

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZENDRIVE, INC.,
Petitioner,
v.
CAMBRIDGE MOBILE TELEMATICS INC.,
Patent Owner.

U.S. Patent No. 10,672,249 B1
Case No. IPR2023-01440

DECLARATION OF SCOTT ANDREWS

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I, Scott Andrews declare as follows:

I. INTRODUCTION

1. I have been retained Zendrive, Inc. (“Zendrive”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”). I am not an employee of Zendrive or any affiliate or subsidiary of Zendrive.

2. I have been asked to consider whether certain references teach or suggest the features recited in certain claims of U.S. Patent No. 10,672,249, which I refer to herein as the ’249 patent.

3. My opinions and the bases for my opinions are set forth below.

4. I am being compensated at my ordinary and customary rate of \$500 per hour for my work, plus reimbursement for any reasonable expenses. My compensation is based solely on the amount of time that I devote to activity related to this case and is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other financial interest in this proceeding.

II. EDUCATION BACKGROUND, PROFESSIONAL EXPERIENCE, AND OTHER QUALIFICATIONS

5. My curriculum vitae (“CV”) is attached hereto as Attachment A and provides an accurate identification of my background and experience.

6. I have over 30 years of professional experience in the automotive and transportation industry, including in intelligent transportation systems, vehicle electrical and electronics systems, vehicle information systems, and navigation systems.

7. I received an undergraduate Bachelor of Science degree in Electrical Engineering from the University of California, Irvine, in 1977. I received a Master's of Science degree in Electrical Engineering from Stanford University in 1982.

8. From 1977 to 1983, I held engineering positions at Ford Aerospace and Teledyne Microwave, working on, among other things, transmitter-receiver systems for guided missile systems and other related military electronics.

9. From 1983 to 1993, I worked at TRW, Inc. ("TRW") in the Space & Electronics Group, where I served as a project manager, a department manager, and as an assistant program manager on a variety of spacecraft communications systems projects. My last position at TRW Space & Electronics was as the manager of the MMIC Products Organization, which was directed toward monolithic microwave integrated circuits. In that role, I developed TRW's commercial GaAs MMIC business. My responsibilities included development of a business strategy and business plan, and overall management of customer and research and development programs for my department. During my time in the MMIC Products Organization I also developed the first single chip 94 GHz radar, intended for use in automotive

adaptive cruise control systems. While I was at TRW Space & Electronics, I received several awards for outstanding performance on Independent Research and Development projects.

10. In 1993, while still at TRW, I moved to the Automotive Electronics and Group and became the Director of Systems Engineering and Advanced Products. In this role, I was responsible for the overall management of TRW's advanced development programs in the automotive electronics space. These programs included, among other things, wireless remote keyless entry systems, vehicle tracking and location systems (e.g., roadside assistance and emergency response systems), emergency vehicle warning systems (e.g., transmitter-receiver systems that would provide a warning inside the user's vehicle when an active emergency vehicle was in the vicinity), automotive collision avoidance radar, and other types of vehicle information systems. I served in this role until 1996.

11. From 1996 to 2000, I worked at Toyota Motor Corporation as a Project General Manager in the R&D Management Division. My responsibilities there included the conceptualization and development of multimedia systems and new technology products and services for Toyota's future generations of passenger vehicles. My work at Toyota included the development of adaptive cruise control systems based on radar and lidar sensors. For example, I evaluated a variety of sensors and subsystems in Europe and Japan specifically to support Toyota's

development of adaptive cruise control and forward collision avoidance systems. In this capacity I also interacted extensively with the Collision Avoidance Metrics Partnership (CAMP), a joint venture between Ford Motor Company and General Motors.

12. While at Toyota, I was responsible for a variety of research collaborations, including, for example, a collaboration with Dr. Paul Green at the University of Michigan Transportation Research Institute (UMTRI) wherein we studied the distraction created by different map displays for navigation systems, and identified various rules for the display of map information based on the speed of the vehicle. This included readability studies for how street names were displayed, and what level of map detail should be displayed as a function of vehicle speed.

13. In 1999, I founded Cogenia, Inc. to develop an enterprise-class data management software system. While at Cogenia, I developed and oversaw the company's business concept and strategic plan and led the executive team in the development of an enterprise data system for managing data between multiple user endpoints or devices. This included home and work computing environments, as well as multiple mobile devices. In each case, key data useful to the user was prepositioned so that it could be easily accessed when and where the user needed it the most. Cogenia, Inc. ceased operations in December 2000.

14. I founded Cogenia Partners, LLC as an independent consultant in the intelligent vehicles and mobile systems industry in October 2001. My primary clients have been automotive manufacturers, various navigation and mobile device makers, and the U.S. Department of Transportation.

15. Between 2001 and 2003, I was engaged as a consultant to Toyota serving as a key member of the AMI-C technical team. At the conclusion of the AMI-C Release II specifications, I transitioned the AMI-C specifications to the International Organization for Standardization (or ISO) and the Open Services Gateway initiative (or OSGi) as part of the Connected Vehicle Trade Association, for which I currently serve as the Vice President of Technology.

16. My consulting experience includes serving between 2005 and 2010 as the Chief System Architect for the Vehicle Infrastructure Integration (“VII”) program. This was a cooperative research project sponsored by the Federal Highway Administration (“FHWA”) and a group of automakers who had formed the VII Consortium (or VIIC). In this role, I was responsible for developing the system architecture, defining requirements, and leading the development and testing of a system for communicating between the roadway and the car, and between cars.

17. My consulting experience also includes serving as technical consultant to the American Association of State Highway Transportation Officials (or AASHTO) for connected vehicle deployment analysis and strategy; technical

consultant to Booz Allen for connected vehicle security credential communications systems analysis, for the FHWA; and technical consultant to ARINC for the development of an advanced connected vehicle test facility for the FHWA Turner Fairbank Highway Research Center. I recently completed a project as co-principal investigator for Integrated Advanced Transportation System (a research program funded by FHWA).

