UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CAMBRIDGE MOBILE TELEMATICS, INC.,
Petitioners,

v.

SFARA, INC.,
Patent Owner

IPR2024-00952

U.S. Patent No. 8,989,952

Issue Date: March 24, 2015

Title: SYSTEM AND METHOD FOR DETECTING VEHICLE CRASH

DECLARATION OF LIN ZHONG, PH.D., IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,989,952

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LIST OF MATERIALS CONSIDERED

Exhibit No.	Description of Document
1001	U.S. Patent No. 8,989,952 ("the '952 patent")
1003	Curriculum Vitae of Dr. Lin Zhong
1004	U.S. Patent No. 9,311,271 ("Wright")
1005	U.S. Patent No. 9,390,625 ("Green")
1006	Plaintiff's Preliminary Infringement Contentions, *Cambridge Mobile Telematics, Inc. v. Sfara, Inc.*, No. 3:23-cv-01368 (D.N.J.) ("Infringement Contentions")
1007	Prosecution History of the '952 patent ("prosecution history")
1008	Cambridge Mobile Telematics, Inc. v. Sfara, Inc., No. 3:23-cv-01368 (D.N.J.), ECF No. 84, Joint Claim Construction and Prehearing Statement
1012	Fazeen et al, Safe Driving Using Mobile Phones, IEEE Transactions on Intelligent Transportation Systems (Volume: 13, Issue: 3, September 2012) ("Fazeen")
1013	Mohan et al, TrafficSense: Rich Monitoring of Road and Traffic Conditions using Mobile Smartphones. Microsoft Research, April 2008.

Exhibit No.	Description of Document
1014	Vukajlovic et al, The Practical Design of In-vehicle Telematics Device with GPS and MEMS Accelerometers, Telfor Journal, Vol. 4, No. 2, 2012.
1015	Yilin Zhao, Telematics: Safe and Fun Driving, IEEE Intelligent Systems 2002
1016	Cook et al, Control, computing and communications: technologies for the twenty-first century model T, Proceedings of the IEEE. Vol. 95, Issue: 2, February 2007.
1017	Ching-Yao Chan, A treatise on crash sensing for automotive air bag systems, IEEE/ASME Transactions on Mechatronics. Vol. 7, Issue. 2, June 2002.
1018	Shaout et al, Automotive airbag technology: past, present and future, International Journal of Computer Applications in Technology Vol. 13, No. 3-5. Jan 1, 2000.
1019	Cech et al, Active Magnetic Field Based Sensing System for Improved Detection and Discrimination of Side Impact Crashes, Proceedings - 19th International Technical Conference on the Enhanced Safety of Vehicles (ESV), Washington, D.C., June 6-9, 2005, Paper Number 05-0406.
1020	Bell, Policy issues for the future intelligent road transport infrastructure, IEE Proceedings - Intelligent Transport Systems, Volume 153, Issue 2, June 2006, p. 147-155.
1021	Hull et al, CarTel: a distributed mobile sensor computing system, SenSys '06: Proceedings of the 4th international conference on Embedded networked sensor systems, Oct

Exhibit No.	Description of Document
	2006, p. 125-138. https://doi.org/10.1145/1182807.1182821.
1022	Dai et al, Mobile phone based drunk driving detection, 2010 4th International Conference on Pervasive Computing Technologies for Healthcare, IEEE, June 2010, DOI: 10.4108/ICST.PERVASIVEHEALTH2010.8901.
1023	Thompson et al, Using Smartphones to Detect Car Accidents and Provide Situational Awareness to Emergency Responders. In: Cai, Y., Magedanz, T., Li, M., Xia, J., Giannelli, C. (eds) Mobile Wireless Middleware, Operating Systems, and Applications. MOBILWARE 2010. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, vol 48. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-17758-3_3 ("Thompson 2010")
1024	U.S. Patent No. 9,037,407 ("Thompson 2011")
1025	Johnson et al, Driving Style Recognition Using a Smartphone as a Sensor Platform, 2011 14th International IEEE Conference on Intelligent Transportation Systems (ITSC), IEEE, November 2011, DOI: 10.1109/ITSC.2011.6083078.
1026	Mednis et al, Real time pothole detection using Android smartphones with accelerometers, 2011 International

Exhibit No.	Description of Document
	Conference on Distributed Computing in Sensor Systems and Workshops (DCOSS), IEEE, August 2011, DOI: 10.1109/DCOSS.2011.5982206.
1027	Eren et al, Estimating driving behavior by a smartphone, 2012 IEEE Intelligent Vehicles Symposium, IEEE, July 2012, DOI: 10.1109/IVS.2012.6232298.
1028	Fleming, Overview of Automotive Sensors, IEEE Sensors Journal, Vol. 1, No. 4, December 2001.

CMT Exhibit 1002, Page 12 of 195
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I, Lin Zhong, Ph.D., declare as follows:

I. INTRODUCTION AND QUALIFICATIONS

A. Introduction

1. I have been retained by Petitioner Cambridge Mobile Telematics, Inc. ("CMT") as a technical expert witness in connection with the petition for *inter partes* review of U.S. Patent No. 8,989,952 (the "'952 patent"). The statements set forth in this declaration are based on my own personal knowledge. I am being compensated at my usual rate for the time spent preparing this declaration, and my compensation is not contingent on the outcome of any matter or any of the opinions provided below. I have no financial interest in this matter.

2. I understand that the '952 patent issued on March 24, 2015 from U.S. Application Serial No. 14/105,744, naming Sascha Simon as the inventor. I further understand that, based on these provisional applications, Patent Owner Sfara, Inc. ("Sfara") contends that "[t]he asserted claims of the '952 patent are entitled to a priority date (*i.e.*, earliest date of invention) at least as early as December 21, 2012." Ex. 1006 (Infringement Contentions) at 13. For purposes of my analysis herein, I have used this date as the relevant time period.

3. I have been asked by CMT to provide testimony regarding the state of the art in the field of smartphone-based telematics prior to December 21, 2012. I

have also been asked to provide my opinion regarding the validity of claims 1-18 of the ’952 patent.

4. I make this Declaration based upon my own personal knowledge, information, and belief, and I would and could competently testify to the matters set forth in this Declaration if called upon to do so.

B. Qualifications and Experience

5. I am a professor at the Department of Computer Science of Yale University. My background includes roughly 30 years of academic and professional experience in the fields of system software, wireless subsystems, and hardware architecture. My research focuses on developing efficient technologies for future computing, communication, and interfacing with a focus on mobile systems.

6. I received a M.S. and a B.S. in Electronic Engineering from Tsinghua University in 2000 and 1998, respectively. More recently, I obtained my Ph.D. in Computer Engineering from Princeton University in 2005. My doctoral dissertation focuses on energy efficiency of mobile systems.

7. Prior to my professorship at Yale, I was a professor in the Department of Electrical and Computer Engineering at Rice University from 2005 to 2019. I also conducted research in the industry during sabbaticals. For example, I was a Visiting Researcher at Microsoft Research during the summer of 2011, March to

December of 2012, and October 2019 to August 2020. My industry research focused on Mobile Systems and Networks.

8. I have been awarded numerous awards, including: (i) ACM SigMobile Test-of-Time Award; (ii) Best Paper Award (first place) for Quantum Systems Software, IEEE QCE; (iii) Distinguished Paper Finalist, NDSS Symposium; (iv) ACM SigMobile RockStar Award; (v) Charles Duncan Award for Outstanding Academic Achievement (Rice University); (vi) Best Paper Award (three times), ACM MobiSys; (vii) Best Paper Award, ACM ASPLOS; (viii) Mark Weiser Best Paper Award, IEEE PerCom; (ix) Best Paper Award, ACM MobileHCI; (x) National Science Foundation CAREER Award; (xi) One of the 30 most influential papers published in the first decade of IEEE Design Automation & Test in Europe Conference; and (xii) AT&T Asian Pacific Leadership Award.

9. I have served on professional committees, groups, and organizations. I was Program Committee Co-Chair of ACM MobiSys 2012. I have served on the Steering Committee of ACM MobiSys since 2013. I was Program Committee Co-Chair of IEEE/ACM IPSN 2014 and Program Committee Chair of ACM HotMobile 2019. I have been the Chair of SigMobile Research Highlights Selection Committee since 2022. I am a Fellow of IEEE and ACM.

10. I am a named inventor on more than 20 U.S. patents, including U.S.

Patent No. 9,817,125, entitled "Estimating and predicting structures proximate to a mobile device."

11. I am the author or co-author of more than 130 scientific and engineering publications, including articles, conference presentations, technical and scientific reports, and tutorials. These publications cover a wide variety of topics, including but not limited to wireless communications, signal processing, mobile & embedded systems, and computer architecture.

12. A copy of my curriculum vitae is attached hereto as Ex. 1003 to this Declaration.

C. Materials Considered

13. In preparing this Declaration, I have reviewed the '952 patent, its prosecution history, and each of the documents I reference herein. I have provided above a list of the exhibits referenced in my Declaration. In reaching my opinions, I have relied upon my experience in the field and have also considered the viewpoint of a person of ordinary skill in the art at the time of the '952 patent's priority date, which I assume is December 21, 2012 based on Patent Owner's contention in litigation. As explained below, I am familiar with the level of skill of a person of ordinary skill in the art regarding the technology at issue as of that timeframe.

II. LEGAL PRINCIPLES

14. I am not an attorney. For purposes of this declaration, I have been informed by counsel for CMT about certain aspects of the law that are relevant to my analysis and opinions, as set forth below.

A. Prior Art

15. I understand that the prior art to the '952 patent includes patents and printed publications in the relevant art that predate the '952 patent's priority date. As I explained previously, I have been instructed to assume for purposes of my analysis that December 21, 2012, is the relevant date for determining what is "prior art." In other words, I should consider as "prior art" anything publicly available prior to December 21, 2012. I further understand that, for purposes of this proceeding in the United States Patent Trial and Appeal Board, only patents and documents that have the legal status of a "printed publication" may be relied on as prior art.

B. Claim Construction

16. I understand that under the legal principles, claim terms are generally given their ordinary and customary meaning, which is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application. I further

understand that the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which a claim term appears, but in the context of the entire patent, including the specification.

17. I am informed by counsel that the patent specification, under the legal principles, has been described as the single best guide to the meaning of a claim term, and is thus highly relevant to the interpretation of claim terms. I understand for terms that do not have a customary meaning within the art, the specification usually supplies the best context of understanding the meaning of those terms.

18. I am further informed by counsel that other claims of the patent in question, both asserted and unasserted, can be valuable sources of information as to the meaning of a claim term. Because the claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims. Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.

19. I understand that the prosecution history can further inform the meaning of the claim language by demonstrating how the inventors understood the invention and whether the inventors limited the invention in the course of prosecution, making the claim scope narrower than it otherwise would be. Extrinsic evidence may also be consulted in construing the claim terms, such as my expert testimony.

20. I have been informed by counsel that, in *inter partes* review ("IPR") proceedings, a claim of a patent shall be construed using the same claim construction standard that would be used to construe the claim in a civil action filed in a U.S. district court (which I understand is called the "*Phillips*" claim construction standard), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

21. I have been instructed by counsel to apply the "*Phillips*" claim construction standard for purposes of interpreting the claims in this proceeding, to the extent they require an explicit construction. The description of the legal principles set forth above thus provides my understanding of the "*Phillips*" standard as provided to me by counsel.

22. I understand that some claims are independent, and that these claims are complete by themselves. Other claims refer to these independent claims and are "dependent" from those independent claims. The dependent claims include all of the limitations of the claims on which they depend.

