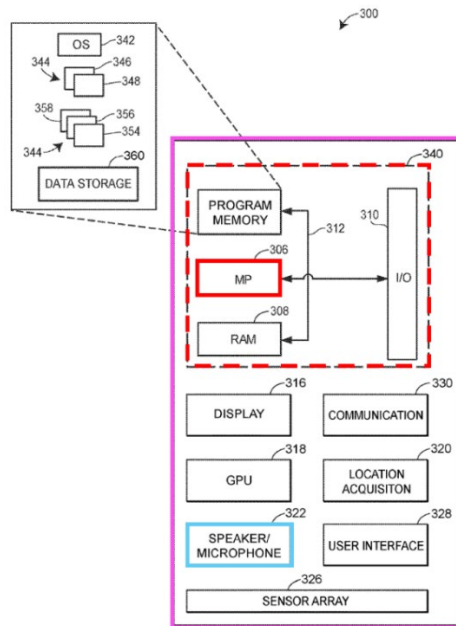


FIG. 3

Fields further explains that speaker/microphone 322 “may be configured to play *audible alerts*” in response to the receipt of an electronic message “from an external computing device” (i.e., the third communication). *Id.* at 16:1-2, 49:29-36. Fields also describes that the alert may include “an *audible warning* to be presented by a

speaker, or other types of warnings to [alert] the driver of the anomalous condition.”

Id. at 50:43-47.

141. I therefore conclude that Fields discloses that “the alert to the occupant of the second vehicle is an audio alert.” As with claim 4, this is true whether the dependency is read as written or as corrected to depend from claim 2. *See supra* ¶¶ 136, 139.

C. GROUND 2: WHETHER FIELDS IN VIEW OF PISZ RENDERS OBVIOUS CLAIMS 1-4 AND 6

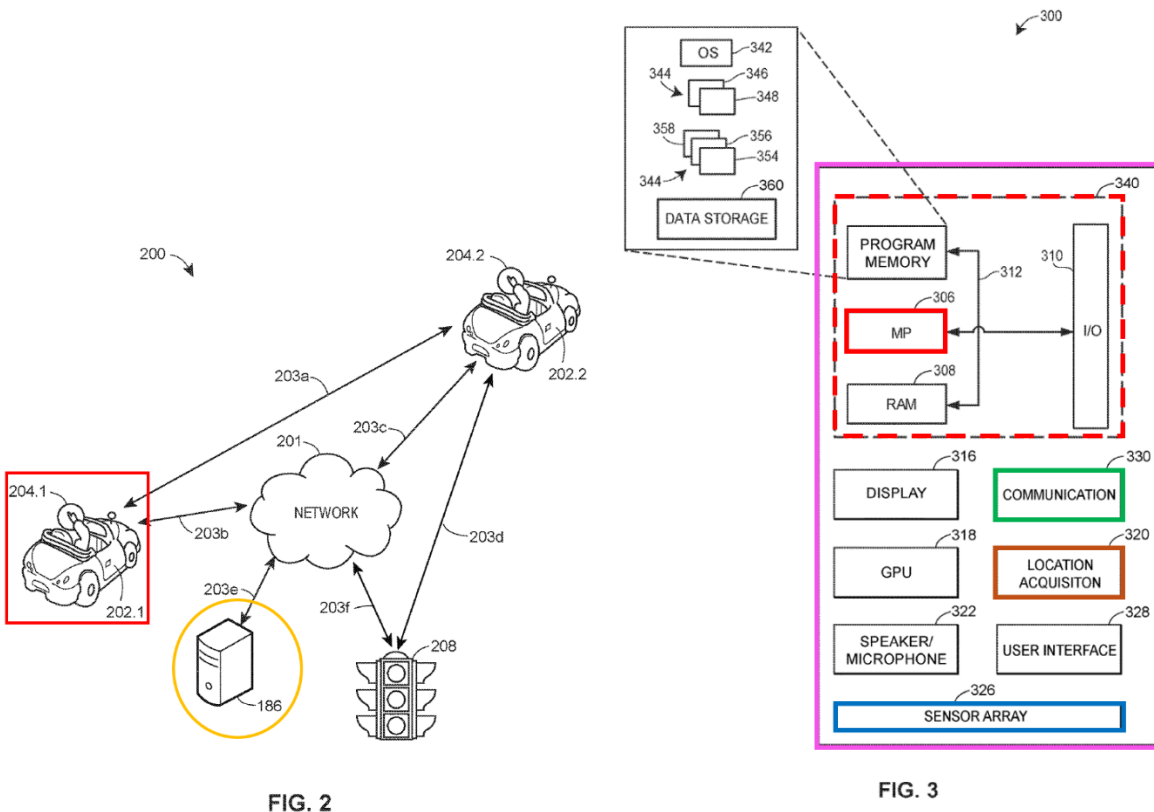
142. I explained above why, in my opinion, Fields anticipates or renders obvious claims 1-4 and 6. *Supra* Section X.B. Should it be determined or argued that Fields alone does not expressly disclose or render obvious “*the first microprocessor operative to receive a first communication sent from the first vehicle to the server* indicating the first vehicle is in a hazardous condition and a location of the first vehicle” (element [1.1]), I believe that limitation would still have been obvious over Fields in view of Pisz.⁶ Ground 2 is an alternative analysis directed solely to element [1.1]. The remaining limitations of claims 1–4 and 6 are, in my opinion, disclosed

⁶ In my opinion, Fields expressly discloses all limitations of claims 1-4 and 6. My analysis of those limitations is incorporated into Ground 2 by reference; it does not affect, and is not affected by, the modification to Fields based on Pisz.

by Fields alone, as I explained in Section X.B, and the Pisz modification does not affect them.

1. Pisz teaches a “microprocessor operative to receive a first communication sent from the first vehicle....” [Element 1.1]

143. As I explained in my discussion of element [1.1], Fields, as shown in Figures 2 and 3 below, discloses an external computing device 206/186 (“a server,” orange) that communicates with a controller 340 and microprocessor 306 (individually or collectively “a first microprocessor,” red) of a computing device 300 (pink) in vehicle 202.1 (“a first vehicle,” red).



Computing device 300 includes sensor array 326 (blue) for receiving telematics

data, including airbag-deployment and rollover signals; location acquisition unit 320 (**brown**) for tracking the vehicle's location; and communication unit 330 (**green**) for transmitting signals to, and receiving signals from, server 206/186. *See supra* Section X.B.1.b.

144. Pisz describes a system in which a vehicle detects a crash condition and automatically provides a crash notification over a wireless network. *See* Ex. 1006, Abstract. Pisz discloses a computing device with components analogous to computing device 300 of Fields, including processing system 101 (**red**) (*id.* at 6:40-58, 7:11-16), which “may have only a single *processor*” (*id.* at 6:8-10); location detection system 111 (**brown**), “configured to detect and communicate the location of the vehicle” (*id.* at 5:25-29); crash detection system 103 (**blue**), which “may detect a crash” (*id.* at 6:40-49); and wireless communication system 105 (**green**), which at the direction of processing system 101, may “transmit notice of the crash to a call center at a remote location” (*id.* at 6:55-58).

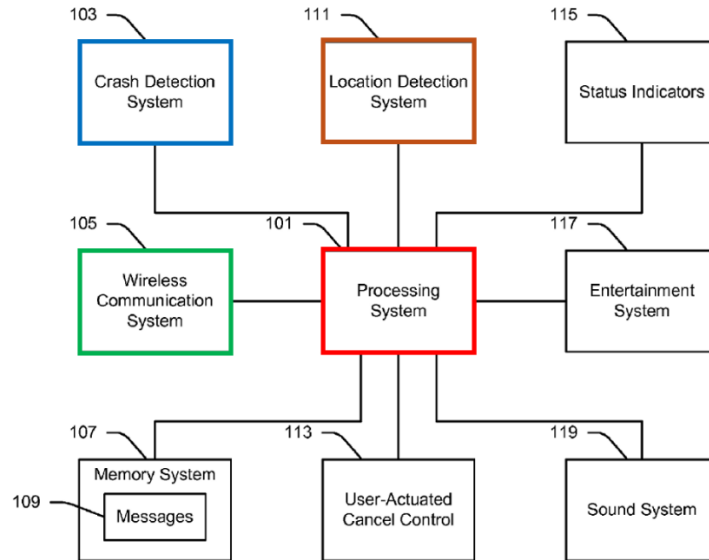


Fig. 1

Pisz specifically explains that “crash detection system 103 may detect a crash,” that processing system 101 may “receive notice of this communication from the crash detection system 103,” and that processing system 101 may then “cause the wireless communication system 105 to transmit notice of the crash to a call center at a remote location.” *Id.* at 6:40-44, 6:55-58. “The transmitted information may include information about the location of the vehicle at the time of the crash,” obtained “from the location detection system 111.” *Id.* at 7:11-16. Put in engineering terms, Pisz routes a crash alert from crash detection system 103, together with GPS information from the location detection system 111, to processor 101, which in turn passes that information to wireless communication system 105 for transmission to a remote location.