18. Currently, I consult with the U.S. Department of Transportation, major carmakers, and suppliers on vehicle information systems, safety systems, and communication systems. In the various positions mentioned above, I was responsible for the research and development of projects relating to numerous vehicle information systems, user interface systems, sensory systems, control systems, and safety systems, and I also had the opportunity to collaborate with numerous researchers and suppliers to the auto industry. I am a member of the Institute of Electrical and Electronics Engineers (or IEEE), the IEEE Standards Association, the Society of Automotive Engineers (or SAE), the Institute of Navigation (or ION), and the International Council on Systems Engineering (or INCOSE).

19. I have authored numerous technical papers. My publications include papers on topics related to telematics, software and network architecture, and vehicle infrastructure, including integration of vehicle systems. My curriculum vitae (attachment A) includes a list of all publications I have authored in the last 10 years.

20. Additionally, I am the named inventor of twenty-seven U.S., Japanese and European patents, including patents related to controlling a mobile device based on contextual information from sensors. For example, U.S. Patent 6,122,682, titled “Communication System for Controlling Data Processing According to a State of a Communication Terminal Device” discloses controlling the behavior of a personal information device (handheld or in a vehicle) based on an inference about the activity (i.e., state or context) of the user. The patent describes determining the speed of a vehicle based on signals from a motion/speed sensors on a terminal device and takes certain actions depending on a positive determination, such as converting text notifications to audio. The patent also describes determining that the user is in a meeting based on their calendar and suppressing the ringing of their phone by an incoming call. Instead, a message is automatically sent back to the caller informing them that the user is in a meeting, and will call back later. My curriculum vitae (attachment A) includes a complete list of my issued patents.

21. I am familiar with the subject matter of this case, and consider myself an expert in, among other things, intelligent transportation systems, vehicle information and communications systems, and navigation systems

III. ASSIGNMENT AND MATERIALS CONSIDERED

22. I have been asked to provide analysis and explain the subject matter of the '249 patent, including the state of the art when the '249 patent application was

filed. I have also been asked to consider, analyze, and explain certain prior art to the '249 patent including how that art relates to the challenged claims of the '249 patent and to provide my opinions regarding whether that art invalidates the claimed subject matter.

23. The opinions expressed in this declaration are not exhaustive of opinions I may offer in the future regarding the unpatentability of the claims of the '249 patent. Therefore, the fact that I do not address a particular point should not be understood to indicate an agreement on my part that any claim complies with the requirements of any applicable patent or other rule.

24. I reserve the right to amend and supplement this declaration in light of additional evidence, arguments, or testimony presented during this IPR or related proceedings on the '249 patent.

25. In forming the opinions set forth in this declaration, I have considered and relied upon my education, knowledge of the relevant field, knowledge of scientific and engineering principles, and my experience. I have also reviewed and considered the '249 patent (Exhibit 1001), its prosecution history (Exhibit 1002), and the following additional materials:

Exhibit	Description
1004	U.S. Patent No. 10,567,919 B2 to Schmitt et al.
1005	U.S. Patent No. 9,796,391 B2 to Olson et al.

1006	U.S. Patent No. 9,692,879 B1 to Lack
1008	U.S. Patent No. 9,053,516 to Stempora
1009	U.S. Patent No. 10,158,977 B2 to Cordova
1010	Horrey et al., “In-Vehicle Glance Duration: Distributions, Tails, and Model of Crash Risk,” Transportation Research Record (Dec. 2007)
1011	Excerpt from Maloney, “Dutton’s Navigation & Piloting” (14 th Ed., 1985)
1012	Barbour et al., “Micromachined Inertial Sensors for Vehicles,” IEEE, 1058-1063 (1998)
1013	U.S. Patent No. 3,197,880 to Rice
1014	Ettelt et al., “A New Low Consumption 3D Compass Using Integrated Magnets and Piezoresistive Nano-Gauges,” Transducers ’11, 40-43 (June 5-9, 2011)
1015	Excerpt from Zhao, “Vehicle Location and Navigation Systems” (1997)
1016	Nowakowski et al., “Map Design: An On-the-Road Evaluation of the Time to Read Electronic Navigation Displays,” Technical Report UMTRI-98-4 (June 1998)
1017	Fleming et al., “Driver Performance and Memory for Traffic Messages: Effects of the Number of Messages, Audio Quality, and Relevance,” Technical Report UMTRI 98-22 (June 1998)
1018	U.S. Patent No. 6,122,682 to Andrews
1019	JP H10-232992 to Nojima (and associated translation)
1020	Excerpt from Resnick et al., “Physics, Part I” (1966)

IV. UNDERSTANDING OF THE LAW

26. I am not an attorney, but have been instructed in and applied the law as described in this section.

27. I understand that the first step in comparing an asserted claim to the prior art is for the claim to be properly construed. I address how a person of ordinary skill in the art (POSITA) would have understood the claims of the alleged invention in Section VIII below.

28. I have been further instructed and understand that a patent claim is unpatentable and invalid as obvious if the subject matter of the claim as a whole would have been obvious to a POSITA of the claimed subject matter as of the time of the invention at issue. I understand that when assessing the obviousness of claimed subject matter, the following factors are evaluated: (1) the scope and content of the prior art; (2) the difference or differences between each claim of the patent and the prior art; and (3) the level of ordinary skill in the art at the time the patent was filed.

29. I understand that claimed subject matter may be obvious in view of more than one item of prior art. I understand, however, that it is not enough to show simply that all the limitations of the claimed subject matter are spread throughout the prior art. Instead, for claimed subject matter to be obvious over multiple

references, there must be some reason or motivation for a POSITA to combine the prior art references to arrive at the claimed subject matter.