C. Obviousness

23. I understand that obviousness is a determination of law based on various underlying determinations of fact. In particular, these underlying factual

determinations include (1) the scope and content of the prior art; (2) the level of ordinary skill in the art at the time the claimed invention was made; (3) the differences between the claimed invention and the prior art; and (4) the extent of any proffered objective indicia of non-obviousness. I understand that the objective indicia which may be considered in such an analysis include commercial success of the patented invention (including evidence of industry recognition or awards), whether the invention fills a long-felt but unsolved need in the field, the failure of others to arrive at the invention, industry acquiescence and recognition, initial skepticism of others in the field, whether the inventors proceeded in a direction contrary to the accepted wisdom of those of ordinary skill in the art, and the taking of licenses under the patent by others, among other factors.

24. To ascertain the scope and content of the prior art, it is necessary to first examine the field of the inventor's endeavor and the particular problem for which the invention was made. The relevant prior art includes prior art in the field of the invention, and also prior art from other fields that a person of ordinary skill in the art would look to when attempting to solve the problem.

25. I understand that a determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention. Instead, it is my understanding that in order

to render a patent claim invalid as being obvious from a combination of references, there must be some evidence within the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination in a way that would produce the patented invention.

26. I further understand that in an obviousness analysis, neither the motivation nor the purpose of the patentee dictates. Rather, any problem known in the field can provide a reason for combining the prior art in the manner claimed.

III. LEVEL OF ORDINARY SKILL IN THE ART

27. I understand that an assessment of claims of the ’952 patent should be undertaken from the perspective of a person of ordinary skill in the art as of the earliest claimed priority date, which, as I explained above, I assumed to be December 21, 2012.

28. I understand that a POSITA is a hypothetical person who is presumed to be aware of all pertinent art, applies conventional wisdom in the art, and is a person of ordinary creativity. I have also been advised that to determine the appropriate level of a person having ordinary skill in the art, the following factors may be considered: (1) the types of problems encountered by those working in the field and prior art solutions thereto; (2) the sophistication of the technology in question, and the rapidity with which innovations occur in the field; (3) the

educational level of active workers in the field; and (4) the educational level of the inventor.

29. Applying these factors, as to the '952 patent, a POSITA in December 2012 would have had at least a Master's degree in computer science, computer engineering, mechanical engineering, electrical engineering, physics, or a related field, and at least four years of experience in telematics or in computer engineering. To the extent necessary, a POSITA may have collaborated with others having expertise in software development, such as computer scientists or software engineers. My opinion regarding the qualifications of a POSITA is based on my knowledge, skill, training, experience and review of the materials discussed herein.

30. Based on this definition, I am at least a person of ordinary skill in the art at least due to my extensive experience in mobile systems embodied in complex hardware and software. I was also at least a person of ordinary skill in the art in the December 2012 timeframe relevant to the field of smartphone-based telematics.

IV. KNOWLEDGE IN THE ART AT THE TIME OF THE ALLEGED INVENTION OF THE '952 PATENT

31. I understand that a skilled artisan is presumed to know and be familiar with all of the relevant art in the field at the time of the invention.

32. The technology at issue in the challenged claims of the '952 patent relates to crash detection, vehicle monitoring, and telematics. The roots of these

technologies can be traced back to the early 20th century with the invention of rudimentary tracking devices primarily used for military and scientific purposes. Starting the late 20th century, telematics began to find its way into consumer vehicles. Indeed, these technologies have been known and used well before December 2012. Ex. 1014, Vukajlovic at Abstract; Ex. 1015, Zhao at Abstract.

33. Vehicle monitoring, telematics, and crash detection have progressed from a common goal of improving driver safety and reducing car accidents, driven by the increasing ubiquity of automobiles. In the vast and highly competitive automotive sector, marked by multiple players and worldwide influence, significant investments in research and development have propelled the development of groundbreaking technologies throughout every aspect of vehicle design and engineering. Ex. 1012, Fazeen at Abstract.

34. Telematics and navigation systems, originating in Europe during the early 1990s, saw pioneering applications, such as Bosch navigation systems on the Ford Transit and Mondeo vehicles, utilizing electronic compasses and Global Positioning Systems (GPS). *See also* Ex. 1016, Cook at Abstract. For example, an early application of magnetic sensors as flux gates was the electronic compass on the 1982 Model Year Lincoln Continental. Accelerometers, as the key sensor for airbag deployment in the 1990s, replaced early mechanical crash sensors. Ex. 1017,

Chan at Abstract; Ex. 1018, Shaout. Indeed, automotive technology—including, specifically, crash detection technology—involves the use of sensors, such as magnetic sensors and accelerometers, to detect when a vehicle has been involved in a collision. Ex. 1019, Cech at 3. These sensors can detect sudden changes in velocity, impact forces, or other indicators of a crash. *Id.* at 2.

35. For example, the accelerometer plays a vital role in detecting acceleration, which is measured as a vector that has magnitude and direction. Ex. 1004, Ex. 1004, Wright at 8:7-10. In the field of crash detection in telematics, the accelerometer is typically used to detect parameters such as roll, pitch, and yaw via a single and/or multi-axis models, which are essential for understanding the orientation and movement of the vehicle. *Id.* at 8:10-20. Roll refers to the rotation of the vehicle around its longitudinal axis (from side to side), pitch refers to the rotation around its lateral axis (forward and backward tilt), and yaw refers to the rotation around its vertical axis (turning left or right). By utilizing an accelerometer and accurately measuring changes in acceleration along the three axes (X, Y, and Z), one can infer these rotational movements. Ex. 1012, Fazeen at 1463. For example, during a turn, it detects the lateral acceleration, indicating a change in the vehicle's yaw. Sudden and significant changes in these aforementioned parameters, beyond the typical range of driving maneuvers, can indicate a potential collision/vehicle

crash. Specifically, different driving maneuvers are identified and differentiated by using each individual axis of the accelerometer. *Id.* at 1463. For example, Fazeen discloses an engine gear shift analysis of an automobile using the single-axis, y-axis, of an accelerometer. *Id.* at 1464. Fazeen further discloses the lane changes recorded by the x-axis of the accelerometer. *Id.* at 1465. Algorithms within the telematics system analyze these accelerometer readings in real-time. If a crash-like event is detected, such as a rapid deceleration or abrupt changes in orientation, the system can trigger automatic crash detection features, deploy airbags, alert emergency services, and provide crucial location information to assist in swift response and aid dispatch.

36. Concurrently, the Pan-European PROMETHEUS program of 1987 marked a milestone in testing telematics and navigation systems, utilizing Radio Data System and later GSM cellular communications for data transmission, including location data provided by location services that are GPS-based first available in 1988. Ex. 1020, Bell at 1. This era also witnessed the emergence of automatic crash alerts, exemplified by GM's ONSTAR system launched in 1996, leading to legislative mandates for crash alert systems in new vehicles post-2018.

37. Throughout this period, the industry's focus transitioned from passive safety measures such as airbags to active safety technologies such as collision

warning, mitigation, and avoidance (e.g., lane departure warning) and Adaptive Cruise Control (ACC). Indeed, in the early 1990s, automotive companies undertook significant development efforts relating to a wide variety of sensor technologies, user interfaces, camera systems, and control algorithms to help solve safety problems associated with transportation. Notably, innovations like Ford's SYNC system in 2008 and subsequent smartphone integration through frameworks like Apple's Core Location and Core Motion have shaped the landscape of automotive infotainment and safety features.

38. The telematics programs developed typically utilize GPS, cellular, and satellite technologies to track the location, movement, and behavior of vehicles. They can also gather data on driving habits, such as speed, acceleration, braking, and cornering. Historically, telematics data has found application in fleet management, stolen vehicle retrieval, and optimizing routes for logistics and delivery services. Additionally, until approximately 2010, telematics started to play a role in usage-based insurance models—specifically in monitoring driver behavior to promote safety and compliance. For example, Europe, especially Italy, was an early adopter of Usage Based Insurance in 2005. Allstate in the United States followed suit in 2010 with their DriveWise product pilot.

39. A pioneer in the development of vehicle telematics, specifically the use

of phone based sensors, was the MIT CarTel project, initiated in 2004 as a six vehicle demonstration in the Boston area. Data from cell phones equipped with GPS, accelerometers, and other sensors, was combined or "fused" from the various data sources and sent to a central portal or server to analyze traffic conditions, road quality, and driver behavior (enabling "insurance telematics" applications). This foundational and influential research and vehicle demonstration portended future ADAS and telematic systems that are enabled by "sensor fusion," typically vehicle based sensors. In a seminal paper published in 2006, before the time of Android and iOS smartphones, the authors described the early results from the CarTel project, including using location and acceleration data collected from a mobile system placed in the car. While the paper used custom-made hardware, they clearly anticipated the use of future phones with sensors: "We are targeting cellular phones and other handheld devices as a future platform for CarTel software; we envision mobile users collecting information about the environment just as cars do in our system today." Ex. 1021, Hull at 12. Soon after that, researchers from Microsoft Research India, Bangalore attached custom-made sensor hardware (accelerometer) to GPS-equipped mobile phones and placed them in cars. By combining location information from GPS and acceleration data from the accelerometer, the authors showed that it is possible to monitor traffic and road condition. They reported their findings in a 2008

paper, "Nericell: Rich Monitoring of Road and Traffic Conditions using Mobile Smartphones". *See* Ex. 1013, Mohan.

40. Sensors are "devices that transform (or transduce) physical quantities such as pressure or acceleration (called measurands) into output signals (usually electrical) that serve as inputs for control systems." *See* Ex. 1028, Flemming at 296.

41. As early as 2008 and following the launch of the iPhone and its operating system (e.g., iOS), the developer community increasingly gained access to Apple's development tools or "frameworks" that provided access to the phone's built-in capabilities, including sensors. Eventually these iPhone frameworks became quite sophisticated to include Core Location (access to GPS and location service) and Core Motion (accelerometers, and gyroscopes, and, when available, the pedometer, magnetometer, and a barometer) along with the release of the iPhone 4 in 2010. The Ford SYNC system available in 2008 was an early example of new infotainment features enabled by connectivity to the driver's phone—voice enabled hands free calling, streaming music from media players, and navigation. In late 2010 Ford launched AppLink, for application developers to link certain phone sensors (e.g., GPS for location-based services) to the vehicle systems.

42. With sensor-equipped smartphones becoming commercially available, the pioneering work by the CarTel Project and Microsoft Research India, Bangalore

inspired many to follow. By the middle of 2012, numerous research groups have published results leveraging sensors available in smartphones, to detect drunk driving (Ex. 1022, Dai at Abstract, 2, 8); to detect car accidents (Ex. 1023, Thompson 2010 at Abstract 30, 32-37, 40-41; Ex. 1024, Thompson 2011 at Abstract, 1:57-2:8); to recognize driving styles (typical vs. aggressive) (Ex. 1025, Johnson at Abstract, 1, 3, 5-6); to detect potholes (Ex. 1026, Mednis at Abstract, 2-3, 5); and to estimate driving behaviors (Ex. 1027, Eren at Abstract, 1-3).

V. THE '952 PATENT

A. Overview of the '952 Patent

43. The '952 patent, titled "System and Method for Detecting Vehicle Crash," issued on March 24, 2015 from U.S. Patent Application No. 14/105,744, which was filed on December 13, 2013. Ex. 1001, '952 patent at 1. I understand that the earliest priority date of the '952 patent, as asserted by Sfara, is December 21, 2012. Ex. 1006, Infringement Contentions at 13.