145. For the reasons that follow, I believe Pisz would have made it obvious to configure Fields' controller 340 and/or microprocessor 306 to receive hazardous-condition alerts from sensor array 326 and location information from location acquisition unit 320, and then to provide that information to communication unit 330.

2. Whether the Combination Was Obvious

146. To the extent Fields is found not to disclose a "microprocessor" that "receive[s] a first communication sent from the first vehicle," it is my opinion that a POSITA would have been motivated, based on Pisz, to configure Fields' controller 340 and/or microprocessor 306 so that location information generated by location acquisition unit 320 and hazardous-condition information—including airbag-deployment information generated by sensor array 326—are received and processed by controller 340/microprocessor 306, combined into a hazard message, and then provided to communication unit 330 for transmission to the server. In my view, three independent rationales support that conclusion, and a POSITA would have had a reasonable expectation of success.

147. First, Fields locates controller 340/microprocessor 306, location acquisition unit 320, sensor array 326, memory, and communication unit 330 together within computing device 300 and interconnects them for data handling. Ex. 1004 at 13:26-60. When "executed *by controller 340*," its telematics collection

routine 354 collects, stores, encrypts, transmits, and broadcasts telematics data obtained through sensor array 326 and location acquisition unit 320. *Id.* at 18:54-19:5. Its location routine processes GPS data in a similar way, and its anomaly-detection routine evaluates telematics and geographic-location data together. *Id.* at 19:6-43. Fields also assigns controller 340 the decision of whether sampled data should be transmitted by communication unit 330. *Id.* at 14:56-15:21. Given these express teachings, a POSITA would have found it obvious to route the GPS and airbag-deployment notifications through controller 340/microprocessor 306—just as Pisz teaches routing its communications—so that they could be analyzed and correlated with each other before transmission.

148. Second, Pisz addresses how an in-vehicle system should convert crash-sensor and location inputs into a remotely transmitted notification. Its processing system 101 receives notice from crash detection system 103, whose sensors may detect airbag deployment; obtains GPS location from location detection system 111; and causes wireless communication system 105 to transmit a crash notice that may include the crash type, location, severity, time, and information relevant to determining whether an air bag was deployed to a remote call center. Ex. 1006 at 4:3-33, 5:25-29, 6:40-7:27. In my opinion, a POSITA implementing Fields' materially similar sensor-processor-transceiver architecture would have had an

apparent reason to adopt Pisz's express routing solution to convey communications to a remote location.

149. Third, there is a direct correspondence between the two references' components: Fields' sensor array 326, location acquisition unit 320, controller 340/microprocessor 306, and communication unit 330 correspond to Pisz's crash detection system 103, GPS-equipped location detection system 111, processing system 101, and wireless communication system 105. In the combined system, every component would keep performing its ordinary function. The sensor reports airbag deployment; the GPS unit supplies location; the processor forms and controls the message; and the communication unit transmits it. Pisz discloses that this sequence delivers a combined crash-and-location notice to a remote recipient, and a POSITA would understand that the same sequence, applied to Fields, would predictably deliver Fields' combined hazard-and-location message to its server.

150. Finally, a POSITA would have reasonably expected the proposed modifications to succeed. All of the required hardware and software functions are already disclosed in Fields: a programmable controller, stored routines, sensor and GPS inputs, message preparation, and network communication with a remote server. Ex. 1004 at 4:64-5:25, 11:36-62, 13:26-60, 14:32-15:21, 18:54-19:28. Pisz confirms that its processing system may be "a general purpose computer, programmed to perform these functions and operations," and that its functions "may be implemented

by one of the processing systems and memories that are in a vehicle computer network.” Ex. 1006 at 6:6-8, 6:17-22. As a result, the modification calls only for ordinary programming and established interfaces; it requires neither new hardware nor any change to Fields’ operating principle.

D. GROUND 3: WHETHER FIELDS (WITH OR WITHOUT PISZ) IN VIEW OF RICCI RENDERS CLAIM 5 OBVIOUS.

1. Ricci teaches providing vehicle alerts on a “heads-up display”

151. Claim 5 recites: “The system of claim 4 wherein the visual indication is provided on a heads-up display.” In my discussion of claim 4, I explained that Fields expressly discloses providing a “visual indication” of a hazardous condition on a “display.” *Supra* Section X.B.4. What Fields does not expressly state is that the display is a “heads-up” display—that is, a display that projects information directly into a user’s line of vision, such as a windshield with a transparent display. *See* Ex. 1012.

152. Ricci fills that gap. It discloses that alerts, such as an alert about the presence of an emergency vehicle, may be provided to nearby vehicles in a “heads-up display” of those vehicles. Ex. 1005 at 10:58–11:12, 93:23-43, 96:57-58 (claim 6), 97:24-25 (claim 12). Ricci thus describes using a “heads-up” display to alert drivers. For the reasons below, a POSITA would have found it obvious, based on Ricci’s teachings, to modify Fields (with or without the Pisz-based modifications)

so that visual indications of hazardous conditions are provided on a heads-up display.

2. Whether the Combination Was Obvious

153. In my opinion, a POSITA would have been motivated to modify Fields to display hazard alerts on a heads-up display, as taught by Ricci, for at least three reasons.

154. First, both Fields and Ricci are directed to communicating safety-critical information to vehicle drivers. Fields describes a system for alerting drivers to “abnormal traffic conditions,” including accidents and hazardous events. Ex. 1004, Abstract. Ricci likewise describes systems that “notify other drivers of dangerous situations” and provide “danger warnings between cars.” Ex. 1005 at 79:66-80:2, 80:17-22, 82:65-83:14. In my opinion, a POSITA seeking to improve the driver’s awareness of alerts in Fields’ alert system would naturally have looked to Ricci’s teachings on how to present safety alerts effectively to drivers.

155. Fields’ in-vehicle systems incorporate displays, and Fields discloses that alerts may be presented through a variety of display mechanisms, including displays associated with a mobile computing device or the vehicle’s on-board systems. Ex. 1004 at 13:26-30, Fig. 3; *id.* at 9:16–21, 50:40-45 (“the mobile computing device 110 or on-board computer 114 may cause the determined alert or recommendation to be presented to the driver of the vehicle 202. This may include

causing a visual warning to be presented on a screen associated with the mobile computing device 110 or on-board computer 114”). Notably, Fields does not restrict the system to any one type of display: “Display 316 may be implemented as *any suitable type of display* For example, display 316 may be implemented as a capacitive touch screen display, a resistive touch screen display, *etc.*” *Id.* at 14:23–27. This open-ended language would, in my view, have prompted a POSITA to consider every known display type—heads-up displays included—for presenting Fields’ hazard alerts. Given the limited number of display types available for vehicles at the time, and given that heads-up displays were known to be well suited for delivering important alerts to drivers focused on the road, a heads-up display would have been an obvious design choice.

156. Second, Ricci expressly identifies a heads-up display as an appropriate way to convey safety-critical alerts. It discloses a “vehicle alert system” with an “alert module adapted to detect a presence of an emergency vehicle” that displays the alert “in a heads-up display of the vehicle.” Ex. 1005 at 10:58–11:12; *see also id.* at 96:57-58 (claim 6). A POSITA would have grasped why Ricci uses a heads-up display for these alerts. During normal, safe operation, the driver is watching the road and is therefore expected to be looking toward the heads-up display. For that reason, I believe a POSITA would have recognized heads-up displays as especially

well-suited to conveying urgent, safety-critical information such as the hazard alerts Fields discloses.

157. Third, on-board vehicle computer systems by 2019 commonly had multiple displays. *See, e.g.*, Ex. 1018; Ex. 1005 at 8:51-53, 10:58–11:12. These typically included a central console display for noncritical functions (e.g., radio or navigation); a display behind the steering wheel for vehicle-status information (e.g., mileage, speed); and a heads-up display for important safety information, such as vehicle speed and potential-impact alerts (e.g., based on sensor data). A POSITA would have understood that many critical alerts, including hazard alerts of the kind Fields discloses, are best conveyed on the heads-up display, since that is where the driver is expected to be looking during normal operation. A POSITA would also, in my opinion, have readily understood that displaying Fields' hazard alerts on a heads-up display, as taught by Ricci, would improve safety: the alerts would appear directly in the driver's line of sight, and the driver would not need to divert attention to an infotainment display or mobile device.

158. I also believe a POSITA would reasonably have expected success in implementing a heads-up display for Fields' hazard notifications based on Ricci. By 2019, heads-up displays were well-known in the vehicle art and in commercial use, as evidenced by Ricci's express teaching of their use for safety alerts (Ex. 1005 at 10:58–11:12). For example, BMW offered a head-up display on its 5 Series by 2003.