30. I have been informed that, in seeking to determine whether an invention that is a combination of known elements would have been obvious to a POSITA at the time of the invention, one must consider the references in their entirety to ascertain whether the disclosures in those references render the combination obvious to such a person.

31. I have been informed and understand that, while not required, the prior art references themselves may provide a teaching, suggestion, motivation, or reason to combine, but other times the motivation linking two or more prior art references is common sense to a POSITA at the time of the invention.

32. I understand that a particular combination may be proven obvious by showing that it was obvious to try the combination. I have been informed that, if a technique has been used to improve one device, and a POSITA would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

33. I further understand that an obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references also may be supplied by the direction of the marketplace. For example, when there is a design need or market pressure to solve

a problem and there are a finite number of identified, predictable solutions, a POSITA has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

34. I have been informed that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. Thus, where all of the elements of a claim are used in substantially the same manner, in devices in the same field of endeavor, the claim is likely obvious.

35. Additionally, I understand that a patent is likely to be invalid for obviousness if a POSITA can implement a predictable variation or if there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent's claims. Therefore, when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one.

36. I further understand that combining embodiments related to each other in a single prior art reference would not ordinarily require a leap of inventiveness.

37. I also understand that a POSITA must have had a reasonable expectation of success when combining references for claimed subject matter to be obvious.

38. I have been informed and I understand that factors referred to as “objective indicia of non-obviousness” or “secondary considerations” are also to be considered when assessing obviousness when such evidence is available. I understand that these factors can include: (1) commercial success; (2) long-felt but unresolved needs; (3) copying of the invention by others in the field; (4) initial expressions of disbelief by experts in the field; (5) failure of others to solve the problem the claimed subject matter solved; and (6) unexpected results.

39. I also understand that evidence of objective indicia of non-obviousness must be commensurate in scope with the claimed subject matter. I further understand that there must be a relationship, sometimes referred to as a “nexus,” between any such secondary indicia and the claimed invention.

40. Finally, I have been informed that one cannot use hindsight to determine that an invention was obvious.

41. I provide my opinions in this declaration based on the guidelines set forth above.

V. LEVEL OF SKILL IN THE ART

42. I have been informed and understand that the level of ordinary skill in the relevant art at the time of the invention is relevant to inquiries such as the meaning of claim terms, the meaning of disclosures found in the prior art, and the reasons a POSITA may have for combining references.

43. I have been informed and understand that factors that may be considered in determining the level of ordinary skill include: (1) the education of the inventor; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) education level of active workers in the relevant field. I have been further informed and understand that a person of ordinary skill in the art (POSITA) is also a person of ordinary creativity.

44. In my opinion, a POSITA in the technology field of the '249 patent would have had a degree in computer science, computer engineering, electrical engineering, or a similar discipline, along with 2 years of professional experience working with the interplay of mobile devices and vehicles, or an equivalent level of skill, knowledge, and experience. This POSITA would have been aware of and generally knowledgeable about mobile device operation and safety problems arising from mobile device use in a moving vehicle.

45. Based on my education, training, and professional experience in the field of the claimed invention, as discussed in Section II, I was a person of more than the ordinary level of skill in the art as of May 2019. In forming my opinion, I have drawn on my academic background and professional experience, including experience hiring and managing engineers engaged in development projects applying the technologies and applications described in the '249 patent. My

opinions herein, however, were formed taking into account the perspective of an ordinarily skilled artisan.

VI. TECHNICAL BACKGROUND

46. To provide background for the element-by-element analysis of the claims to follow, below I present an overview of the state of the art existing at the time of the alleged invention relating to various topics underlying the '249 patent and the prior art I have assessed. This includes the determination of the location and dynamic state of a vehicle (or a mobile device within a vehicle) using inertial sensors, and/or GPS. It also includes the assessment of driver distraction.

A. Geolocation Generally

47. Many safety and convenience systems rely on determining the geographic position of an object (vehicle, mobile device, etc.) with reasonable accuracy. This position can then be used to locate the object on a map, for example to inform or support a device user, or to control the position of a vehicle relative to known structures or hazards.

48. Traditionally, navigation has used three methods (and combinations thereof) for determining location: range and bearing localization and trilateration, “dead reckoning,” and celestial navigation or Global Positioning (GPS). I have limited the discussion below to only those elements that are relevant to the '249

patent and the prior art I discuss in this declaration. Specifically, localization using GPS and/or inertial sensors.

B. Trajectory and Vectors

49. Numerical quantities are generally of two types: scalars and vectors. A scalar is a counting quantity. (*See generally* Ex. 1020.) For example, the number of cards in a deck of playing cards (52) is a scalar quantity, as is the population of a city, or the mileage on the odometer of a car. Scalars represent the magnitude of a quantity. In many physical situations it is also necessary to specify the direction in which the magnitude is oriented. For example, when giving directions to a destination it would be insufficient to simply say “travel 24 miles.” In this example one must specify how far to travel in which direction (or directions) in order for the directions to have any meaning. Quantities that have both magnitude and direction are called vectors.

50. Vectors are used in most physical applications. For example, to determine the path that an object may follow, it is sufficient to simply specify the magnitude and direction of the acceleration it experiences. (*See id.* at 57.) According to Newton’s first law, an object will not change its motion (magnitude or direction) unless a force acts on it. According to Newton’s second law, an object of mass m will accelerate with an acceleration $\mathbf{a}$ if it is acted on by a force $\mathbf{F}$. This law is traditionally written as force equals mass time acceleration, or $\mathbf{F} = m\mathbf{a}$. Here I have

bolded the terms **F** and **a** to denote that they are *vectors*. Specifically, a force is always applied to an object in some specific direction, and the resulting acceleration of the object will be in the direction of that force. From these basic laws, Newton also developed a set of equations that relate acceleration to velocity and distance. Specifically for a constant magnitude of acceleration **a**, the resulting velocity **v** of an object is:

$\mathbf{v}(t) = \mathbf{a}t + \mathbf{v}_0$ Where $\mathbf{v}_0$ is the initial velocity of the object. And, the displacement as a result of this velocity is given by:

$\mathbf{D}(t) = (1/2)\mathbf{a}t^2 + \mathbf{v}_0t + \mathbf{d}_0$ Where $\mathbf{d}_0$ is the initial displacement of the object.