44. In the '952 patent specification, the patentee describes that conventional crash detection methods using smartphones would often return a "false positive," i.e., "detect[ing] a vehicle crash when there in fact has not been a vehicle crash." Ex. 1001, '952 patent at 3:63-66. As the specification explains, false positives may occur, for example, "if the communication device itself is dropped by

the user, and the rapid deceleration of the communication device hitting the ground emulates a rapid deceleration associated with a vehicle crash," or "if the communication device is near some other event, that is not a vehicle crash, but that emulates the vibrations associated with the deployment of an airbag." *Id.* at 3:66-4:2, 4:12-15.

45. The '952 patent sought to decrease the likelihood of obtaining such false positives during crash detection by a communication device. The '952 patent purports to do so by first having the communication device "determine[] whether it is located in a vehicle. This first determination will greatly decrease the number of false-positive vehicle crash detections." *Id.* at 4:32-35. The patent explains that the in-vehicle determination can be made "by any known method, non-limiting examples of which include detecting parameters and comparing the detected parameters with those associated with vehicle . . . ." *Id.* at 7:37-41. According to the '952 patent, any known parameter can be used to determine whether the device is in a vehicle, including, for example, velocity, acceleration, and sound. *Id.* at 7:41-62. All of the parameters identified in the patent specification were well-known to a POSITA as of and before December 2012.

46. Next, the '952 patent discloses that the communications device may use two detected parameters to determine whether a crash has occurred. *Id.* at 4:35-40.

As with the in-vehicle determination, the types of detected parameters are well-known in the art, "non-limiting examples of which include velocity, acceleration, geodetic position, sound, temperature, vibrations, pressure, contents of surrounding atmosphere and combinations thereof." *Id.* at 6:51-58. The '952 patent states that "[t]he detection of at least two parameters further decreases the number of false-positive vehicle crash detections." *Id.* at 4:41-42.

47. This basic method of detecting whether the device is in a vehicle and then using two detected parameters to make a crash determination is depicted in Figure 3 of the '952 patent:

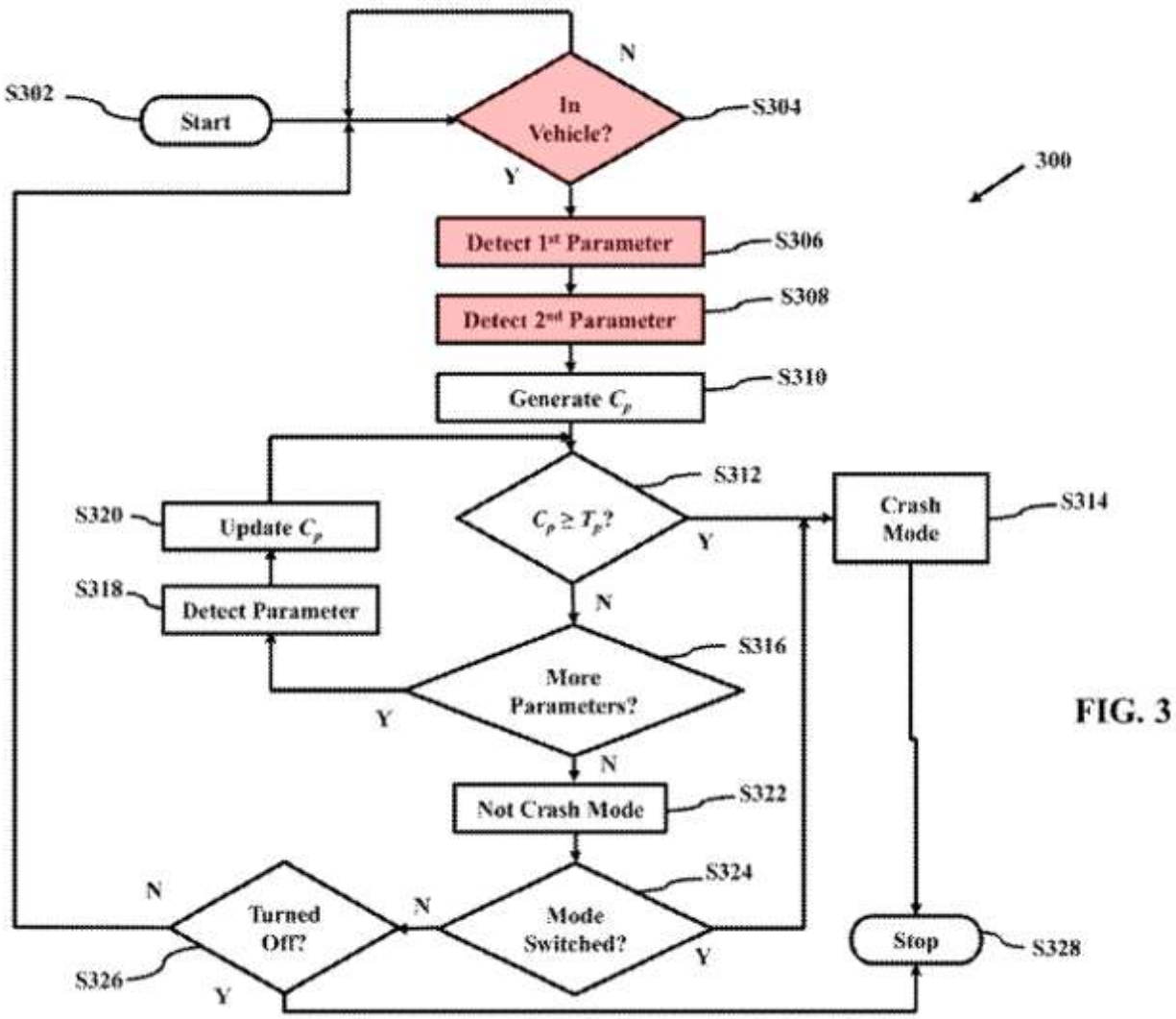


FIG. 3

Id. at Fig. 3 (annotated).

B. Prosecution History

48. I reviewed the history of the application as it was considered and then approved by the United States Patent and Trademark Office, which I understand is called the "prosecution history." *See generally* Ex. 1007, '952 patent prosecution history. As discussed below, I understand that the Examiners entered one non-final

office action rejecting the pending claims before issuing a notice of allowance. *See generally id.*

49. The non-provisional application that led to the '952 patent had 18 claims. *Id.* at 27-31. Original claim 1 read as follows:

> 1. A device for use with a vehicle, said device comprising:
>
> a mode-determining component operable to generate an in-vehicle signal;
>
> a first detecting component operable detect a first parameter and to generate a first detector signal based on the first detected parameter; and
>
> a second detecting component operable detect a second parameter and to generate a second detector signal based on the second detected parameter; and
>
> wherein said mode-determining component is further operable to generate a crash mode signal based on the in-vehicle signal, the first detector signal and the second detector signal.

Id. at 27.

50. In the first office action, the Examiners rejected all pending claims as obvious under § 103 based on Pat. App. Pub. No. US 2013/0130639 to Oesterling et al. in view of Pat. App. Pub. No. 2007/0021915 to Breed at al. Ex. 1007, '952 patent

prosecution history at 65-73.

51. In response, the applicant did not traverse the Examiners' rejection but instead amended claim 1 as follows:

> 1. A device for use with a vehicle, said device comprising:
>
> a mode-determining component operable <u>to detect whether the device is in the vehicle and</u> to generate an in-vehicle signal;
>
> a first detecting component operable detect a first parameter and to generate a first detector signal based on the first detected parameter; and
>
> a second detecting component operable detect a second parameter and to generate a second detector signal based on the second detected parameter; ~~and~~
>
> wherein said mode-determining component is further operable to generate a crash mode signal based on the in-vehicle signal, the first detector signal and the second detector signal.

Id. at 81 (underlined language in original). The applicant made similar amendments to independent claims 7 and 13. *Id.* at 82, 84.

52. In its remarks to the Examiners, the applicant asserted that the added language of "to detect whether the device is in the vehicle" captured the purported "novel aspect" of the claimed invention. *Id.* at 87. The applicant argued that, in

determining whether a vehicle has been in a crash, "a determination is first made as to whether the communication device is actually in the vehicle. This determination helps avoid 'false positive' or erroneous crash detections." *Id.* And, according to the applicant, neither Oesterling nor Breed disclosed this limitation. *Id.* at 88.

53. Following the applicant's response, the Examiners issued a notice of allowance. *Id.* at 171-74. The Examiners provided the following reasons for allowance relating to claim 1:

> None of the references of record either alone or in combination teaches or suggest the following limitations as claimed in claim 1, an apparatus that ***detects whether it is present in a vehicle and then generates a crash mode signal based upon the in-vehicle detection***. This limitation, in combination with the other elements of the claim, is not shown or suggested in the prior art of record.

Id. at 172.[1] The Examiners provided similar reasons for allowance for independent claims 7 and 13. *Id.* at 172-73.

C. The Challenged Claims

54. This Declaration addresses claims 1-18 of the '952 patent (the "Challenged Claims"). Claims 1, 7, and 13 are the independent claims.

[1] All emphasis in this Declaration added unless otherwise noted.

55. Independent claim 1 recites:[2]

1[pre]	A device for use with a vehicle, said device comprising:
1[a]	a mode-determining component operable to detect whether the device is in the vehicle and to generate an in-vehicle signal;
1[b]	a first detecting component operable [to] detect a first parameter and to generate a first detector signal based on the first detected parameter; and;
1[c]	a second detecting component operable [to] detect a second parameter and to generate a second detector signal based on the second detected parameter;

[2] Claim 1 of the '952 patent appears to have the same typo for the "first detecting component" and "second detecting component" limitations. In particular, the limitations are missing the word "to," as added here: "a first detecting component operable [to] detect a first parameter and to generate a first detector signal based on the first detected parameter" and "a second detecting component operable [to] detect a second parameter and to generate a second detector signal based on the second detected parameter." For purposes of this Declaration, I will interpret the limitations as including the additional "to."

1[d]	wherein said mode-determining component is further operable to generate a crash mode signal based on the in-vehicle signal, the first detector signal and the second detector signal.

56. Independent claim 7 recites:

7[pre]	A method for use with a vehicle, said method comprising:
7[a]	detecting, via a mode-determining component, whether the mode-determining component is in the vehicle;
7[b]	generating, via the mode-determining component, an in-vehicle signal;
7[c]	detecting, via a first detecting component, a first parameter;
7[d]	generating, via the first detecting component, a first detector signal based on the first detected parameter;
7[e]	detecting, via a second detecting component, a second parameter;
7[f]	generating, via the second detecting component, a second detector signal based on the second detected parameter; and
7[g]	generating, via the mode-determining component, a crash mode signal based on the in-vehicle signal, the first detector signal and the second detector signal.

57. Independent claim 13 recites:

13[pre]	A non-transitory, computer-readable media having computer-readable instructions stored thereon, for use with a vehicle, the computer-readable instructions being capable of being read by a computer and being capable of instructing the computer to perform the method comprising:
13[a]	detecting, via a mode-determining component, whether the mode-determining component is in the vehicle;
13[b]	generating, via the mode-determining component, an in-vehicle signal;
13[c]	detecting, via a first detecting component, a first parameter;
13[d]	generating, via the first detecting component, a first detector signal based on the first detected parameter;
13[e]	detecting, via a second detecting component, a second parameter;
13[f]	generating, via the second detecting component, a second detector signal based on the second detected parameter;
13[g]	operating an operating component in a first mode;
13[h]	generating, via the mode-determining component, a crash mode signal based on the in-vehicle signal, the first detector signal and the second detector signal; and

13[i]	switching operation of the operating component from the first mode to a second mode based on the crash mode signal.