See Ex. 1018 (showing the heads-up display under “BMW 5 Series/Head-up Display (04/2003)”). Using one for hazard alerts would have required no more than applying a known technique (displaying alerts on a heads-up display, as taught by Ricci) to a known device (the vehicle alert system of Fields) to yield predictable results (hazard alerts displayed in the driver’s line of sight). A POSITA would have understood, for example, that display 316 of Fields’ computing device 300 could be implemented as a heads-up display, as taught by Ricci, so that hazard alerts reach the driver more directly, conveniently, and safely.

159. To summarize, the combination of Fields and Ricci renders claim 5 obvious in my opinion. Fields, as I explained above, discloses every limitation of claims 1, 2, and 4 (from which claim 5 depends), including the provision of a visual indication of a hazardous condition on a display. *Supra* Sections X.B.1, X.B.2, X.B.4. Ricci, for its part, describes presenting safety-critical alerts on a heads-up display. Ex. 1005 at 10:58–11:12, 96:57-58 (claim 6). A POSITA would have been motivated to combine the two references to display Fields’ hazard alerts on a heads-up display, as taught by Ricci, and would have reasonably expected success in doing so. Claim 5 would therefore have been obvious, in my opinion.

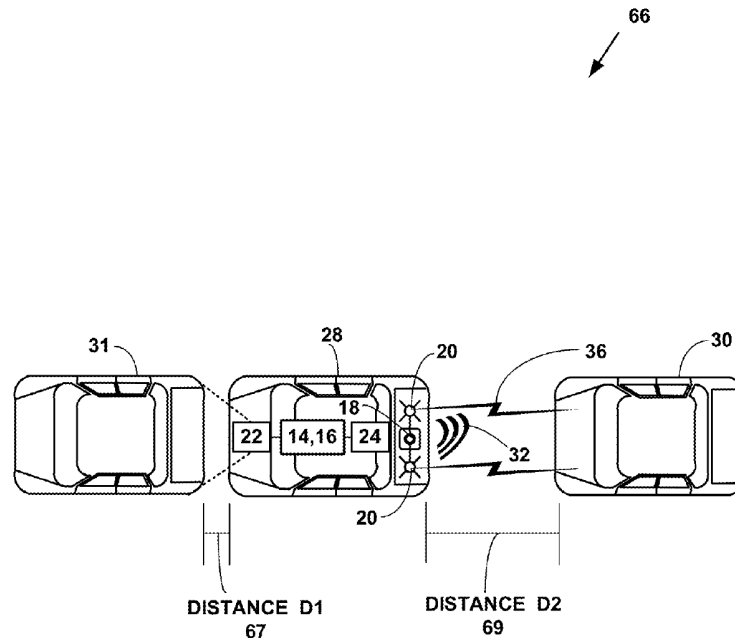
E. GROUND 4: WHETHER FIELDS (WITH OR WITHOUT PISZ) IN VIEW OF SEIFERT RENDERS CLAIMS 7 AND 8 OBVIOUS

1. Seifert teaches the lighting features of claims 7 and 8.

160. Claim 7 recites: “wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided.”

Claim 8 recites: “wherein the high conspicuity external visual indicator is activated to strobe the lights at the rear of the second vehicle.”

161. In my discussion of claim 4, I explained that Fields expressly discloses providing a “visual indication” of a hazardous condition on a “display.” *Supra* Section X.B.4. What Fields does not expressly state is that it has an external visual indicator that is activated when the alert is provided, or that the external visual indicator is activated to “strobe” lights at the rear of the second vehicle. However, those features would have been obvious based on Fields (with or without Pisz) further in view of Seifert, which teaches automatically activating a rear-mounted strobe light 18 (FIG. 10 below), visible to the vehicle directly behind, when the vehicle slows, comes within a certain distance of a vehicle ahead, or stops due to an emergency event such as an accident, in order to prevent rear-end collisions. Ex. 1016 ¶¶ [0108], [0112], [0156], claim 1.

FIG. 10

162. In my opinion, all other limitations of claims 7 and 8 are disclosed by Fields alone (Ground 1) and, alternatively, rendered obvious by Fields in view of Pisz (Ground 2), as I explained in Sections X.B and X.C, and are not affected by the Seifert modification.

2. Whether the Combination Was Obvious

163. A POSITA would have been motivated, for several reasons, to add Seifert's rear strobe to Fields' second vehicle 202.2 and automatically activate it when computing device 300 provides the hazard alert. As explained below, this would have provided several obvious safety benefits.

164. Seifert addresses a danger created by Fields' own alert. Fields alerts the second vehicle's driver so *that driver* can avoid a condition ahead. Ex. 1004, 1:44–50, 6:14–33, 20:63–21:6. Seifert explains that a driver who becomes aware of an

upcoming hazardous conditions will slow or stop, that rear-end crashes make up approximately one third of highway accidents, and that distracted drivers react more slowly to a vehicle slowing or stopping ahead of them. Ex. 1016 ¶¶ [0004], [0114]–[0119]. A POSITA would thus have been motivated to increase the safety of Fields’ “second vehicle” and the vehicles following it by using the hazard alerts provided by Fields’ server to automatically activate a rear strobe as taught by Seifert, to help prevent a rear-end collision between them. This would have been understood to especially improve safety for following vehicles that are not part of Fields’ server-alert network by visually alerting them. Those vehicles would have no way of knowing that the “second vehicle” received a hazardous condition alert, and thus would clearly benefit from having the second vehicle turn on strobe lights to make those vehicles’ drivers aware of the impending hazardous condition.

165. Seifert activates its strobe in response to the same event Fields’ alert represents: a hazard ahead. Seifert’s front end monitor 22 turns on the strobe when the vehicle “comes within a certain distance of any vehicle in front of it,” and Seifert also activates it upon an “emergency event (e.g., accident...).” Ex. 1016 ¶¶ [0106], [0108], [0156]–[0157]. Fields’ server alert likewise provides early, distance-based notice of the hazard ahead. Ex. 1004, 21:46–54. Using that alert as an input to trigger a rear-strobe (e.g., via Seifert’s signal detection circuit 14 implemented in Fields), which may receive wired signals from the vehicle’s control system or wireless

network signals (Ex. 1016, ¶¶ [0041], [0043], [0067], claim 3), would have been a predictable use of a known technique to improve a similar system (Fields' system) in the same way. It was already known to activate a rear strobe automatically "[i]n the event that a car[']s airbag deploys ... to warn other drivers" and to automatically flash a vehicle's exterior lights (including rear lights) in response to a hazard warning signal relayed from vehicle to vehicle. Ex. 1016 ¶ [0016]; Ex. 1017 ¶¶ [0039]–[0040]. Moreover, a POSITA would have understood that relying on Fields' server-based hazard alerts would have allowed the second vehicle to turn the strobe lights on sooner based on hazards that cannot be detected by Seifert's proximity sensor (e.g., a vehicle accident around a corner).

166. Seifert teaches that drivers "acclimatize" to center high-mounted stop lamps ("CHMSLs"), whereas a strobe "helps re-focus a driver[']s attention" and "remain[s] visible in low visibility and bad weather." Ex. 1016 ¶¶ [0009], [0113], [0120], [0138]. Moreover, ordinary brake lamps do not necessarily indicate a hazardous condition ahead but instead indicate that a vehicle ahead is slowing down or stopping. A strobe is thus well suited to warning following drivers of a hazard they may not, and possibly cannot, yet see. A POSITA would have understood that this can help prevent rear-end collisions.

167. A POSITA would have had a reasonable expectation of success in implementing Seifert's rear-strobe lights into Fields' vehicles and automatically

activating them based on the hazardous condition alerts received by those vehicles. Fields' controller 340 already interacts with the vehicle's on-board computer 114 and generates alerts upon receipt of the hazard notification from the server, and Seifert's apparatus interfaces with "a control system in a vehicle" and can be "easily retrofitted." Ex. 1004, 13:45–60, 20:63–21:6; Ex. 1016 ¶¶ [0041], [0178]. Each component performs its known function, yielding predictable results: Fields' alert is received and presented as before, and Seifert's strobe flashes rearward as Seifert describes.

a. Claim 7: "The system of claim 1, wherein the second vehicle is equipped with a high conspicuity external visual indicator that is activated when the alert is provided."

168. Like claims 4 and 6, claim 7 recites "*the* alert," for which claim 1 provides no antecedent basis. Claim 7 was then-pending claim 33, which originally depended from cancelled claim 29. Ex. 1003 at 36, 381-382, 665. For the same reasons I explained with respect to claims 4 and 6, I believe a POSITA would understand claim 7 as intended to depend from claim 2 (then-pending claim 27 (*id.* at 381)) and would interpret it accordingly. *Supra* Sections X.B.4, X.B.5. In my opinion, the prior art satisfies claim 7 whether the dependency is read as written or as corrected to depend from claim 2.