(See generally id.)

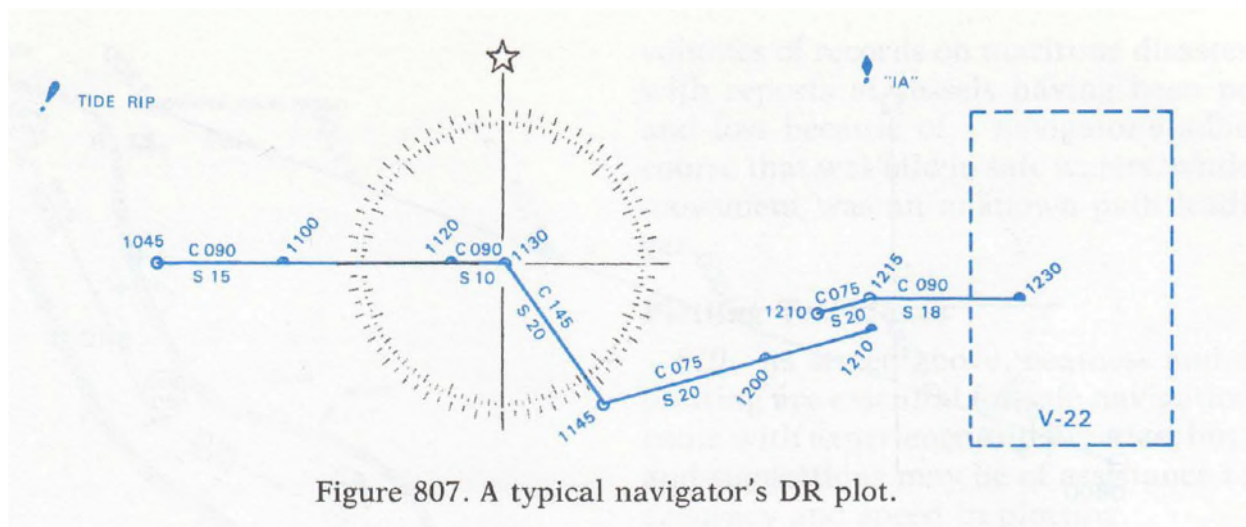
51. These relations are important because they show that by measuring the acceleration vector of an object, for example measured by an accelerometer attached to the object, it is possible to determine the velocity of the object at any point in time. In practice this is done by “integrating” the acceleration, that is, multiplying the acceleration over a small time interval by that time interval, and adding the result (in a vector addition that accounts for any changes in direction of the acceleration vector) to any prior values of acceleration times time. Performing this same operation on the velocity yields a measure of the displacement of the object from its initial position as a function of time. Thus, by measuring acceleration and direction (for example using an accelerometer together with a compass or a gyroscope), it is

possible to determine the change in position of the object as a function of time. This position vs time represents the path or trajectory of the object. At any point in time the direction of travel of the object is the object's trajectory at that time. This stringing together of incremental segments of a trajectory is also known as "dead reckoning."

C. Dead Reckoning and Inertial Sensors

52. Dead reckoning (DR) uses a known location of a starting point (originally in navigation a point of land, or a buoy in a harbor). As the vehicle or device moves, its heading and speed are recorded and each time the heading or speed changes, a new record is made,¹ thereby creating a chain of vectors with direction according to the heading at that time, and with distance equal to the speed times time on that course. By linking together these changes, the navigator can plot the course traveled and determine roughly where they are after traveling some distance over time. Figure 807 below from "Dutton's Navigation & Piloting" (Ex. 1011) combined the associated explanation of the DR plot changes (*Id.* at 121), provides a good overview of the DR process:

¹ Historically this method was used for maritime navigation, and this record was made in the ship's log.



- 1045. With Tide Rip Light bearing 315°, distant 6 miles, took departure for operating area V-22 on course 090°, speed 15 knots.
- 1120. Changed speed to 10 knots.
- 1130. Changed course to 145° and increased speed to 20 knots.
- 1145. Changed course to 075°.
- 1210. Made radar contact on Buoy 1A bearing 010°, distant 8 miles.
- 1215. Changed course to 090° and changed speed to 18 knots to arrive at the rendezvous point at 1230.

53. In centuries past, mariners used various tools to measure heading and speed to support DR computations. For example, the speed of a ship was measured by throwing a barrel or other floating object over the back of the boat. The object was tied to a long line with knots equally spaced along the line. The barrel would float stationary in the water while the ship moved away, causing the knotted line to pay out over time. The mariners would count the knots passing over the stern of the ship as the line paid out. The knots were spaced in such a way that using a sand glass (*i.e.*, an “hour glass” with a specific duration in seconds instead of an hour),

the speed of the ship in nautical miles per hour could be easily calculated by counting knots. Interestingly, this is why the speed of a ship is measured in “knots.” (See Ex. 1011 at 104.) Because the inertia of the barrel would keep it stationary in the water as the ship moved away, the relative motion of the ship and the barrel represented the speed of the ship. The barrel and the knotted line was thus a very early example of an “inertial sensor.”

54. Today, most DR based-systems rely on self-contained inertial sensors to determine changes in heading, speed, and distance traveled.