58. I have added indices of the form 1[a], 1[b], 1[c], etc. to each of the claim elements for ease of reference.

D. Claim Construction

59. I understand that Patent Owner is asserting the ’952 patent against CMT in patent litigation in the United States District Court for the District of New Jersey captioned *Cambridge Mobile Telematics, Inc. v. Sfara, Inc.*, No. 3:23-cv-01368 (D.N.J.). I further understand that in that litigation, the parties filed a Joint Claim Construction Statement in which the parties set forth their competing proposed constructions. Ex. 1008, Joint Claim Construction Statement. I understand that the court in that case has not issued a claim construction order for any terms in the Challenged Claims of the ’952 patent.

60. I understand that, in the district court litigation, the parties have agreed to the constructions for “in-vehicle signal” and “crash mode signal” as used in the ’952 patent. For purposes of this Declaration, I have applied those constructions, set forth in the table below.

61. I understand that the parties dispute the meanings of certain terms in the claims of the ’952 patent. For purposes of this Declaration, I have applied Sfara’s

proposed constructions of any disputed claim terms. In short, I understand that Sfara contends that all claim terms should be given their plain and ordinary meaning.

Claim Term	Construction Applied in IPR
"in-vehicle signal" (claims 1, 7, 13)	Plain-and-ordinary meaning, wherein the plain-and-ordinary meaning of "in-vehicle signal" is "a signal that indicates whether the device is in a vehicle"
"crash mode signal" (claims 1, 7, 13)	Plain-and-ordinary meaning, wherein the plain-and-ordinary meaning of "crash mode signal" is "a signal that indicates detection of a vehicle crash"
"[first/second] detector signal" (claims 1, 7, 13)	Plain-and-ordinary meaning, wherein the plain-and-ordinary meaning of "[first/second] detector signal" is "a signal that corresponds to a [first/second] detected parameter"
"[first/second] mode" (claims 6, 12, 13, 18)	Plain-and-ordinary meaning, wherein the plain-and-ordinary meaning of "[first/second] mode" is "a [first/second] mode of operation"

See Ex. 1008, Joint Claim Construction at 16-20, 23-26.

62. I have applied my understanding of what would be the plain and ordinary meaning to a POSITA of all other claim terms appearing in the Challenged

Claims.

VI. APPLICATION OF THE PRIOR ART TO ASSERTED CLAIMS

63. Based on my review of the prior art it is my opinion that the claims of the ’952 patent are rendered unpatentable based on the following prior art:

Ground	References	Claim(s)
1	Obviousness based on Green (Ex. 1005)	1-18
2	Obviousness based on Wright (Ex. 1004) in view of Green	1-18

64. I am informed by counsel that each reference listed above qualifies as prior art to the challenged claims because each reference was filed and/or published before the earliest claimed priority date of the ’952 patent. I reserve the right to respond in the future to any arguments or positions that Patent Owner may raise, taking account of new information as it becomes available to me.

A. Brief Summary of Prior Art

1. Green

65. U.S. Patent No. 9,390,625 to Green et al. (“Green”) (Ex. 1005), titled “System and method for automatic traffic accident determination and notification,” was issued on July 12, 2016 from Application No. 13/241,398, filed on September

23, 2011, which claims priority to Provisional Application No. 61/387,470, filed on September 29, 2010.

66. Green's invention "relates to a portable onboard device for measuring data associated with a status of a vehicle, determining a status possibly including an accident or other notable event, and transmitting data or alerts based on the determined status and/or measured data." Ex. 1005, Green at 1:23-28. Green's Figure 8 "is a block diagram representing internal components of an exemplary device according to an embodiment of the present invention." *Id.* at 4:7-9.

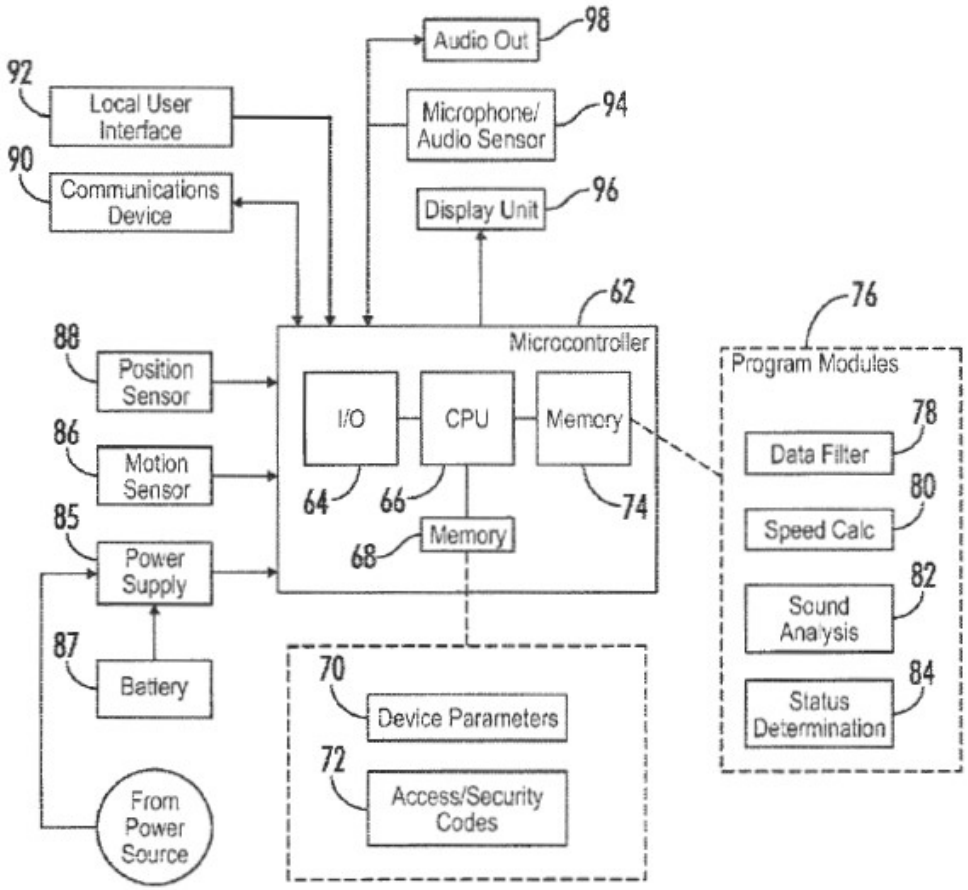


FIG. 8

Id. at Fig. 8.

67. Green's device "may include a control unit 62 such as a conventional microcontroller having an I/O module 64, a processing unit 66, a memory 68 effective to store for example device parameters 70 and relevant access or security codes 72 and a memory 74 upon which resides instructions or program modules 76 such as for example a data filtering module 78, a speed calculation module 80, a sound analysis module 82 and a vehicle status determination module 84." *Id.* at

7:13-22. The device also includes "a vehicle motion sensor 86 such as an accelerometer and/or gyroscope, a position sensor 88 such as a conventional GPS receiver, a communications device 90 such as a cellular modem . . . [and] a microphone 94 or equivalent audio sensor . . . ." *Id.* at 7:40-47.

68. In Figure 10, Green discloses a specific embodiment where the crash detection device is "a computer program product installed on and executable by a mobile cellular device 54 such as for example a smartphone." *Id.* at 12:44-47. The mobile cellular device may be, for example, an Apple iPhone. *Id.* at 12:48-53. The device further includes various onboard sensors known to exist on smartphones, including, for example, an accelerometer, a gyroscope, a GPS receiver, and a microphone. *Id.* at 12:53-56. A POSITA would understand that the mobile device discussed in Figure 10 contains the same elements disclosed in Figure 8.

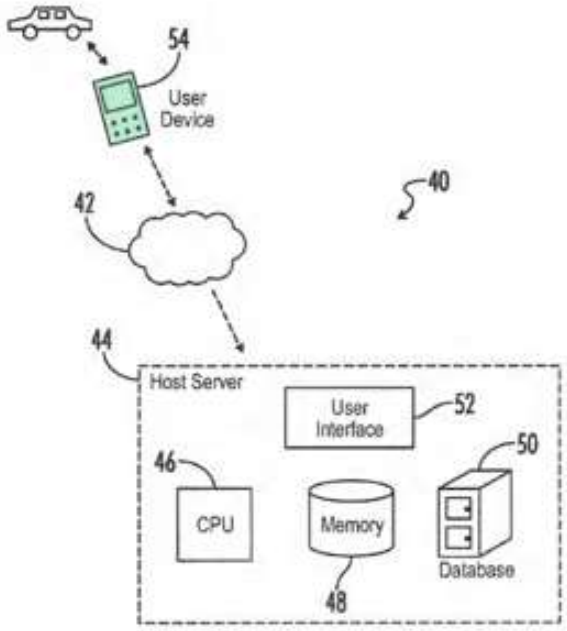


FIG. 10

Id. at Fig. 10 (annotated).

69. In Figure 11, Green describes a crash detection method specifically performed by a computer program running on a smartphone. *Id.* at 13:1-5.

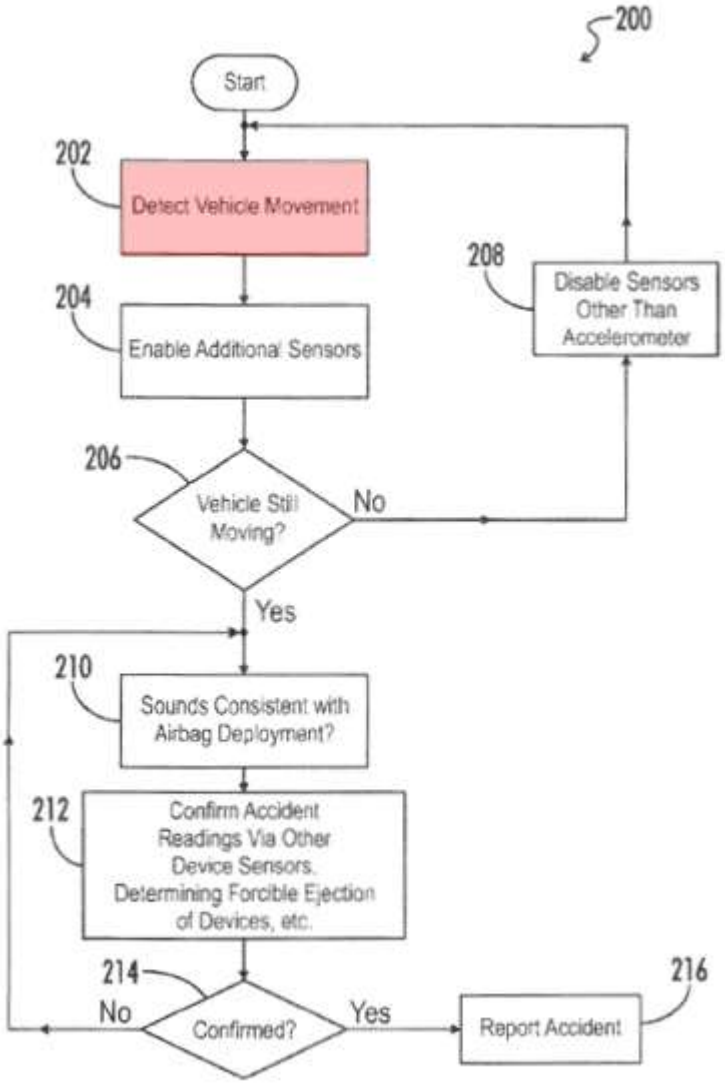


FIG. 11

Id. at Fig. 11 (annotated).