169. Fields discloses "the second vehicle" and "the alert" provided to the second vehicle. *Supra* Sections X.B.1.c-d, X.B.2, X.B.4–5. Seifert's very bright,

directional strobe 18, installed in a rear portion of the vehicle and visible to the vehicle directly behind (Ex. 1016 ¶ [0112], claim 1), is a “high conspicuity external visual indicator” consistent with the ’938 Patent’s description of that term. *Id.* ¶¶ [0113], [0128], [0173]; Ex. 1001 at 5:10–17. It is distinguishable from ordinary brake and tail lights, which are generally not permitted to flash. Ex. 1016 ¶ [0132].

170. In Figure 10, vehicle 28’s front end monitor 22 detects that it has come within distance D1 of the vehicle ahead, and vehicle 28 activates its rear warning lights 18, 20 (strobe flash 32), visible to following vehicle 30. Ex. 1016 ¶¶ [0156]–[0159], [0177], FIG. 10. Vehicle 28 is thus the claimed “second vehicle” (Fields’ vehicle 202.2) and the vehicle ahead corresponds to the “first vehicle” (Fields’ vehicle 202.1). It is irrelevant that Seifert calls following vehicle 30 the “second vehicle” (Ex. 1016 ¶¶ [0111], [0177]), because Seifert simply numbers vehicles from the perspective of the equipped vehicle, which it calls “first vehicle 28.” *Id.* ¶ [0111].

171. In the combination, microprocessor 306/controller 340 of second vehicle 202.2, upon receipt of the third communication, both alerts the occupant and triggers Seifert’s strobe, which is therefore “activated when the alert is provided.” Ex. 1004, 20:63–21:6; Ex. 1016 ¶¶ [0041], [0106]; *supra* Section X.E.2. Accordingly, Fields (with or without Pisz) in view of Seifert renders claim 7 obvious.

b. Claim 8: “The system of claim 7, wherein the high conspicuity external visual indicator is activated to strobe the lights at the rear of the second vehicle.”

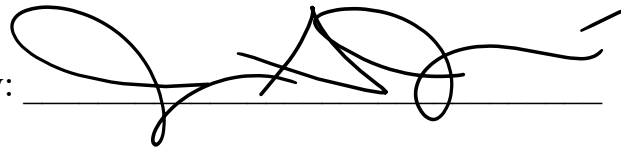
172. Seifert’s strobe is “installed in a rear portion of the vehicle,” directed to the vehicle “directly behind,” and may be integrated into the CHMSL or the “third break [sic] light, left or right break [sic] lights.” Ex. 1016 ¶¶ [0112], [0139], claim 1. In Figure 10, vehicle 28’s rear lights strobe toward following vehicle 30. *Id.* ¶ [0177], FIG. 10. The combination thus strobos “the lights at the rear of the second vehicle” (Fields’ vehicle 202.2) and would have been obvious for the reasons above. *Supra* Section X.E.2. Accordingly, Fields (with or without Pisz) in view of Seifert renders claim 8 obvious.

XI. CONCLUSION

173. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code. I further declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated: October 19, 2026

By: _____

A handwritten signature in black ink, appearing to read 'Jason Janét', is written over a horizontal line.

Jason Janét, Ph.D.

APPENDIX A

Jason A. Janét, Ph.D.

103 Bridgeway Ct

Cary, NC 27511

Mobile: (919) 225-1724

E-mail: jasonajenet@gmail.com

Education

- Ph.D. Electrical & Computer Engineering, North Carolina State University, 1998
- M.S. Integrated Manufacturing Systems Engineering, North Carolina State University, 1994
- B.S. Mechanical Engineering, University of Virginia, 1990

Employment History

Applied Research Associates (ARA): 2018 - present

- **Corporate Director of IP and Product Commercialization (IP to Product—IP2P) | CTO-SSM:** Corporate/Business development, Intellectual Property Portfolio Build-out/Protection, and IP Transition to Product. Evaluate, quantify, present and recommend portfolios of IP, product lines and ventures on the basis of competitive landscapes, addressable markets, sales strategy, resource availability and technology readiness. Design, propose and mentor organizational structure(s), including cross-department and cross-sector relationships. Relevant technologies include medical technologies, augmented reality, non-GPS, synthetic environments, computer vision, machine intelligence, IoT sensors, robotics, automation, security, photogrammetry, weapons systems, unmanned systems, SaaS, BioTech, and precision agriculture for multiple market domains. Clearance Level: TOP SECRET & SCI.

DeltaFive: 2014 - 2018

- **CEO & Co-Founder:** Lead corporate, business, IP and technical development for spinout focused on IoT sensors, computer vision, machine intelligence, mobile robots, SaaS, and Lure Formulation for hospitality, pest, IT, and security markets. Strategic and tactical direction for sales, marketing and client services teams.
- **Inventor:** Three awarded patents (USPTO) and patents pending.
- **Board of Directors:** Serve on and report to Board of Directors, and chair the Technical Advisory Board.
- See www.deltafive.com, <https://jgc.outgrow.us/deltafive> or www.youtube.com/watch?v=LoQe6_Lxprs.

Transdigm [TDG] (Avionic Instruments | Acme Aerospace | Aerospace Cooling Solutions): 2002 – 2004, 2013 - 2014

- **VP/Director of Development (2002-2004), VP/Director of Sales, Program Management (2013-2014).** See www.transdigm.com, www.avionicinstruments.com, www.acme-aero.com, or www.aerospacecoolingsolutions.com.
 - Manage multiple product lines and cross-functional teams including product line managers (PLMs), account managers, inside sales, international sales, marketing, repair, engineers, technicians, distributors, legal, IP and rep organizations. (270 employees)
 - P&L, strategy, reporting, and forecasting for ~\$105M/yr, 50% EBITDA, and 10% YOY growth.
 - Product lines comprised ~600 SKUs for advanced aerospace systems.
 - Epicor ERP for standard resource planning, including inventory optimization and workflow.
 - Change-Agent: Sikorsky S97/JMR programs and supply chain for Aerospace Cooling Solutions.
 - Incubation, launch, growth and exits for **ShelfWorks**, **VortexHC** and **RxMedic** (below).
- **Programs:**
 - **S97 Raider Light Tactical Helicopter** – Autonomy, power distribution and electrical system (PDES) for the Sikorsky S97 LTH, including FAA-compliant software development per DO-178B. (2013 – 2014) See <http://www.youtube.com/watch?v=qy-Xb3X-bC0>.
 - **Joint Multi-Role (JMR) Helicopter** – Leveraging S97, JMR employs a scaled-up level of autonomy/PDES for Sikorsky-Boeing team, under U.S. Army funding. (2014)
 - **Blue Fans** – Aerospace Cooling Solutions supply chain optimization. (2013 – 2014)
 - **DARPA Distributed Micro-Robotics** – PI/PM for “Mobile Robots that Climb Vertical and Inverted Surfaces.” sponsored by DARPA – MTO. Develop mobile robots that climb walls and ceilings for surveillance, reconnaissance and breaching. Collaborated with Lockheed-Martin for automatic target recognition and Picatinny Arsenal for *Lamprey* SLAM holder. (2002 – 2004)

Teledyne Technologies [TDY]: 2011 - 2013

- **Senior Manager**

- Lead cross-functional teams of scientists and engineers in CONUS
- M&A due-diligence, identification and recommendation (SeaBotix & BlueView)
- Lead contingents of cross-division teams to secure ~\$352M in funding over 24 months.
- Plan and execute CRAD, business development and coordinate with strategic business units
- **ONR/USMC Cargo UGV** – PM for ONR/USMC-sponsored Cargo Unmanned Ground Vehicle (CUGV) Program subcontract (2011-2012). Manage team of engineers and scientists, in coordination with contract prime (Oshkosh) for unmanned combat vehicle control, perception and navigation. Multi-sensor suite included EO/IR Vision, LIDAR, IMU, and GPS.
- **Army LTL** – PM for Army-sponsored Lighten-the-Load (LTL) Program subcontract (2012-2013). Manage team to develop perception system comprised of stereo EO and stereo LWIR cameras to find and track leader(s), perform optical odometry, detect and map obstacles, and enhance SIGINT. Interface with sensors (LIDAR, IMU, GPS), autonomy for ATV-sized unmanned ground vehicles.
- **NASA ESP** – PM for RTP-based tasks for NASA Engineering Services and Prototyping demonstration (2012-2013). Provide Teledyne Engineering Services (lead), SAIC, Oceaneering, and Schafer with robot prototype and vision-based perception to detect, classify and track targets.
- **DARPA EXACTO** – PM for NC-based tasks for DARPA TTO Extreme Accuracy Tasked Ordnance (EXACTO) Program (2012-2013). Program developed first ever guided, small-caliber bullet with MEMS-based actuation, optical bullet tracking, optical target tracking, and bullet guidance to greatly improve accuracy and extend the day and nighttime range over current state-of-the-art sniper systems.
- **DARPA AngelFish/EagleRay** – PI/PM and inventor of the AngelFish Cross-Domain Submersible UAV, a man-portable, floodable airframe with tilt-thrusters capable of operating in and deliberately transitioning between the air, surface and underwater. Designed for optimal balance between hydro-/fluid-dynamics, materials, guidance/navigation/control, power conversion/storage, and perception for wing-in-ground flight.
- **Army PIRST** – Propose and capture the Pursuant In-stride Reconnaissance, Surveillance & Targeting (PIRST) program. By Army Night Vision & Electronics Sensors Directorate (NVESD) in 2013.