55. Three such sensors are commonly used. The first is a magnetic compass (the only substantive change over the past several hundred years being the development of more accurate electronically readable compasses). The second is three-axis accelerometers, which are used to measure the forces acting on the object in three dimensions. The third is a gyroscope which is used to measure the rate of change in heading, that is, angular velocity. The second and third sensors, in particular, are discussed in more detail below.

56. Based on Newton’s laws of motion, any change in the speed or position of an object requires a force to act on the object. This force results in the object being accelerated. Thus, by measuring the acceleration on the object in any direction over time, it is possible to determine its speed, and by measuring the speed over time, it is possible to determine its displacement (i.e., distance traveled). In two or three

dimensional space, these accelerations, speeds and distances are all vectors (numerical quantities that have magnitude and direction).

57. Accelerometers typically use an element of known mass (called a “proof mass”). The proof mass is suspended in some way within the sensor, and as the sensor moves the inertia of the mass causes it to move relative to the other non-suspended parts of the sensor. Since the amount of force required to move the mass is known (based on the mechanism used to suspend the mass), and the mass itself is known, any displacement of the mass represents an acceleration applied to the mass. This motion is measured electrically, thereby providing an electrical signal that is representative of the acceleration.

58. While it is technically possible to measure rotational motion using accelerometers, this approach is technically challenging and there are numerous confounding factors that make such measurements challenging (for example, noise, gravitational effects, and coupling between the various axes as the object rotates).

59. As a result, gyroscopes have typically been used to measure rotational accelerations. A gyroscope uses the same principle of inertia as an accelerometer, except that the proof mass is not suspended, it is instead able to rotate freely in any direction. In most gyroscopes, the rotational part is caused to spin at some rate. The angular momentum of the spinning element then causes it to remain in a stationary orientation regardless of the orientation of the body of the gyroscope. The relative

motion of the rotating element and the body of the gyroscope is electrically measured, and the resulting signal represents the rotational motion. In practice, the resulting signal represents the yaw rate (that is the rate of rotation) of the gyroscope (or the object to which the gyroscope is attached).

60. Gyroscopes and accelerometers have been used for decades. (*E.g.*, Exs. 1012, 1013, 1014.)

61. More recently (since around 1994) solid state micro machining (Micro-Electro-Mechanical-Systems (“MEMS”)) technology has been used to create miniature accelerometers and yaw rate sensors. (*E.g.*, Ex. 1014.)

D. Global Positioning System (GPS)

62. Navigation, and numerous other safety and convenience systems rely on determining the state² of the vehicle or device with reasonable accuracy. This position can then be used to locate the vehicle or device on a map.

63. Traditionally, navigation has used two methods for determining location. Celestial navigation and what is known as “Dead Reckoning,” described earlier. Celestial navigation involves measuring the positions of stars and planets at known times, and then converting those measurements to a position estimate using

² In general, this state is represented by a set of state parameters that include latitude, longitude, altitude or elevation, time, speed heading and other related information.

tables describing the well-established motions of these celestial objects. Dead reckoning uses a known starting point, and a log of changes in direction and speed. By linking together these changes the navigator can plot the course traveled and determine roughly where they are after traveling some distance.

64. These two methods (dead reckoning and celestial navigation) have served navigators well for centuries, but they have serious drawbacks. Celestial navigation lacks fine accuracy (because you have to measure the elevation of a star from the horizon, and this may be challenging on the deck of a floating ship or flying aircraft), and it suffers greatly from the fact that it cannot be used effectively in daylight or under cloud cover. Dead reckoning assumes that speed and heading can be measured reasonably accurately. Dead reckoning works well over short distances, but if used for a long time the errors in heading and speed measurement accumulate, and the position estimate can drift off of the true position by significant amounts. To provide a more reliable and accurate alternative to celestial navigation, the U.S. government built a constellation of satellites known as the Global Positioning System (GPS).³ This system operates in a way reminiscent of celestial navigation, but only re-created in an electronic form.

³ The GPS system is variously known as the Global Navigation Satellite System (GNSS), Navstar, and simply the Global Positioning System (GPS). Its European

65. The satellites are arranged in earth orbit in a way that allows several of them to always be visible from any point on the globe. As a result, it is possible to use the system at any time of day, and under most weather situations. In operation, the satellites transmit a repeating signal that contains a variety of information used by a receiver to determine the orbital location of the satellite, and also the time delay from when the signal was sent to when it was received by the receiver.

66. The determination of the position of the receiver is done by solving a system of equations, known as “the GPS equation.” This is shown below.

$$\begin{aligned} p_1 &= \sqrt{(x - x_1)^2 + (y - y_1)^2 + (z - z_1)^2} + c(dt - dT_1) \\ p_2 &= \sqrt{(x - x_2)^2 + (y - y_2)^2 + (z - z_2)^2} + c(dt - dT_2) \\ p_3 &= \sqrt{(x - x_3)^2 + (y - y_3)^2 + (z - z_3)^2} + c(dt - dT_3) \\ p_4 &= \sqrt{(x - x_4)^2 + (y - y_4)^2 + (z - z_4)^2} + c(dt - dT_4) \end{aligned}$$

(Ex. 1015 at 69.)

67. In this equation, p_1 represents the measured pseudorange for satellite 1 (where 1 is the number of the satellite); x_1 , y_1 and z_1 represent the position of satellite 1; x , y and z represent the position of the receiver, dt represents the offset between

counterpart is the Galileo System, and a Russian counterpart is known as GLONASS. All of these systems operate similarly.

the receiver clock and the time the satellites transmitted their signals, and dT_1 is a time correction provided for each satellite. Indices 2-4 in the remaining three equations represent similar quantities (pseudorange, x, y, and z position, and time delay) related to additional satellites. This equation with four measured pseudoranges (from four satellites) represents a system of four equations with four unknowns (x, y, z and dt)⁴. The GPS receiver then solves for x, y, z and dt , and thus determines its position and the time offset between its clock and the satellite clock. (See, e.g., *id.* at 69-70.)