70. Green's smartphone method begins at step 202, where the mobile device confirms that it "is in fact located in a moving vehicle." *Id.* at 13:22-23. Similar to the goal of the patentee in the '952 patent, Green makes this in-vehicle determination to avoid false-positive crash determinations: "Since a mobile cellular

device does not remain in a vehicle at all times, ***such an assessment is necessary to avoid false positives***." *Id.* at 13:23-26. The in-vehicle determination "can be done by using the GPS receiver, accelerometer or various combinations of sensors to discern when conditions being experienced by the device are consistent with being in a vehicle." *Id.* at 13:26-29. As explained below, it is my opinion that Green's determination whether the vehicle is in fact located in a moving vehicle is the "in-vehicle signal" of the '952 patent.

2. Wright

71. U.S. Patent No. 9,311,271 ("Wright") (Ex. 1004), titled "Method and system for logging vehicle behavior," was issued on April 12, 2016 from Application No. 13/994,455, filed on July 24, 2013, which itself claims priority to a number of foreign British applications filed December 15, 2010, January 25, 2011, June 10, 2011, and October 31, 2011. Ex. 1004, Wright at 1:7-11. Wright issued from a PCT application with a PCT filing date of December 15, 2011.

72. Wright is directed to "methods and systems for logging driving information associated with vehicle behaviour." *Id.* at 1:17-19. Wright describes "a mobile telecommunications device for recording events associated with a vehicle, such as a car." *Id.* at 12:56-58. Wright's Figure 3 "is a schematic of the modular components of the mobile telecommunications device 17 . . . ." *Id.* at 15:16-17.

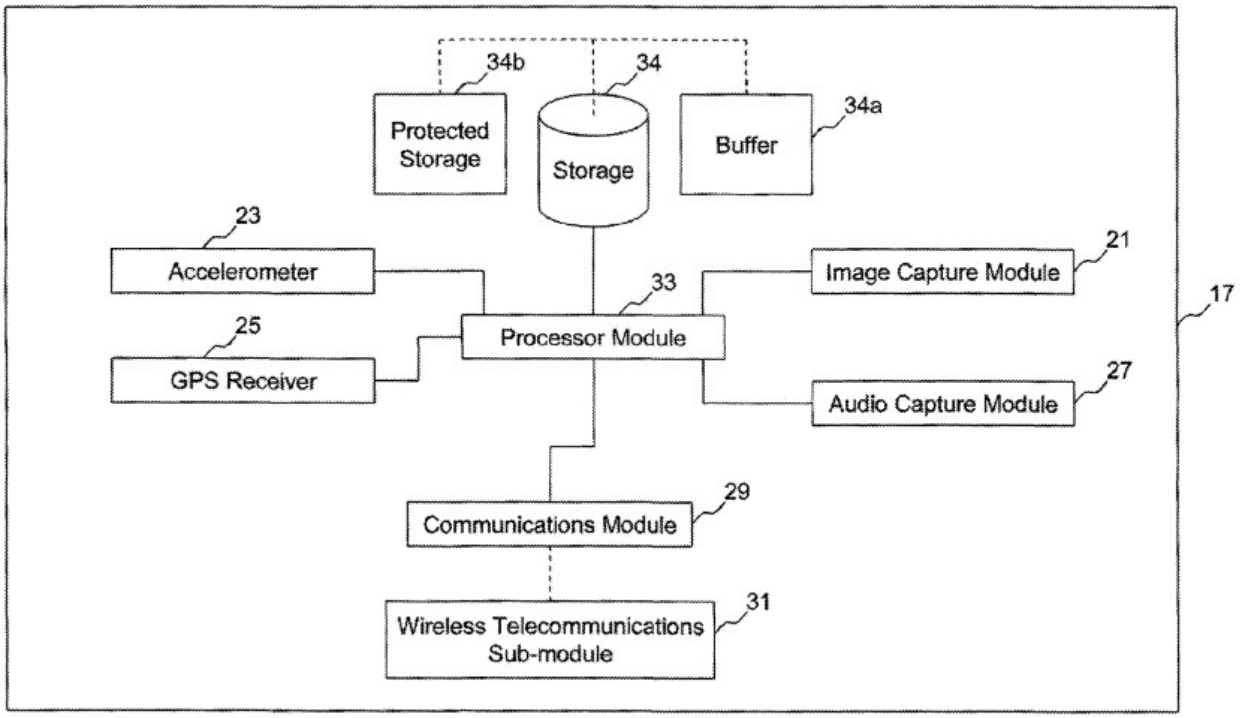


Fig .3

Id. at Fig. 3.

73. Wright discloses that the mobile device includes "an image capture module 21, an accelerometer 23, a GPS receiver 25, an audio capture module 27, a communications module 29, a processor module 31 and a storage module 33." *Id.* at 15:17-21. According to Wright at "[t]he image capture module 21, accelerometer 23, GPS receiver 25, and audio capture module 27 form a sensor set and are generically referred to as data capture modules … and are differentiated from the communications module 29, processor module 31 and storage module 33, in that they comprise sensors for sampling physical data. *Id.* at 15:22-28. The data sampled by the sensors, also known as sensor data, is "processed by the processor module 31

and stored in the storage module 33." *Id.* at 15:29-31.

74. Wright discloses in Figure 4a a method carried out by the mobile device to determine if a driving incident has occurred. *Id.* at 18:8-11.

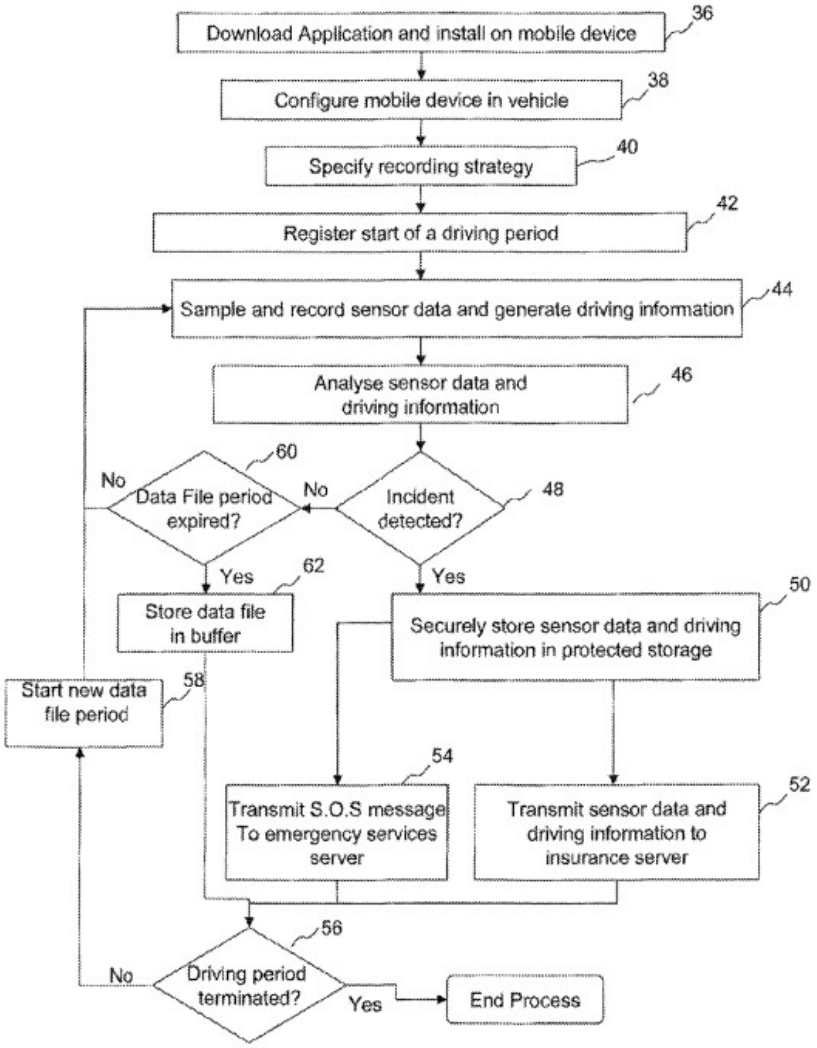


Fig. 4a

Id. at Fig. 4a.

75. Wirght discloses that, in step 42, "[t]he start of a driving period is registered . . . . The start of the driving period determines when the recording of

sampled sensor data begins." *Id.* at 18:30-32. As Wright explains, "the start of the driving period may be automated. For example, ***the mobile device 17 may be configured to initiate the driving period once sensor data above a minimum threshold value is recorded, indicative of the vehicle being in motion***. For example, once a velocity greater than 20 kilometers per hour is detected." *Id.* at 18:34-39. As explained in more detail below, it is my opinion that the identification of the start of the driving period in Wright is the "in-vehicle signal" of the '952 patent.

B. Ground 1: Green Renders Obvious Claims 1-18.

1. Independent Claim 1

76. It is my opinion that Green renders obvious each and every limitation of independent claim 1 as discussed below.

a. 1[pre]: "A device for use with a vehicle, said device comprising"

77. To the extent the preamble of claim 1 is limiting, Green discloses "a device for use with a vehicle."

78. Green is directed to "[a] vehicle status awareness system [that] includes one or more ***devices***," where those devices "include movement sensors which indicate changes in movement of the ***vehicle***, a position sensor which indicates a position of the ***vehicle***, a communications device to send and receive data to and from a remote device and a control unit." Ex. 1005, Green at Abstract. The

disclosure of Green "relates to ***a portable onboard device for measuring data associated with a status of a vehicle***, determining a status possibly including an accident or other notable event and transmitting data or alerts based on the determined status and/or measured data." *Id.* at 1:23-28.

79. Green also discloses a local device 10 that is "a dedicated or standalone device for use in (and powered by a power source associated with) a vehicle such as for example a cigarette lighter adapter as further described below, or may be a computing device having numerous alternative uses such as for example a smartphone running a dedicated program application." Ex. 1005, Green at 5:12-18; *see also id.* at Fig. 8.

80. Figure 10 of Green, copied below, illustrates "an embodiment [where] the local device 10 may be replaced by a computer program product installed on and executable by a mobile cellular device 54 such as for example a ***smartphone*** . . . such as for example the iPhone by Apple . . . ." *Id.* at 12:44-49.

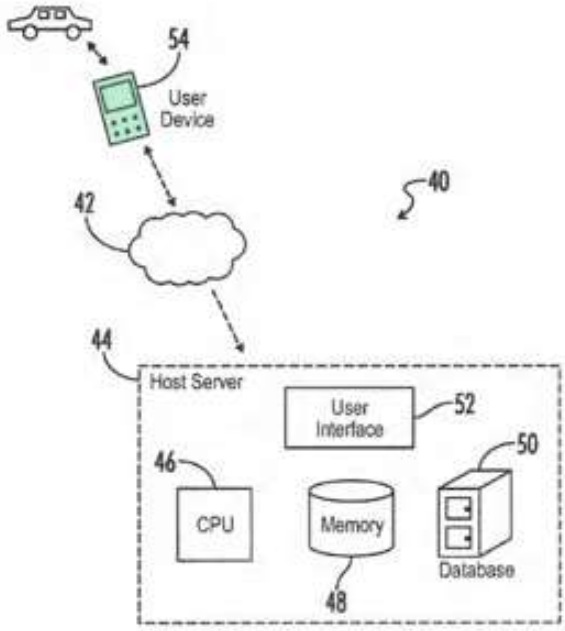


FIG. 10

Id. at Fig. 10 (annotated).