RxMedic Systems: 2003 – 2011 (*spinout from Avionic Instruments*)

- **Co-Founder/General Manager/Board Member** (2004-2007), **CTO** (2007-2010), and **Director of Robotic/Automated Systems** post-acquisition by JM Smith (2010-2011).
 - Manage launch from **Avionic Instruments** (2004)
 - Build and lead nationwide growth of cross-functional teams to 75+ employees
 - Direct product development, manufacturing, field support, sales and marketing
 - Manage IP Portfolio & Legal: Patents include USPTO# 7,726,514 and 8,091,733
 - Oversee P&L, accounting, raising of capital, and accounts receivable
- **RxMedic ADS:** Invent, develop, market and support automated pharmacy dispensation and packaging systems for retail, hospital, mail order and industrial fulfillment organizations.
- **RxMedic ACS:** Integrate, refine, market and support automated pharmacy-counting systems for retail and hospital fulfillment organizations.
- Co-negotiated the acquisition of RxMedic Systems by JM Smith, Inc. in May of 2010, established RxMedic as a division, and coordinated 12-month transition. Supported evaluation and integration of automated systems for JM Smith business units including Smith Drug.

Vortex HC: 2002 - 2009 (*spinout from Avionic Instruments*)

- **Vice President** (2004-2006), and **Facilities Security Officer (FSO)** (2005-2006)
 - Manage spin-out from **Avionic Instruments** (2004)
 - Lead cross-functional teams for product development, manufacturing, support, sales and marketing
 - Manage business and corporate strategy, execution, licensing, and ITAR/EAR-compliance
 - Support domestic and international legal and IP portfolio management, P&L, AP/AR
- **DARPA ARTEMIS** – PI and PM for “Vortex-Based AUVs for Counter-Mine and Counter-Obstacle Operations” sponsored by DARPA – ATO. Managed development of holonomic AUVs for landing on mines and performing soft-kill neutralization. Integrated CFD, rugged materials, MEMS-sensors for guidance, navigation and control. Collaborated with UT-ARL for development of circular synthetic aperture sonar and Teledyne RD Instruments for DVL. Developed high-precision acoustic underwater tracking system.
- **Products:** Managed development, manufacturing, world-wide marketing, and support of the following to military, law-enforcement, security, rescue, nuclear and entertainment customers:
 - VMRP Wall-Climbing Robot – Man-portable mobile robots that climb walls and ceilings.
 - Submersible Attractor – Rad-hardened attractor for nuclear energy market, BWR inspection
 - Submersible VMRP Robot – Man-portable underwater robots for bulkheads and tank interiors.

- Lamprey SLAM Holder – Surface-agnostic instant placement mechanism for Picatinny Arsenal’s Selectable Land- and Anti-personnel Mine (SLAM) breaching charge.
- **Licensing:** As part of exit strategy, instituted licensing and transition of VRAM technologies:
 - SeaBotix LBC – Little Benthic Crawler Remotely Operated Vehicle (ROV).
 - SeaRobotics HullBUG – Autonomous hull-grooming robot.
 - BDT – Attractors for high-speed, high-efficiency, low-overhead paper & fabric handling.
 - TMI – Attractors for inspection of nuclear boiler water reactor (BWR) facilities
- **ONR & NAVSEA HullBUG VRAM** – PI/Consultant for “Attractor Design for the Hull Biomimetic Underwater Grooming (HullBUG) Technology” and “HullBUG VRAM Design Optimization”. (2006–2009).

ShelfWorks Technologies: 2002 – 2006 (*spinout from Avionic Instruments*)

- **Charter Officer** (2004-2006).
 - Supported launch from **Avionic Instruments** (2002-2004)
 - Direct military product development, support commercial product development, sales & marketing
 - Bed, Bath & Beyond
 - Home Depot
 - Support IP Portfolio & Legal

Nekton Research (iRobot [IRBT]): 1998 - 2002

- **Vice President of R&D** (1998-2000) and **Director of Business Development** (2000-2002).
 - **Lead:** Cross-functional teams in marine-focused product/business development, production, deployment.
 - **IP Portfolio:** Co-inventor on USPTO# 6,378,801 (2002)
 - **Spinout:** Support incubation/launch of Parata Systems, a pharmacy automation company (1999-2002)
 - **M&A:** Provided early-stage due-diligence and introductions for acquisition by iRobot (2006)
- **Principal Investigator and Program Manager:**
 - **DARPA LSALS-SP3** – PI/PM for “3D Plume Tracing using Ranger™ MicroAUVs,” sponsored by DARPA – MTO. Joint effort with Sandia National Labs, and Woods Hole Oceanographic Institute. Developed multiple collaborative MicroAUVs that search for and localize plume sources and aircraft blackbox, to rescue and/or recover humans and assets.
 - **DARPA Distributed Micro-Robotics** – PI/PM for “Swimming Arrays for Anti-Submarine Warfare”, sponsored by DARPA – ATO. Joint effort with Draper Labs, Johns Hopkins University Applied Physics Lab, and Solers. Mobile acoustic array formations of multiple MicroAUVs. In contrast to towed arrays (e.g., TB-29), *Swimming Arrays* decouple tactical maneuvers from sensing maneuvers; enable protracted sensing, strong source direction discrimination, forward end-fire view, and dynamic array beamforming.
 - **DARPA Distributed Micro-AUVs** – PI/PM for “Aquatic Microbots”, sponsored by DARPA – MTO. Under *Distributed Robotics* program, design, build and demonstrate ultra-small AUVs, called “MicroHunters™”, which maneuver in 3D using only one moving part. Resulting navigation, called “Helical Klinotaxis” was validated on three different platforms and demonstrated to DARPA. Co-inventor on patent “3D Orientation for Aquatic Robots Using Helical Klinotaxis”, USPTO in April 2002.
 - **Forensics ROV** – PM and inventor of porthole-size ROV to perform forensic analyses of sunken assets. Based on a diametrically-opposed, large-diameter, low-velocity, vector thrusters, provide underwater telepresence to search for remains, assets and root-cause indicators. Unique design minimized silt disturbance, and maximized options for ingress and egress. (Private customer)
 - **Deepwater Towfish** – 6500m depth-rated towfish to carry sensor suite for applications in energy sector, telecommunications sector, sub-bottom profiling, and terrain mapping. (Private customer – EdgeTech)
 - **DARPA APLA/MGM** – PI/PM for “MicroHunter Guidance and Control of 60mm Mortars”, sponsored by DARPA – ATO. Under *Anti-Personnel Landmine Alternative/Minimally Guided Munitions* (APLA/MGM) program, collaborate with Battelle Memorial Institute to demonstrate feasibility, integrate microelectronic GNC sensors and actuators, and validate performance of single-actuator control force producer and guidance algorithm for indirect-fire munitions. Performance exceeded specifications.

Parata Systems: 1999 – 2002 (*spinout from Nekton Research serving as VP of Eng and Dir of BD*)

- Supported incubation and launch from **Nekton Research** (1999-2002)
 - Robotic System for Retail & Mass-Fulfillment Pharmacy
 - Technical & Business Development of Alpha- and Beta-level Products
 - Supported initial IP Portfolio

Duke University, Pratt School of Engineering: 1999 - 2021

- **Adjunct Associate Professor** (2005-2021) and **Adjunct Assistant Professor** (1999-2005).
 - Courses Taught Include:
 - Entrepreneurship & Tech Transition (Special Topics)
 - Robotics & Automation (MAE 442, ECE 383, ECE 142/442)
 - Control Theory (ECE 141/441)
- **MS Committee Member:** Serve on graduate student committees and advise research.
- **Advisor** and sponsor for Duke's Wall-Climbing Robot Team, which earned 1st place in the 2004 and 2005 International Climbing and Walking Robot (CLAWAR) Competitions in Madrid, Spain and London, England. Sponsored by the LORD Corporation and VortexHC.
- **Advisor** for Duke's DARPA Grand Challenge Team, in support of the Carnegie Mellon Red Team(s), which earned 2nd and 3rd places. Perception included RADAR, LIDAR, IMUs and GPS.
- **Advisor** and sponsor for Duke's Autonomous Underwater Vehicle (AUV) team, which earned finalist standings five times in the AUVSI/ONR International Autonomous Underwater Vehicle Competition. Participated in multiple annual competitions since 2001, with the following rankings: 2nd in 2006, 4th in 2005, 5th in 2004, 3rd in 2003, 4th in 2002, and 7th in 2001. Sponsored by LORD, VortexHC, and SeaBotix.