68. The GPS receiver also performs other measurements on the signals to determine its speed and direction. Specifically, since the frequency of the satellite signals is known, measuring the observed frequency of each satellite signal, which will be doppler shifted as a result of the relative velocity of the satellite and the receiver, allows the receiver to determine its own speed and heading. For example:

Velocity measurements are based on the Doppler frequency shift principle. The Doppler shift in the frequency of each satellite is a direct measure of the relative velocity of the receiver and the satellite along

⁴ Note, data from four satellites is required to solve this system of equations. However, it is not uncommon for the receiver to receive data from *more than four* satellites, in which case it determines the best fit for this over-specified set of equations.

the line between them. Each satellite has a very high velocity relative to a stationary receiver, both because of the orbital motion of the satellite and because of the motion of the receiver associated with the Earth's rotation. The velocity solution can be calculated by differentiating the four dimensional navigation solution (pseudorange equations) introduced earlier with respect to time.

(*Id.* at 71.)

E. Driver Distraction

69. With the emergence of various systems delivering graphical and other information to the driver—including in vehicle telematics systems and separate devices like mobile phones—driver distraction became a significant concern long before the '249 patent was filed.

70. For example, in 1997-1998, I was responsible for a project that Toyota sponsored with Dr. Paul Green at the University of Michigan Transportation Research Institute (UMTRI). This project used driving simulators fitted with cameras to assess the ability of drivers to decipher digital maps displayed on an in vehicle screen while driving.

71. Several elements emerged from this research. For example, the way in which street names are presented on the map either aids or inhibits the speed (and thus degree of distraction) that the driver can relate a street name to the line representing the street on the map. Similarly, it was found that the greater the vehicle speed, the lower the level of graphical detail should be presented on the map because

the driver would have less time to cognitively understand what was being displayed.

This is set forth, for example in UMTRI Report 98-4 (Ex. 1016):

Recently there has been an influx of in-vehicle navigation systems into the United States, both as standard equipment (on the Acura RL and several Lexus vehicles) and as aftermarket products such as the Rockwell (now Magellan) PathMaster, the Alpine voice navigation system, and the Philips (now VDO) Carin system. A major concern is that the in-vehicle maps provided by navigation systems may be difficult to read, distracting drivers from attending to the road ahead. Such distractions could provide increased opportunities for crashes (Green, 1997).

(*Id.* at 1.)

Across all tasks, increasing the number of streets displayed increased the response times. For simple tasks the increase was slight (about 7 ms per street); but for more difficult tasks, such as an unstructured search, the response times increased by 140 ms per street.

(*Id.* at 46.)

72. In other words, more complicated interaction (either from a qualitative or quantitative perspective) leads to increased driver distraction and reduced driver response time.

73. A similar study by UMTRI (Ex. 1017) examined the ability for drivers to understand and remember audio prompts related to driving (e.g., audio driving directions). For example:

This report describes an on-the-road experiment conducted as part of the DIRECT (Driver Information Radio using Experimental Communication Technologies) Project, an operational field test of various low-cost traffic information system sponsored by the Michigan Department of Transportation (MDOT) using funds provided by the U.S. Department of Transportation, Federal Highway Administration (FHWA). In this project 4 mechanisms for presenting traffic information to drivers were evaluated: (1) Low Power Highway Advisory Radio (LPHAR), (2) Automatic Highway Advisory Radio (AHAR), (3) cellular call in, and (4) Radio Broadcast Data System (RBDS).

(*Id.* at v.)

4 CONCLUSIONS

1. Poor audio quality combined with lack of relevance, more than one message, and age led to reduced recognition of the messages. Drivers recalled less than half of the information presented. Approximately 4 terms from each traffic message were recalled, regardless of the amount presented.
2. Poor audio quality, lack of relevance, more than one message, and response tasks led to poorer driving performance.
3. Drivers generally felt that the system was safe for them to use, but did not believe that it was safe for inexperienced drivers.
4. Subjects felt that the information would be useful when driving in a familiar area, but not in an unfamiliar area. On average, drivers were willing to pay \$117 (U.S.) for this type of system. However, the most common response was \$0.

(*Id.* at iv.)

74. Once again, qualitatively intense (due to, for instance, poor audio quality that is distracting) or quantitatively intense (due to a greater number of instances) tasks are more likely to distract a driver.

75. In 1998, while I was employed at Toyota Motor Corporation in Japan, I filed U.S. Patent No. 6,122,682 (Ex. 1018) on a system that, among other things evaluated the format of an incoming communication and either converted the format or saved the communications and automatically responded to the communication depending on what the user was doing. For example:

If a vehicle is in motion, a text or an audio data is output as a voice message. Conversion of text data to audio data is performed by the text/audio converter 24, using ordinary audio synthesis. Image/graphic, HTML/VRML, and Applet are converted into audio summaries. An audio summary has a data type, data length, and a sender's name. Audio data itself is generated by audio synthesis. If a vehicle is stopped, an input file is output as it is without converting its data type. If a portable terminal is in motion, it is regarded the same as the "in car-moving". If it is stopped, it is regarded the same as "in car-stoppe".

(*Id.*, 5:21-31.)

76. Similarly, Japanese patent H10-232992 to Nojima (Ex. 1019) ("Nojima"), describes a system that infers the user's state based on speed and the type of transportation route being used to adjust the output of the device so as to best conform to the user's activity. For example:

The mobile terminal device can be used in a portable fashion and is therefore used during the use of various travel modes. According to the present invention, the travel mode that is currently used by the user is discerned based on the above-mentioned travel mode data, the current

position, travel speed and travel direction. For example, when the current position is located on a road indicating a slow travel speed, the travel mode is determined to be on foot, whereas it is determined to be by car when the travel speed is fast. Also, for example, when the current position is located on a train route with the travel direction following along the route, the travel mode currently being used is determined to be a railroad train.