81. Accordingly, Green discloses the preamble of independent claim 1.

b. 1[a]: "a mode-determining component operable to detect whether the device is in the vehicle and to generate an in-vehicle signal"

82. Limitation 1[a] requires "a mode-determining component operable to detect whether the device is in the vehicle and to generate an in-vehicle signal." The '952 patent explains that "[m]ethod 300 starts (S302) and it is determined whether the device is in a vehicle (S304)." Ex. 1001, '952 patent at 7:36-37. The '952 patent states that "device 202 may determine that it is in vehicle 102 by any known method non-limiting examples of which include detecting parameters and comparing the

detected parameters with those associated with vehicle 102." *Id.* at 7:37-41. Examples of detected parameters that can be used to determine whether the mobile device is in a vehicle are "velocity in any of three dimensions" and "acceleration in any of three dimensions." *Id.* at 7:41-46.

83. Green's vehicle status determination module 84 or computer program product executed from a smartphone ("computer program") is the "mode-determining component" claimed in the '952 patent. Figure 8 of Green, copied below, illustrates the "various internal components of an exemplary device 10." Ex. 1005, Green at 7:13-15.

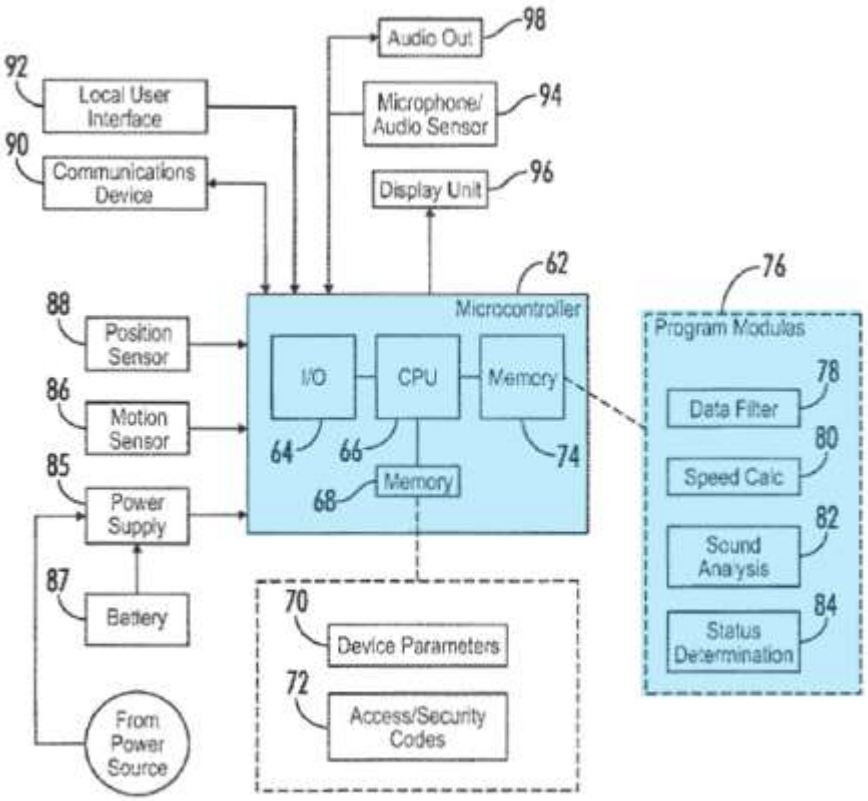


FIG. 8

Id. at Fig. 8 (annotated). Green discloses that the local device 10 can be a mobile device, such as a smartphone, running a dedicated program application. *Id.* at 5:12-19 ("The local device may in various embodiments be a dedicated or standalone device for use in (and powered by a power source associated with) a vehicle such as for example a cigarette lighter adapter . . . , or may be a computing device having numerous alternative uses such as for example a smartphone running a dedicated program application."). Control unit 62 of device 10 may be "a conventional microcontroller having . . . a memory 74 upon which resides instructions or program modules 76 . . . ." *Id.* at 7:15-22. The program modules 76 include a vehicle status determination module 84. *Id.* at 7:13-22, Fig. 8. A POSITA would have understood that the control unit 62 executes program modules 76, including the status determination module.

84. Figure 11 of Green, copied below, illustrates a "method 200 of detecting a vehicle status and more particularly an accident condition, as may be performed by a computer program product executed from a smartphone . . . ." *Id.* at 13:1-5. A POSITA would understand that the smartphone (i.e., user device 54 shown in Figure 10) has the same operative software components as the local device 10, shown in Figure 8, including program modules 76. A POSITA would understand that switching the local device 10 with mobile cellular device 54 would have been a

simple substitution with a reasonable expectation of success. Green discloses that Figure 10 illustrates "an embodiment [where] the local device 10 may be replaced by a computer program product installed on and executable by a mobile cellular device 54 such as for example a smartphone . . . such as for example the iPhone by Apple . . . ." *Id.* at 12:44-49. A POSITA would have further understood that mobile cellular device would have a controller to execute program modules 76, shown in Figure 8. *See supra* section IV. A POSITA would understand that the "computer program product installed on and executable by a mobile cellular device 54" would operate in substantially the same manner, with the same algorithms, as the computer program executed by local device 10 (i.e., program modules 76). Thus a POSITA would understand that the computer program contained the same program modules 76 as local device 10 in order to perform the same methods.

85. Alternatively, Green explicitly discloses that "local device 10 may be replaced by a computer program product installed on and executable by a mobile cellular device 54." *Id.* at 12:44-49. Thus, a POSITA would understand that the computer program would have been capable of executing the methods disclosed in Green—particularly the method disclosed in Figure 11. *See* Ex. 1005, Green at 13:15-21.

86. Both the vehicle status determination module 84 and computer program

are "operable to detect whether the device is in the vehicle." Referring to Figure 11, Green discloses that "[t]he process may begin in step 202 by ***confirming that the mobile device is in fact located in a moving vehicle***." *Id.* at 13:22-23. Green discloses that the determination of whether the mobile device is in the vehicle "can be done by using the GPS receiver, accelerometer or various combinations of sensors to discern when conditions being experienced by the device are consistent with being in a vehicle." *Id.* at 13:26-29.

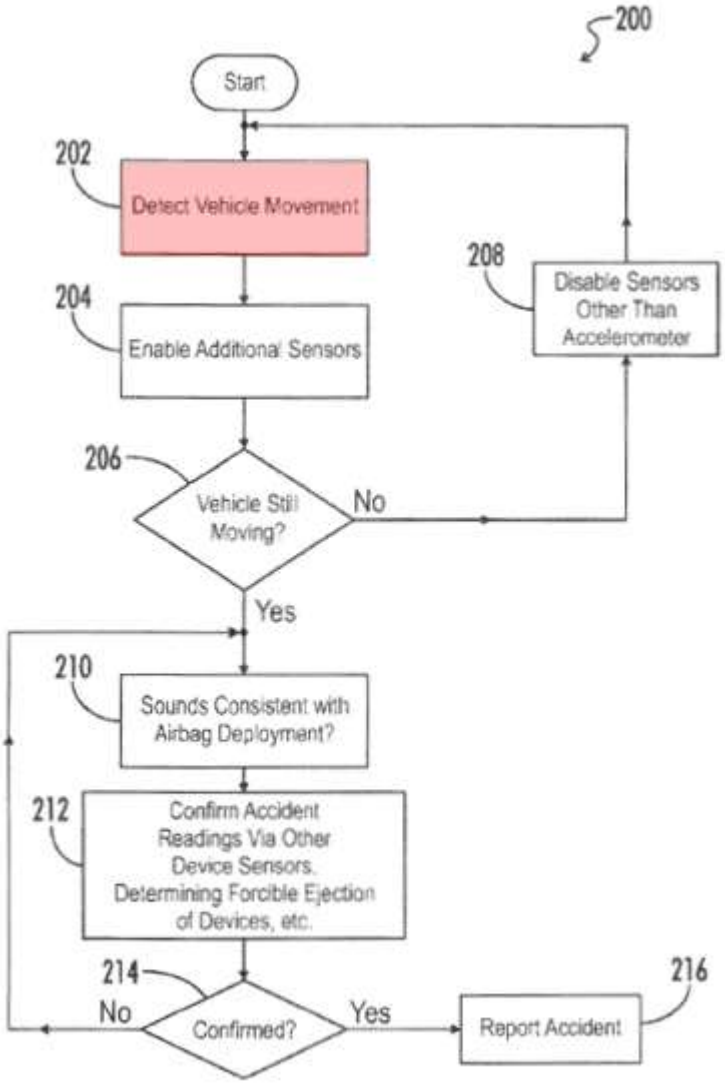


FIG. 11

Id. at Fig. 11 (annotated). Similar to the '952 patent, Green discloses that the purpose of first determining if a mobile device is in a vehicle is to avoid false positives. *Id.* at 13:23-26 ("Since a mobile cellular device does not remain in a vehicle at all times, ***such an assessment is necessary to avoid false positives***."). This determination of whether the smartphone is in the vehicle "can be done by using the GPS receiver,

accelerometer or various combinations of sensors to discern when conditions being experienced by the device are consistent with being in a vehicle." *Id.* at 13:26-29. Green discloses an example where "[t]he data from the accelerometer is used to determine when the device 54 (handset) is transported into the interior of a moving vehicle." *Id.* at 13:42-45. In this example, the program analyzes "velocity and duration of velocity data, as the speed achieved in a moving vehicle coupled with the time spent at that speed is only rarely achieved outside of a moving vehicle." *Id.* at 13:46-48. "Velocity data can be garnered by integrating the acceleration data from the accelerometer as the area under the acceleration curve." *Id.* at 13:45-51.

87. In light of the disclosures above, a POSITA would understand that both the vehicle status determination module 84 and computer program are "operable to detect whether the device is in the vehicle."

88. Both the vehicle status determination module 84 and computer program are "operable . . . to generate an in-vehicle signal." As discussed in section V.D above, I have applied the construction of "in-vehicle signal" to be "a signal that indicates whether the device is in a vehicle." Green discloses that the program runs "passively" in the background and "only draws data constantly from the accelerometer" "[i]n an effort to conserve battery life." Ex. 1005, Green at 13:38-42. If the program determines that the mobile device is located in a moving vehicle

at step 202, then the program "enabl[es] additional sensors (step 204)." *Id.* at 13:55-57; *see also id.* at 13:67-14:3 ("Assuming that the accelerometer data indicates the device is in a moving vehicle, the other sensors will start collecting data to aid in the full functioning of the application."). Green discloses that "when the program is executed and fully functioning," it enters into "active mode." *Id.* at 14:4-5. Green discloses that the program "may continue to check data from the sensors to confirm that it is, in reality, in a moving vehicle (step 206)." *Id.* at 145-7. If the program determines that the mobile device is no longer in a vehicle, then at step 208 "the program returns to passive mode where it only draws data from the accelerometer." *Id.* at 14:7-15.

89. In light of the disclosures above, a POSITA would understand that to move from determining that the mobile device is in a vehicle at step 202 to enabling additional sensors at step 204, the computer program must generate "a signal that indicates whether the device is in a vehicle." Even assuming Green's device did not already include a signal that the device is in a vehicle, a POSITA would have been motivated to design a device that provides such a signal in light of the disclosures in Green regarding avoidance of false accident reporting. Such a modification would have been easy to implement.

90. In light of Green's disclosures above, a POSITA would understand that

the vehicle status determination module 84 and computer program each determine that the mobile device "is in a moving vehicle." *See* Ex. 1005, Green at 13:67-14:1. Therefore, the vehicle status determination module 84 and computer program are each the "mode-determining component" that is "operable to detect whether the device is in the vehicle."