North Carolina State University, School of Engineering: 1992 - 2021

- **Adjunct Assoc Professor** (2009-2020), **Board Integrated Manufacturing Systems Engineering Institute** (1998 – 2020), **Adjunct Asst Professor** (2000-2009), **Instructor** (1996-1999), **Researcher** (1992-1996).
 - Teaching Experience:
 - Robotics & Automation (ECE 444, ECE 591)
 - Control Theory (ECE 435)
 - Distributed (Non-Deterministic, Network- & Statistics-based) Controls (ECE 492Z)
 - **MS Committee Member:** Serve on graduate student committees, sponsor, and advise research.
 - **Advisor & Corporate Sponsor** for NCSU's Autonomous Underwater Vehicle (AUV) team, which began participating in the AUVSI/ONR International AUV Competition. Participated in 2005 and 2006.
- **NASA-HELIOS** – PM for development and demonstration of semi-autonomous robotic system for lunar habitation and transport. Under NASA's Exploration Office, and funding from United Technologies, Caterpillar, and North Carolina Space Grant Consortium. Managed team of 40+ people to build and competitively demonstrate lunar exploration and habitation mission including deployment of lunar lander, UGV, and personnel habitat modules. Mission was demonstrated in full and earned first place and NASA's *1998 Extra Terrestrial Award*. January 1996 to April 1998.
- **DARPA/ONR Outdoor Landmark Recognition** – Researcher for "Outdoor Landmark Recognition Using Hybrid Fractal Vision System and Neural Networks", by DARPA and ONR. Validate new approach to detecting and recognizing outdoor landmarks using the Region-Feature Neural Network. (1993–1996)
- **Other Systems:** Bipedal robot (*Jenner*), a hexapod colony, an autonomous mobile robot (*Lazarus*), home automation & security based on decentralized control networks.

TMI Robotics: 1998 - 2013

- **President**
 - **Robotic & Automation Systems:** Submersible Robotic Hull Crawlers & Attractors for *General Electric*, *Hitachi*, *Framatome/Areva*, *SeaRobotics*, *SeaBotix*, etc. (2009-2018); wall-climbing robots for *SignalScape* (2009-2013); Pioneer mobile robot end-effector and bipedal robot for *Adept MobileRobots* (1998-2004); decentralized fuel pump control systems for *Gilbarco* (1998); Autonomous Following Golf Caddy for *Caddy Master* (1998-1999); Universal rotary actuator system for *Real World Interface (RWI)* and *iRobot (IS Robotics)* (1998-2000), etc.
 - **Artificial Intelligence Software and Textbook:** "Computational Intelligence: Supervised and Unsupervised Learning with Neural Networks", J.A. Janét and J.C. Sutton III. Copyright © 1998-2013. ISBN #0-9678493-0-6. Textbook included a time-limited single-user license for neural network software by TMI Robotics, Inc. Software included data, the Region-Feature Neural Network and the Hyper-Ellipsoid Clustering Neural Network for pattern analysis and machine intelligence. End-users/clients include *NCSU*, *National Technological University (NTU)* and *Video Based Engineering Education (VBEE)*, IBM, etc.

Other Professional Highlights:

- **Intellectual Property Litigation Expert Witness:** Provided reports, descriptive imagery and testimony for litigation regarding intellectual property, contracts and trade secrets. Cases are listed below, clients in **bold**:
 - Automated Layout Technology v **Precision Steel Systems** (2026-pres) [No. 4:20-cv-03127, Dist NE]
 - **Wybotics** v Zodiac (2026-pres) [USPTO PTAB IPRs IPR2026-00158/-00159/-00160]
 - **Honeywell** v EPS (2026-pres) [No. 2:25-cv-00918-JRG E.D. TX]
 - **Honeywell** v EPS (2026-pres) [No. 3:25-cv-00494-SCR W.D. NC]
 - Perrone Robotics v **Toyota** (2026-pres) [No. 2:25-CV-01150, E.D. TX]
 - Perrone Robotics v **Kia** and **Hyundai** (2026-pres) [No. 2:25-CV-01150, E.D. TX] (invalidity)
 - Perrone Robotics v **Volkswagen** and **Porsche** (2026-pres) [No. 3:25-cv-984-RCY, Eastern Dist of VA]
 - **Archer Aviation** v Joby (2026-pres) [U.S. International Trade Commission]
 - **Menard** v JR Automation (2026-pres) Am. Arbitration Assoc., [Case No. 01-27-0008-1682-1-NM]
 - **NJOY** v Juul (2026-pres) [CIVIL ACTION NO. 1:23-cv-00917-MN] Dist of DE
 - **Beatbot** v Zodiac (2025-2026) [USPTO PTAB IPR US Patent 11,003,191, 11,262,766, and 11,880,207]
 - **Tesla** v Bulletproof (2025-pres) [USPTO PTAB IPR US Patents 11,932,230; 12,221,104; 12,227,184; 12,233,871; 12,240,456; 12,240,457; and 12,240,458]
 - Perceptive Automata v. **Tesla** (2025-pres) [NO. 2:25-cv-00742, Eastern District of TX]
 - **Tesla** v Perceptive Automata (2025-pres) [USPTO PTAB IPR US Patents 10,614,344; 11,126,889; 11,467,579; 11,520,346; and 11,753,046]
 - **Hargrave** v. Locus Robotics (2025-pres) [NO. 3:23:CV-01521, Middle District of PA]
 - Spacemaker v. **Frazier** (2025-pres) [Civ. Action No. 3:24-CV-9279, Superior Court of NJ]
 - USA v. **Levchuk** (2025-pres) [8:23-cr-00184, MD District Court]
 - **FORTNA** v. Plus One Robotics (2025) [CIVIL ACTION NO. 5:24-CV-1274 OLG, W. Dist of TX]
 - Apple v. **Haptic** (2024-2025) [USPTO PTAB IPR2024-01475]
 - Apple v. **Haptic** (2024-2025) [USPTO PTAB IPR2024-01476]
 - **Tyson** v Primus (2025) [Civil Action #22-A-04543-10, Superior Ct of Gwinnett County, GA]
 - **Airspace Systems** v. Dedrone (2024-pres) [1-24-cv-01625-7413 [Eastern Dist of VA Alexandria Div]
 - **Tesla** v Autonomous Devices (2023-2025) [USPTO PTAB EX PARTE REEXAM] 11,055,583
 - **Tesla** v Autonomous Devices (2023-2025) [USPTO PTAB EX PARTE REEXAM] 10,452,974
 - **Tesla** v Autonomous Devices (2023-2025) [USPTO PTAB EX PARTE REEXAM] 10,607,134
 - NxtGen v. **ZipString** (2024-pres) [Case IPR2024-01213]
 - **Boston Dynamics** v Ghost Robotics (2024-2025) [1:22-cv-01484, District Court of DE]
 - **ATLeisure** v Treasure Garden (2024-pres) [1:24-cv-02270, Northern District of Georgia]
 - **Stryker** v Ferno-Washington (2024-pres) C.A. No. 1:22-cv-00588-MRB
 - **Squaregles** v Laltitude (2024-pres) Case No. 2:23-cv-09751 (C.D. Cal.)
 - **Demand Vape** v. RAI (2024) [337-TA-1410, U.S. International Trade Commission]
 - Hesai v. **Ouster** (2024) [USPTO PTAB IPR2023-01421]
 - Hesai v. **Ouster** (2024) [USPTO PTAB IPR2023-01456]
 - Hesai v. **Ouster** (2024) [USPTO PTAB IPR2023-01457]
 - Hesai v. **Ouster** (2024) [USPTO PTAB IPR2023-01422]
 - A360 v **Toyota/Bastian** (2024) [No. 1:23-cv-00198-JRS-TAB, Southern District of Indiana]
 - **Motive** v Samsara (2024) [337-TA-1393, U.S. International Trade Commission]
 - **Good Sportsman** v Hangzhou ZH Tech (2024) [USPTO PTAB PGR]
 - **Tesla** v Autonomous Devices (2024-2024) [USPTO PTAB (IPR)] ‘474 Patent
 - **Becton Dickenson** v **JFCRx** (2023-2024) [Contract, trade secret compliance/audit]
 - Juul v **NJOY** – (2023-2024) [337-TA-1368, U.S. International Trade Commission]
 - Juul v **NJOY** – (2023-2024) [1:2023cv00917, District Court of DE]
 - **NJOY** v Juul– (2023-2024) [IPR2024-00267 USPTO PTAB]
 - **NJOY** v Juul– (2023-2024) [IPR2024-00268 USPTO PTAB]
 - Textron v **DJI** – (2023-2024) [Case No. 2:22-cv-351-RWS-RSP (E.D. Tex)]
 - Solmetex v. **Dental Recycling** (2023-2024) [Pre-IPR: USPTO]
 - **Daifuku** v. ControlLogix [IPR2024-00475 USPTO PTAB]
 - Autonomous Devices v **Tesla** (2023-pres) [C.A. No. 22-1466 (MN), District Court of DE]
 - **Tesla** v Autonomous Devices (2023-2024) [USPTO PTAB IPR2023-01172] ‘583 Patent
 - **Tesla** v Autonomous Devices (2023-2024) [USPTO PTAB IPR2023-01055] ‘344 Patent
 - **Tesla** v Autonomous Devices (2023-2024) [USPTO PTAB IPR2023-01054] ‘974 Patent