(*Id.*, ¶ [0010].)

(3) "Travel on foot":

The display unit 30 displays an enlarged map of the surrounding area of the current position and also a current-position mark. It also displays an indication of the address of the current position, a guide for the surrounding facilities, etc. The loudspeaker 32 outputs notification, such as, "You are at the district number 00 of the Township of 00" or the like. In this way, the local information on the area around the current position is provided during travel on foot (Figure 3 (a)).

(*Id.*, ¶ [0035].)

(2) Motor vehicle:

The display unit 30 displays a road map as well as a current-position mark. The map displayed herein covers a wider range than the map displayed in the case of travel on foot. The road, on which the user is currently driving, is indicated by a different color. And, intersections are displayed in a zoomed view. The loudspeaker 32 outputs notification, such as, "You are currently driving on National Highway

No. 00 toward the direction of 00," or the like. In this way, information suitable for driving is provided during travel by car (Figure 3 (b)).

(*Id.*, ¶ [0036].)

(3) Public transportation:

The display unit 30 displays a route map. As appropriate, the route map also shows the station names and the respective durations up to the last stop as well as the connection/transit information. A current-position mark is also displayed on the route. Furthermore, the display unit 30 also displays the diagram-schedule delay information created in the step S30 shown in Figure 2. The loudspeaker 32 outputs a notification such as, "The next stop is 00 Station" or the like. It further outputs a notification such as, "This train is No. 00" doing so based on the boarding/flight number information sent from the travel-mode assessment part 24. In this way, during travel with public transportation, information associated with the use thereof is provided (Figure 3(c)).

(*Id.*, ¶ [0037].)

77. In other words, it was known that the context surrounding device usage is also important to determining distraction (and any appropriate response to such distraction).

78. There have also been numerous studies of driver distraction, many of which focus on complex issues of cognitive load (how much attention a given task or set of tasks requires).

79. Simpler measures of distraction, however, emphasize the number of distraction events, and the time associated with the distraction events. This makes intuitive sense, since driving is at its most fundamental a pair of tasks: One that requires the driver to perceive the driving environment, and the second to control the vehicle in a way that avoids roadway hazards while achieving the drivers travel objective. If the driver is distracted from the perception task, for example because they are not looking at the road environment, or if they are distracted from the vehicle operation task, for example because they are operating a non-vehicle device (book, phone, shaver, hairbrush, etc.), then there is a risk that they will fail to perceive a hazard, or fail to control the vehicle. Because the vehicle is moving, the most fundamental element governing distraction from these two tasks is time.

80. It is well understood that if a driver is not performing the vehicle operation task, the vehicle will travel on its own for some period of time, but since the roadway environment is changing constantly, and since the vehicle is not perfectly stable, failing to steer the vehicle (to use one example of vehicle operation) will result in the vehicle drifting out of its lane. The longer the vehicle operation task is not performed, the farther the vehicle may drift, and eventually it may either collide with another car, collide with a roadside object, or leave the roadway.

81. Similarly, perceiving the roadway environment does not require continuous attention. It is well-understood that a driver glances at the vehicle

instruments, looks at signs and other roadside objects, at passengers in the vehicle, etc. and while doing this the driver can still pay sufficient attention to the roadway to avoid hazards and to follow the roadway. However, if the driver takes their eyes off the road for too long a time interval, the movement of the vehicle and the movement of other vehicles on the road may cause hazards to emerge, and if the driver is not looking at the roadway, they will fail to perceive these hazards, and will thus fail to avoid them.

82. To illustrate this, I created a mathematical model of a delayed reaction to a common roadway occurrence. In this model I have a lead vehicle that is separated from a test vehicle by some distance. Both vehicles are traveling at the same speed, and both can decelerate at the same rate. I ran this model using four different reaction delay times. I have assumed that the delay is caused by the driver being distracted for some interval corresponding to the delay time. For this model, I assumed a speed of 30 mph, a deceleration of 0.5 g, and an initial separation between the lead vehicle and the test vehicle of 45 feet, which corresponds to the well-known maxim of one car length for every 10 mph of speed. In the model the lead vehicle begins decelerating (*i.e.*, braking) at time $t=0$.

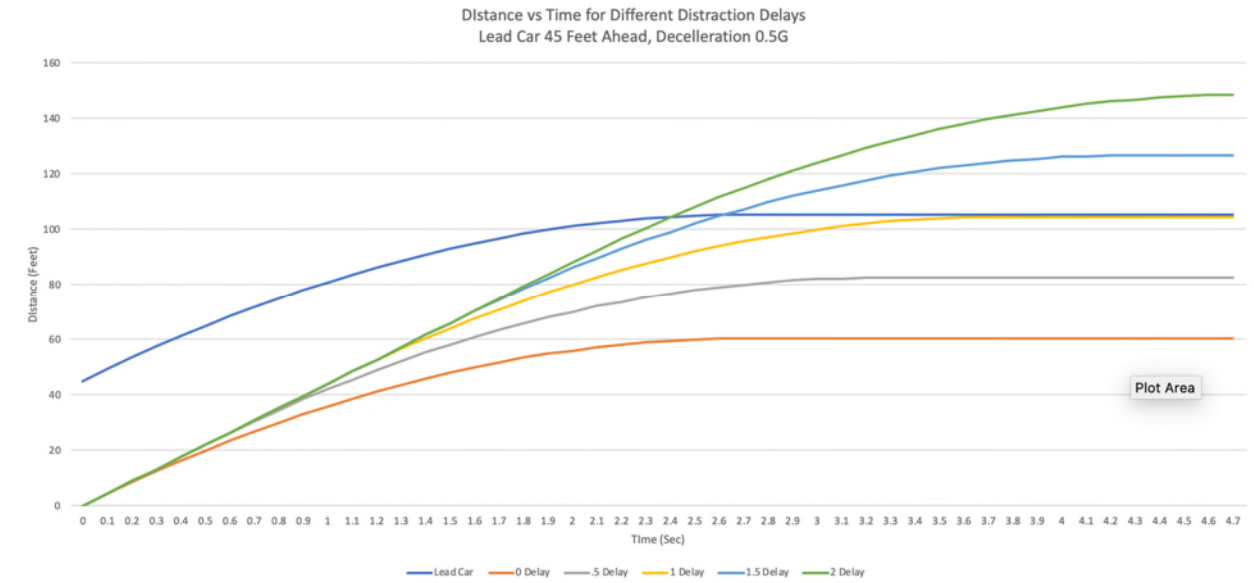
83. The dark blue line shows the distance the lead vehicle travels over time. As can be seen, at about 2.7 seconds the distance traveled by the lead vehicle becomes constant, meaning that the lead vehicle is stopped.