91. Accordingly, Green's vehicle status determination module 84 and computer program are each "a mode-determining component operable to detect whether the device is in the vehicle and to generate an in-vehicle signal," and Green discloses or renders obvious limitation 1[a].

c. 1[b] & 1[c]: "a first detecting component operable [to] detect a first parameter and to generate a first detector signal based on the first detected parameter" & "a second detecting component operable [to] detect a second parameter and to generate a second detector signal based on the second detected parameter"

92. Limitations 1[b] and 1[c] require "a [first/second] detecting component operable [to] detect a [first/second] parameter and to generate a [first/second] detector signal based on the [first/second] detected parameter." The '952 patent discloses that sound may be the first detected parameter. Ex. 1001, '952 patent at 6:53:58 ("Parameter-detecting component 222 may be any known device or system that is operable to detect a parameter, non-limiting examples of which include . . . sound . . . ."); *see also* 8:11-40.

93. I have been informed by counsel that it is common in patent parlance to use words like "first" and "second" to distinguish between multiple instances of the same element (here, "detecting components") rather than using those words to connote any specific sequential order. This common usage of "first" and "second" to distinguish elements is also supported by the '952 patent specification. In my opinion, the specification does not place any significance on the specific order in which the two parameters are detected by the "first" and "second" detecting components; instead, according to the '952 patent, all that matters is that the two parameters are detected at all and used for the crash determination. Ex. 1001, '952 patent at 4:35-37 ("Then the communication device will detect at least two parameters associated with a vehicle crash."), 16:52-55 ("By detecting a crash based on being in a vehicle and based on two additionally detected parameters, the likelihood of erroneously detecting a crash is greatly reduced."). Indeed, a POSITA would understand that the various detecting components in a smartphone (e.g., accelerometer, microphone, GPS) operate independently of each other.

94. Sound: Green's sound analysis module 82 or the computer program are each the "[first/second] detecting component" claimed in the '952 patent. As discussed above, Figure 8 of Green, copied below, illustrates the "various internal components of an exemplary device 10," including program modules 76. Ex. 1005,

Green at 7:13-15. The program modules 76 include a sound analysis module 82. *Id.* at 7:13-22, Fig. 8. As discussed above, a POSITA would understand that the control unit 62 executes program modules 76, including the sound analysis module 82. Green discloses that "[f]urther residing within or about the device housing(s) 10 and functionally linked to the controller 62 may be without limitation . . . a microphone 94 or equivalent audio sensor." *Id.* at 7:13-22, 7:40-47.

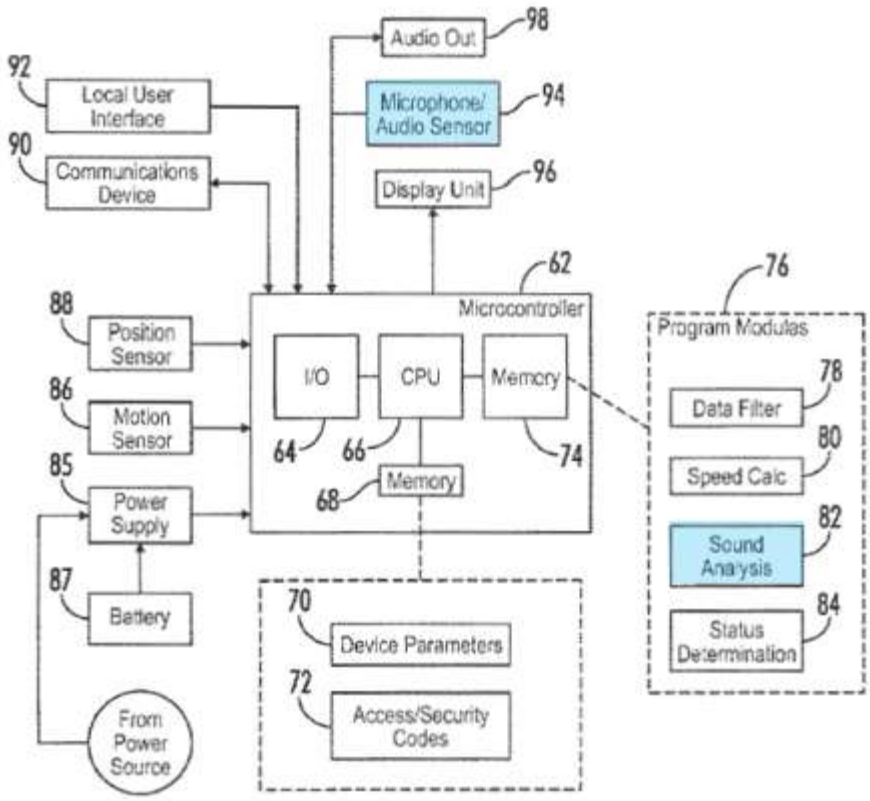


FIG. 8

Id. at Figure 8 (annotated).

95. As discussed above, Figure 11 of Green, copied below, illustrates

"another method 200 of detecting a vehicle status and more particularly an accident condition, as may be performed by a computer program product executed from a smartphone, may include supplementing of movement data as described above by further using sound data." *Id.* at 13:1-5. As discussed above, a POSITA would understand that the computer program would have been capable of executing the methods disclosed in Green—particularly the method disclosed in Figure 11. *See* Ex. 1005, Green at 13:15-21. Thus, a POSITA would understand that the computer program included sound analysis module 82.

96. Alternatively, as discussed above, A POSITA would understand that the computer program would have been capable of executing the methods disclosed in Green—particularly the method disclosed in Figure 11. *Id.* at 13:15-21.

97. Both the sound analysis module 82 and computer program are "operable [to] detect a [first/second] parameter." Accordingly, a POSITA would have been motivated to use the sound analysis module 82 and computer program interchangeably due to their overlapping functionality. Referring to Figure 11, Green discloses that "another method 200 of detecting a vehicle status and more particularly an accident condition, as may be performed by a computer program product executed from a smartphone, may include supplementing of movement data as described above by further using ***sound data***." Ex. 1005, Green at 13:1-6. Green

explains that, "[i]n an effort to eliminate false positives, the data from the accelerometer/gyroscope may be substantiated using the microphone to detect the impulse/noise physically generated by airbag deployment or an equivalent sound sufficiently representative of an accident." *Id.* at 13:11-15. Referring to Figure 11, Green discloses that "[t]he process continues in step 210 when a sound has been detected by the program as being consistent with airbag deployment in the vehicle, while the program is in active mode." *Id.* at 14:35-38.

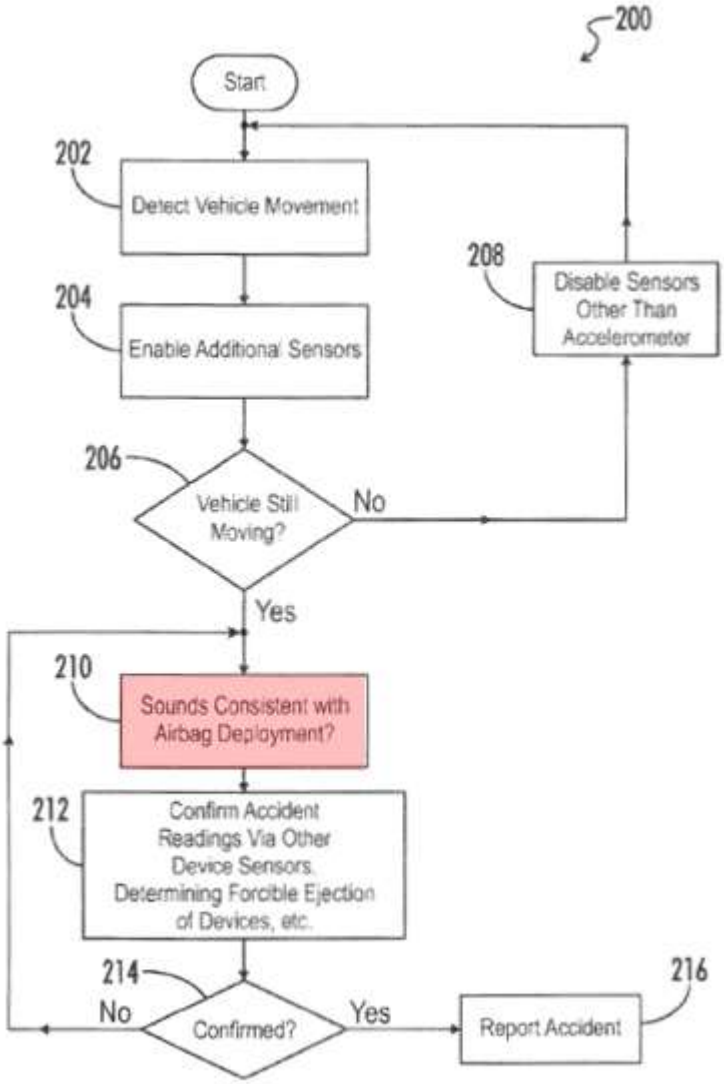


FIG. 11

Id. at Fig. 11 (annotated). Green further states that "[t]he noises/impulses that the microphone detects can be interpreted in two fashions, by analyzing the sound signature or by detecting the occurrence of a given threshold (measured in for example decibels—dB as is conventionally known in the art)." *Id.* at 14:38-42.

98. A POSITA would understand the sound analysis module 82 or the

computer program to be the "[first/second] detecting component" claimed in the '952 patent. Green's sound analysis module 82 or the computer program detects the exact same parameter—sound—as one of the exemplary parameters detected by the parameter-detecting component 222 of the '952 patent. Accordingly, Green's sound analysis module 82 or the computer program are each "a [first/second] detecting component operable [to] detect a [first/second] parameter."

99. The sound analysis module 82 and the computer program are each "operable . . . to generate a [first/second] detector signal based on the [first/second] detected parameter." As discussed in section V.D above, I have applied the construction of "[first/second] detector signal" to be "a signal that corresponds to a [first/second] detected parameter."

100. As discussed above, the sound analysis module 82 or the computer program "interprets" the sound by either "analyzing the sound signature or by detecting the occurrence of a given threshold (measured in for example decibels—dB as is conventionally known in the art)." Ex. 1005, Green at 14:38-42. As will be discussed in more detail below, this output is sent to the "mode determining component." A POSITA would understand the output of the analysis would be "a signal that corresponds to a [first/second] detected parameter." A POSITA would further understand that the sound analysis module 82 or the computer program would

send a signal to trigger the advancement to another step. A POSITA would further be motivated to design a device that could generate the signal to advance the process of efficiently detecting an accident and would have had a reasonable expectation of success in doing so.

101. In light of Green's disclosure above, a POSITA would understand that the sound analysis module 82 or the computer program are each "a [first/second] detecting component operable [to] detect a [first/second] and to generate a [first/second] signal based on the [first/second] detected parameter."

102. Acceleration: Green's speed calculation module 80 or the computer program are each the "[first/second] detecting component" claimed in the '952 patent. As discussed above, Figure 8 of Green, copied below, illustrates the "various internal components of an exemplary device 10," including program modules 76. Ex. 1005, Green at 7:13-15. The program modules 76 include a speed calculation module 80. *Id.* at 7:13-22, Fig. 8. As discussed above, a POSITA would understand that the control unit 62 executes program modules 76, including the speed calculation module 80. Green discloses that "[f]urther residing within or about the device housing(s) 10 and functionally linked to the controller 62 may be without limitation . . . a vehicle motion sensor 86 such as an accelerometer and/or gyroscope, a position sensor 88 such as a conventional GPS receiver." *Id.* at 7:13-22, 7:40-47.