- **Tesla** v Autonomous Devices (2023-2024) [USPTO PTAB IPR2023-01169] ‘134 Patent
- **Tesla** v Autonomous Devices (2023-2024) [USPTO PTAB IPR2023-01170] ‘449 Patent
- **Tesla** v Autonomous Devices (2023-2024) [USPTO PTAB IPR2023-01171] ‘585 Patent
- **Ouster** v. Hesai et al, Lidar Systems (2023-2024) [337-TA-1363, U.S. International Trade Commission]
- **Ouster** v. Hesai et al, (2023-pres) [No. 1:23-cv-00406, District Court of DE]
- **Boston Dynamics** v Ghost Robotics (2023-2025) [1:22-cv-01483-MN, District Court of DE]
- Vivint v **SkyBell** Technologies (2022-pres) [2:21-cv-09472, Central Dist of DC]
- Moog v **SkyRyse** (2022-2024) [1:22-cv-00187, Western Dist of NY]
- Velodyne v **Ouster** (2022-2023) [337-TA-1322, U.S. International Trade Commission]
- **IQRIS** v Point Blank (2022-2023) [21-CV-61976-BB, Southern District of FL]
- **Opex** v HC Robotics/Invata (2022) [337-TA-1293, U.S. International Trade Commission]
- **iAqua** v Cayago (2022) [Reexam-EPR814 of 90/014,995 USPTO]
- Cayago v **iAqua** (2022) [21-CV-61035, Southern District of FL]
- Cayago v **iAqua** (2022) [Civil No. 21-1212, Puerto Rico]
- Bacon Sons v **Perception Robotics** (2021-2022) [Case No: 30-2018-01000372, Orange Co, CA]
- **AutoStore** v Ocado (2021-2023) [IPR2022-00443 USPTO]
- **AutoStore** v Ocado (2021-2022) [IPR2022-00673 USPTO] (pre-institution)
- **AutoStore** v Ocado (2021-2022) [IPR2021-00274 USPTO]
- **AutoStore** v Ocado (2021-2022) [IPR2021-00311 USPTO]
- **AutoStore** v Ocado (2021-2022) [IPR2021-00398 USPTO] (pre-lit)
- **AutoStore** v Ocado (2021-2022) [IPR2021-00412 USPTO] (pre-lit)
- **AutoStore** v Ocado (2021-2022) [PGR2021-00038 USPTO] (pre-lit)
- **AutoStore** v Ocado (2021-2022) [HP-2020-000035, United Kingdom]
- **AutoStore** v Ocado (2021-2022) [Spain – Pre-lit]
- **AutoStore** v Ocado (2021-2022) [Case No. 2:20-cv-494, Eastern District of VA]
- Ocado v **AutoStore** (2021-2022) [1-21-cv-00041, USDC - DNH]
- Ocado v **AutoStore** (2021-2022) [1-21-cv-00806, USDC - DNH]
- **iRobot** v SharkNinja (2021-2022) [337-TA-1252, U.S. International Trade Commission]
- **Airborne Systems** v Wamore – Steerable parachute systems (2019-pres) [Arbitration – NJ]
- **AutoStore** v Ocado (2020-2021) [337-TA-1228, U.S. International Trade Commission]
- Interactive Play Devices v **Spin Master** (2020-2021) [Civil Action File No. 6:20-cv-00066, W.D. TX]
- **DJI** v Autel – (2017-2021) RC UAV Systems [C.A. No. 16-706-LPS-CJB, District Court of DE]
- Velodyne v **RoboSense** (2019-2020) [337-TA-1173, U.S. International Trade Commission]
- Odyssey Marketing v **Spin Master** (2018) Unmanned Air Vehicles [IPR, USPTO]
- Mattel v **Spin Master** (2018) Transformable Devices [IPR2018-01672, USPTO]
- Mattel v **Spin Master** (2018) Transformable Devices [IPR2018-01673, USPTO]
- Mattel v **Spin Master** (2018) Transformable Devices [IPR2018-01674, USPTO]
- MPV v **DJI** – (2018) [Case No. 2:18-cv-02210-RGK-AGR, Central District Court of CA]
- **Samsung** v Cywee – (2017) IMU Pose & AR [Case No. 2:2017cv00140, Eastern District of TX]
- **DJI** v Autel – (2017-2018) [2:17-cv-00776-RAJ, Western District of WA]
- Synergy Drone v **DJI**– (2017-2018) [Case No. 1:17-cv-00242, TX Western District Court]
- **iRobot** v Bissell – (2017-2018) [337-TA-1057, U.S. International Trade Commission]
- **Hayward Industries** – (2015-2016) Evaluate IP and Enabling Technologies for Submersible Systems
- Choirock v **Spin Master** (2016-2018) Transformable Devices [Case No. IPR2017-00030, USPTO]
- **Spin Master** v Sphero, Inc. (2016-2017) [Case No. IPR2017-01272, USPTO]
- Sphero, Inc. v **Spin Master Ltd.** (2017) [New York Southern District Court, Case No. 1:17-cv-05428]
- Razor/Chen/Inventist v **Jetson Electric Bikes** (2016-2017) [337-TA-1000, U.S. Int. Trade Commission]
- Razor/Chen/Inventist v **Powerboard** (2016-2017) [337-TA-1000, U.S. International Trade Commission]
- Segway/DEKA/Ninebot v **Jetson** (2016-2017) [337-TA-1007, U.S. Int. Trade Commission]
- Segway/DEKA/Ninebot v **Powerboard** (2016-2017) [337-TA-1007, U.S. Int. Trade Commission]
- Segway/DEKA/Ninebot v **Jetson** (2016-2017) [337-TA-1021, U.S. Int. Trade Commission]
- Segway/DEKA/Ninebot v **Powerboard** (2016-2017) [337-TA-1021, U.S. Int. Trade Commission]
- **DJI** v Yuneec [No. 5:16-cv-595, U.S. District Court, Central District of CA]
- Rehco LLC v **Spin Master Ltd.** (2015-2020) [No. 1:2013cv02245, Northern District of IL]
- Segway/DEKA v **Ninebot** [Inv. No. 337-TA-935, U.S. International Trade Commission]
- Segway v **Shenzhen Inmotion** – [Inv. No. 337-TA-935, U.S. International Trade Commission]

- ScriptPro v **Innovation** – Pharmacy Automation (2015) [2:06-cv-2468-CM-JPO U.S. Dist Court, KS]
- ScriptPro v **Innovation** – Pharmacy Automation (2011-2015) [06-2468-CM U.S. District Court, KS]
- Spinmaster v **YourStoreOnline** – Wall-Climbers (2009-2010) [CV 09-5803 CAS]
- SpinMaster v **YourStoreOnline** – RC Helicopters (2009-2010) [CV 09-2121 CAS]
- **Patent Inventorship:** Other patents pending
 - 6,378,801: Devices and methods for orienting and steering in three-dimensional space.
 - 7,726,514: Automated article dispensation mechanism.
 - 8,091,733: Automated article dispensation mechanism.
 - 8,751,035: Automated laundry drop-off and retrieval system.
 - 9,664,813: Automated Insect Monitoring
 - 9,999,211: Automated Insect Monitoring (Removable Chambers with Transparent Sides for Inspection)
 - 9,999,212: Automated Insect Monitoring (Signal Processing to Detect and Recognize Invasive Pest)
 - 11,382,324: Insect Traps and Monitoring System (IoT Monitoring System with Detect/Classify Ability)
 - 12,431,780: Magnetic braking system for descending payloads
- **Board of Directors/Advisors Experience:** Provide strategic technology, business and corporate expertise.
 - **Delta Five** – Distributed unattended sensors, automation, SaaS and IoT.
 - **Panacea BioMatx Inc** - Automated customized medications and nutraceuticals. (www.panacea.me)
 - **Lealear** – Automated storage and retrieval systems.
 - **RxMedic** – Automation for preparing prescription orders in retail, government, and hospital pharmacies.
 - **VortexHC** – Non-dexterous gripping, robot climbers (air and underwater), and 6DOF holonomic AUVs.
 - **NCSU Integrated Manufacturing Systems Engineering Institute** – Multi-disciplinary graduate school

Selected Publications (of ~40)

- IoT Solutions Enabling Hotelier's to Monitor for Bed Bugs, www.deltafive.com/wp-content/uploads/2018/06/DeltaFive_BedBugAwarenessWeek2018_PressRelease.pdf, June 2018.
- New York City Challenged by Bed Bugs, www.newswire.com/news/new-york-city-challenged-by-bed-bugs-delta-five-offers-green-solution-20043137, November 2017.
- On the Heels of the Largest Bed Bug Lawsuit Judgement, Delta-Five Has a Proven Green Solution for Hotels, www.newswire.com/news/on-the-heels-of-the-largest-bed-bug-lawsuit-judgement-delta-five-has-a-19990567, October 2017.
- Hoteliers Find Delta Five's Innovative Bed Bug Solution Catches Bugs Faster and More Consistently, www.newswire.com/news/hoteliers-find-delta-fives-innovative-bed-bug-solution-catches-bugs-19940513, September 2017.
- As Hoteliers Look to Combat Bed Bug Rise Delta Five Offers Researched Solution, www.newswire.com/news/as-hoteliers-look-to-combat-bed-bug-rise-delta-five-offers-researched-19846348, August 2017.
- Green Approach to Prevention and Early Detection, www.eprnews.com/delta-five-highlights-green-approach-to-prevention-and-early-detection-during-bed-bug-awareness-week-138925/, June 2017
- Delta Five Raises the Bar in Battle Against Bed Bugs, www.newswire.com/news/delta-five-raises-the-bar-in-battle-against-bed-bugs-19547330, May 2017.
- Automated Bed Bug and Insect Monitoring System, www.newswire.com/news/delta-five-launches-automated-bed-bug-and-insect-19224593, April 2017.
- “Think It, Build It, Win It: Vision-Based Robot Design Secures Teledyne a \$350M NASA Engineering Contract” H. Neale. *NASA Tech Briefs* 2013/2014.
- “Automation is Changing Pharmacy: How Reducing Repetition Behind the Counter Improves Over the Counter Care” J. Janét. October 2010. *Insight Magazine*.
- “Automate Your Profits” J. Janét. October 2009. *Insight Magazine*.
- DTIC #ABV 299170 (NATICK/TR-04/013L): “Vortex Regenerative Air Movement: Attraction and Attachment on Vertical and Inverted Surfaces— A Simple Method for Static and Mobile Robots for Climbing Walls and Ceilings” J. Janét, D. Reinfeld, B. Wiedeman. October 2003. (Contract No. DAAD16-00-C-9259; US Army Soldier Systems Command, Natick, MA)
- DTIC #AD B267 288 (NATICK/TR-01/009L): “MicroHunter Control Applications for Elimination of Anti-Personnel Landmines: Low-Cost, Minimally Guided Munitions – A Simple Method for Controlling the Trajectory of Spinning Projectiles” M. Kemp, J. Janét, and C. Pell. May 2001. (Contract No. DAAN02-98-C-4030; US Army Soldier Systems Command, Natick, MA)

- “Development of a Micro Autonomous Underwater Vehicle for Complex 3-D Sensing”, *IEEE/MTS Oceans 2001 Conference*; Honolulu, HI; Nov 2001; B. Hobson, B. Schulz, J. Janet, R. Moody, C. Pell, and H. Pinnix.
- “MicroAUVs I: Platform Design and Multi-Agent System Deployment”, *Unmanned Untethered Submersible Technology (UUST)*; August 2001; Durham, NH; B. Schulz, B. Hobson, J. Janét, M. Kemp, R. Moody, C. Pell, H. Pinnix, J. Pollard, and H. Crenshaw.
- “Assessing the Performance of Oscillating Fin Thruster Vehicles”, *Unmanned Untethered Submersible Technology (UUST)*; August 2001; Durham, NH; M. Kemp, B. Hobson, J. Janét, C. Pell, and E. Tytell.
- “Using Control Networks to Control Multiple Autonomous Mobile Robots: Biped, a Hexapod Colony, and a Complex Autonomous Mobile Robot”, *IEEE Int’l Conf. on Robotics & Automation*; Detroit, MI; May 1998; J. Janet, B. Wiseman, R. Michelli, S. Scoggins, and A. Walker.
- “Autonomous Mobile Robot Global Self-Localization Using Kohonen and Region-Feature Neural Networks”, *Jnl of Robotic Systems*; Vol. 14, No.4, 1997; J. Janet, R. Gutierrez, T. Chase, M. White, J. Sutton.
- “Combining Self-Organizing Geometric Certainty Maps with the Unscented Kalman Filter”, *Proc. of IEEE Int’l Conf. on Robotics & Automation*; Leuven, Belgium; May 1998; J. Janét, J. Brickley, M. Kay, M. White, and J. Sutton.
- “Modeling of Sonar Sensors for Localization of Autonomous Mobile Robots”, *IEEE Transactions on Industrial Electronics*; October 1998; R. Gutierrez, J. Janet, and R. Luo.
- “Autonomous Mobile Robot Global Motion Planning and Geometric Beacon Collection Using Traversability Vectors”, *IEEE Trans on Robotics & Automation*; Vol.13, No.1, 1997, Pages:132–140; J. Janét, M. Kay, and R. Luo.

Skills Brief

- *Executive Leadership.* Provided fiscal, strategic, IP and operational leadership in application and development of heavily engineered systems for software, robotics and automation, medical, pharmacy, maritime, aviation, government, military, law enforcement, security, entertainment, hospitality, analytics, pattern analysis, and energy markets. Demonstrated ability to develop and implement business plans, integrate emerging technologies, raise capital, be an effective change agent, and transition product and client service concepts to commercial viability. Effective collaborator with companies, academic institutions, military, government and foreign entities. Experienced with legal aspects of launch, operations, equity, M&A, intellectual property & litigation. Successful manager of sales, marketing and finance including, ROI tool development, market research, prospecting, sales presentations, competitive analysis, brand development, multi-media advertising, contract negotiation, deal closure, A/P and A/R.
- *Board Member.* Effective strategic contributor and communicator on behalf of corporations (Delta Five, RxMedic, Panacea Biomatix, Lealear, and VortexHC) and an academic institution (NCSU IMSEI).
- *Engineering and Product Development.* Demonstrated ability to develop and deploy hardware and software products, including automated retrieval systems, fixed-base robots, medical systems, mobile robots, autonomous and remote-control unmanned ground robots, wall-climbing robots, hull inspection & cleaning robots, nuclear vessel inspection robots, autonomous underwater vehicles, non-destructive inspection robots, retail automation, and mine neutralization robots.

Additional

- **Security Clearance.** Personal clearance level – TOP SECRET & SCI. Facilities Security Officer (FSO) for Vortex HC. Coordinated processing of SECRET level Facility Clearances (FCL) and Personnel Clearances (PCL).
- **Institute of Electrical & Electronic Engineers (IEEE):** Robotics, Controls & Pattern Analysis.
- **Autonomous Unmanned Vehicle Systems International (AUVSI)**
- **American Society for Engineering Education (ASEE)**
- **American Society of Mechanical Engineers (ASME)**
- **PADI SCUBA:** Professional diver for underwater mobile robots, hull inspection, underwater video, counter-mine, ASW, etc.
- **Commercial Driver’s License:** Class-A CDL, base registrations in North Carolina (and Virginia).

- **USPA Skydiving:** (1991 – 1997) USPA Jumpmaster certification in 1996. D-license with 400 jumps including instruction, tandem master training support, demonstrations, accuracy, and freefall relative work (RW). National collegiate RW championship team in 1994 (Richmond, IN). Carolina Sky Sports Accuracy Champion in 1993 (Louisburg, NC).
- **Pyrotechnician:** Class-A/B levels.
- **Master Mason:** Foundation of ~20 years of construction experience, primarily with ornamental stone, brick, and concrete. Experience initially gained as a youth within family-owned and operated business (Dogwood Quarries) in DC-metropolitan area; summers and school breaks from 1981 until 1997. Since 1998, all work has been *pro bono* including for Habitat for Humanity.

Computer Tools

Proficient: SalesForce, PowerPoint, Excel, Word, Project, MATLAB

Prior experience: Epicor ERP, QuickBooks, AutoCAD, SolidWorks, OrCAD, LabView, C/C++, Assembly