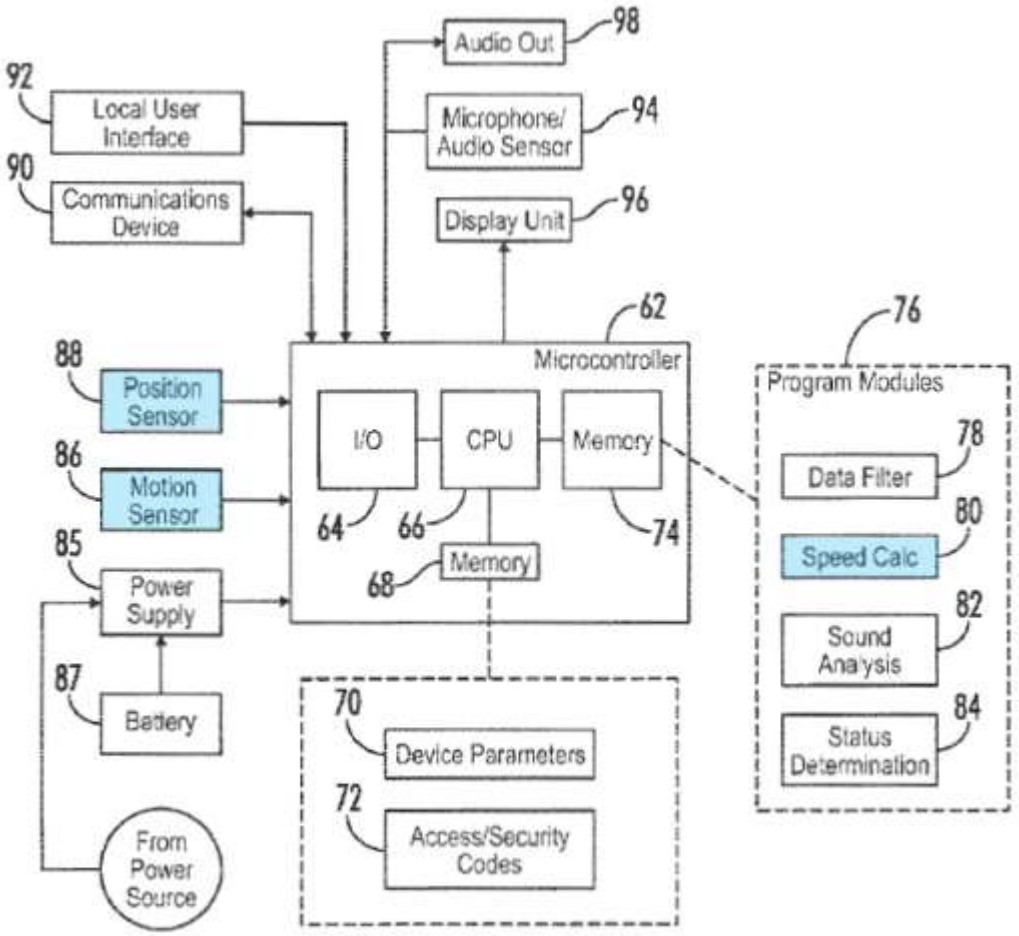


FIG. 8

Id. at Figure 8 (annotated).

103. As discussed above, Figure 11 of Green, copied below, illustrates "another method 200 of detecting a vehicle status and more particularly an accident condition, as may be performed by a computer program product executed from a smartphone, may include supplementing of movement data as described above by further using sound data." *Id.* at 13:1-5. Again referring to Figure 11, Green discloses that, "in step 212 the process continues by confirming the accident reading

via other device sensors such as the accelerometer, in a manner which in various embodiments may be substantially equivalent to that of the process 100 described above," in Figure 9. *Id.* at 14:63-67.

104. Figure 9 of Green shows "a method 100 for determining an accident condition as a vehicle status." *Id.* at 10:13-15. Green discloses that method 100 "may be executed in accordance with a computer program product as described above." *Id.* at 10:15-17.

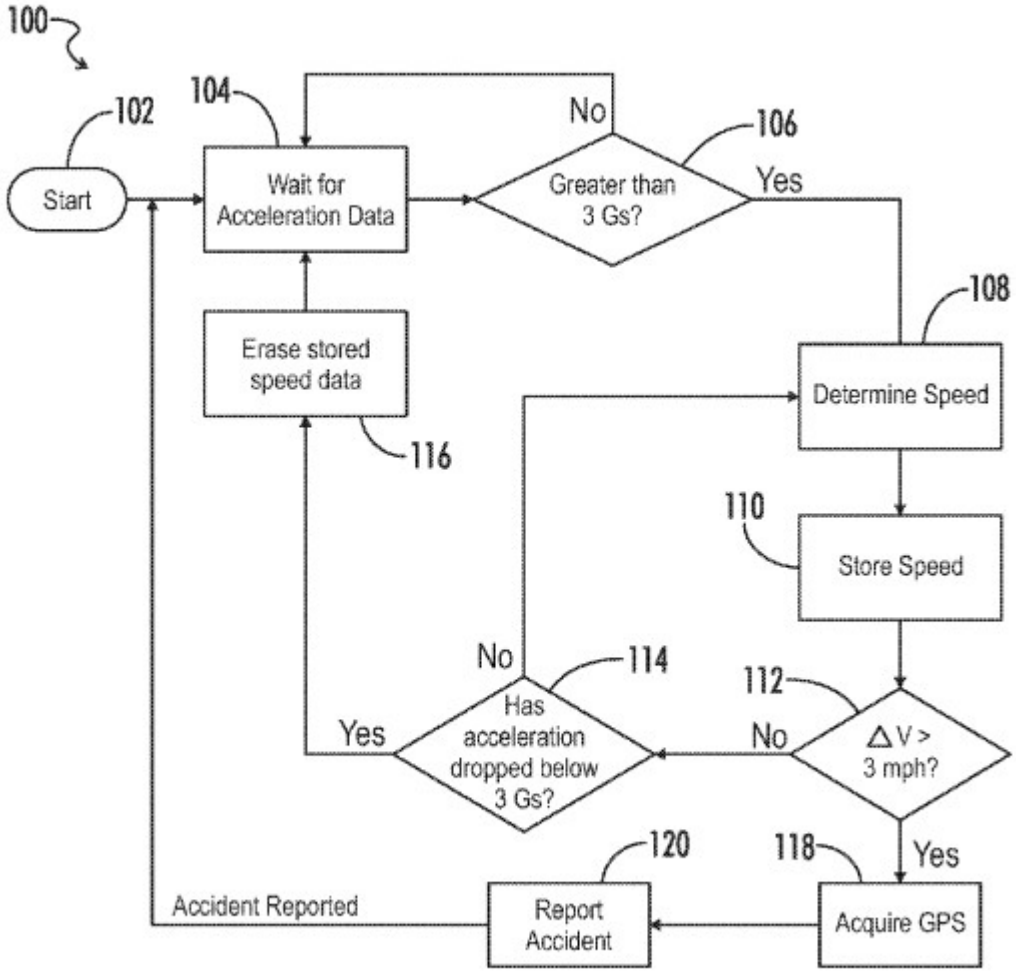


FIG. 9

Id. at Fig. 9.

105. As discussed above, a POSITA would understand that the computer program would have been capable of executing the methods disclosed in Green—particularly the method disclosed in Figure 11. *See id.* at 13:15-21. Thus, a POSITA would understand that the computer program included speed calculation module 80.

106. Alternatively, as discussed above, A POSITA would understand that

the computer program would have been capable of executing the methods disclosed in Green—particularly the method disclosed in Figure 11. *See id.* at 13:15-21.

107. Both the speed calculation module 80 and computer program are "operable [to] detect a [first/second] parameter." Accordingly, a POSITA would have been motivated to use speed calculation module 80 and the computer program interchangeably due to their overlapping functionality. Referring to Figure 9, Green discloses that at step 104, "the microcontroller may begin receiving acceleration data from the accelerometer of the local device." *Id.* at 10:25-27. "If an acceleration reading (or alternatively a set of acceleration readings where the data may be averaged and filtered for any of various reasons) exceeds the acceleration threshold (i.e., 'yes' in response to the query of step 106), the process continues to step 108 and the vehicle speed may be determined." *Id.* at 10:31-36. "Upon determining a vehicle speed or a series of two or more vehicle speed readings (step 108) and storing the vehicle speed reading(s) (step 110), the process then determines whether the change in speed is consistent with an accident in view of for example a change in speed being greater than a second predetermined threshold (step 112)." *Id.* at 10:44-49.

108. A POSITA would understand the speed calculation module 80 or the computer program to be the "[first/second] detecting component" claimed in the

'952 patent. Green's speed calculation module 80 or the computer program detects the exact same parameters—acceleration and speed—as one of the exemplary parameters detected by the parameter-detecting component 222 of the '952 patent. Accordingly, Green's speed calculation module 80 or the computer program are each "a [first/second] detecting component operable [to] detect a [first/second] parameter."

109. The speed calculation module 80 and the computer program are each "operable . . . to generate a [first/second] detector signal based on the [first/second] detected parameter." As discussed in section V.D above, I have applied the construction of "[first/second] detector signal" to be "a signal that corresponds to a [first/second] detected parameter."

110. As discussed above, the speed calculation module 80 or the computer program determines "[i]f an acceleration reading (or alternatively a set of acceleration readings where the data may be averaged and filtered for any of various reasons) exceeds the acceleration threshold (i.e., 'yes' in response to the query of step 106), the process continues to step 108." Ex. 1005, Green at 10:31-36. A POSITA would understand that the result of the comparison of an acceleration reading (or other calculation) to a threshold is "a signal that corresponds to a [first/second] detected parameter." Additionally, at step 108, "the vehicle speed may

be determined." *Id.* at 10:35-36. Green discloses that "[u]pon determining a vehicle speed or a series of two or more vehicle speed readings (step 108) and storing the vehicle speed reading(s) (step 110), the process then determines whether the change in speed is consistent with an accident in view of for example a change in speed being greater than a second predetermined threshold (step 112)." *Id.* at 10:44-49. A POSITA would understand that the result of the comparison of a change in speed to a threshold is "a signal that corresponds to a [first/second] detected parameter." A POSITA would understand the output of either analysis would be "a signal that corresponds to a [first/second] detected parameter." A POSITA would also understand that the speed calculation module 80 or the computer program would send a signal to trigger the advancement to another step. A POSITA would further be motivated to design a device that could generate the signal to advance the process of efficiently detecting an accident and would have had a reasonable expectation of success in doing so.

111. A POSITA would have been motivated to combine the methods shown in Figures 9 and 11, in part, because they disclose methods that Green describes as "for determining an accident condition as a vehicle status." Ex. 1005, Green at 10:13-15 (Referring now to FIG. 9, an exemplary embodiment of a method 100 for determining an accident condition as a vehicle status may be described."), 13:1-2

("Referring to FIG. 11, another method 200 of detecting a vehicle status and more particularly an accident condition ….). Moreover, Green discloses that method 200 shown in Figure 11, "may include supplementing of movement data as described above by further using sound data." *Id.* at 13:1-5. Green discloses that "[t]he previously described method 100 determined an accident based upon acceleration and rate of change in velocity readings that are consistent with an accident …." *Id.* at 13:6-8. Green even describes step 212 ("Confirm Accident Readings Via Other Device Sensors, Determining Forcible Ejection of Devices, etc.") as "confirming the accident reading via other device sensors such as the accelerometer, in a manner which in various embodiments may be substantially equivalent to that of the process 100 described above." *Id.* at 14:63-67. A POSITA would have been motivated, through the explicit disclosures in Green, to combine method 200 with elements of method 100. A POSITA would have had a reasonable expectation of success in combining the methods because Green instructs the use of method 100 in conjunction with method 200. Moreover, combining methods 100 and 200 are adjacent to each other and are explicitly disclosed as being able to be combined.

112. In light of Green's disclosure above, a POSITA would understand that the speed calculation module 80 or the computer program are each "a [first/second] detecting component operable [to] detect a [first/second] and to generate a