84. The trajectory of the first test vehicle is shown in orange. This vehicle has no reaction delay, meaning that there is no distraction. Thus, the orange vehicle starts decelerating at exactly the same time ($t=0$) as the lead vehicle. As can be seen, this vehicle comes to a stop at the same time as the lead vehicle, and is 45 feet behind it (the same distance it was at $t=0$).

85. The second test vehicle's—shown with a grey line—reaction is delayed by 0.5 seconds, meaning that the driver was distracted by something for one half second before they perceived the lead vehicle stopping and then started decelerating. As can be seen, this vehicle (grey line) stops about 22 feet behind the lead vehicle.

86. The third vehicle—shown with a yellow line—has a 1 second delay. This causes it to stop at approximately the same location as the lead vehicle.

87. The fourth vehicle—the light blue line—has a response delay of 1.5 seconds, and the fifth vehicle—the green line—has a response delay of 2 seconds. As can be seen, both vehicles come to a stop well past the lead vehicle, which means that if these vehicles were in the same lane, they would collide with the lead vehicle.



88. What this simple model demonstrates is that the duration of a distraction session is directly related to the potential for a collision or other roadway accident.

89. In this simple model, distractions less than 0.5 seconds in duration are unlikely to result in a collision, because the driver still has time to react and stop the vehicle.

90. Distractions over 1 second are certain to result in a collision.

91. Clearly, depending on the level safety margin desired, a designer could set thresholds to separate distraction sessions into those that do not represent any risk, those that involve some risk, and those that are certain to produce a negative outcome (collision, etc). This threshold could be either time based, or event based because more distraction events obviously result in a longer period of distraction. By way of example, it takes less time for a driver to (i) simply look at a mobile phone

lock screen to determine the identity of a missed caller than it would for the driver to (ii) look at the lock screen to identify the missed caller, unlock the phone, navigate to a phone app, select the missed call, and then initiate a return call to the missed caller.

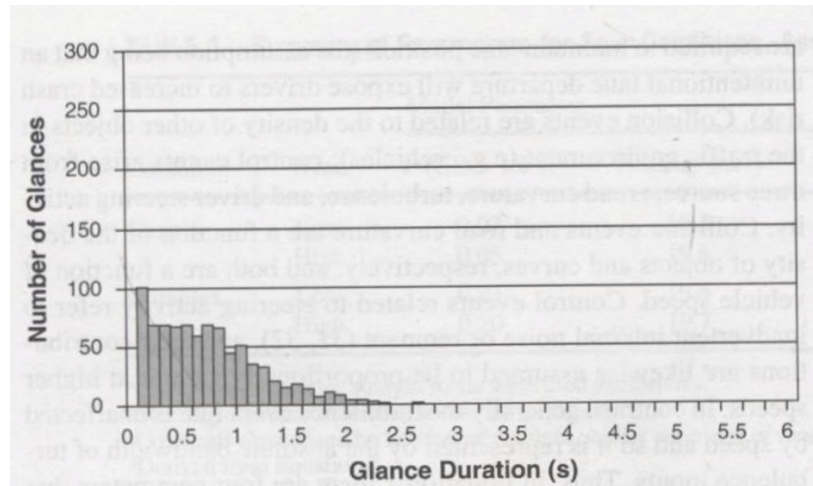
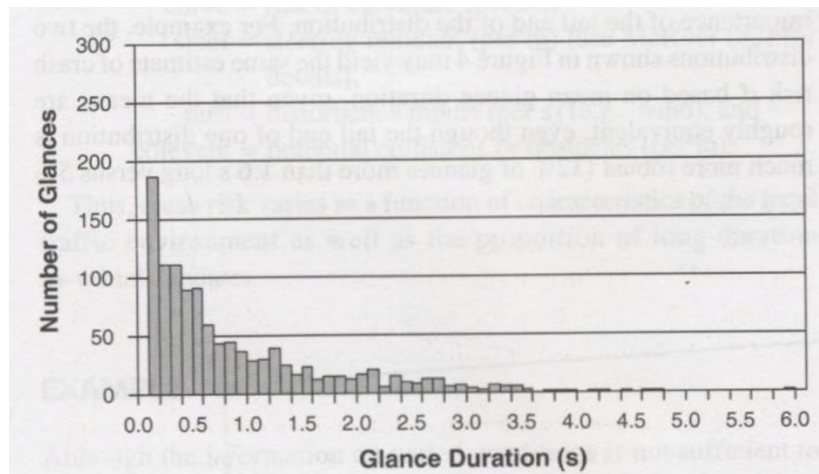
92. The same conclusion reflected by this intuitive model (longer distractions are more likely to cause accidents) is also set forth in the literature.

93. For example, a paper by Horrey et al. entitled “In-Vehicle Glance Duration: Distributions, Tails and Model of Crash Risk (Ex. 1010) describes a statistical study of glance duration (time spent not looking at the roadway), and the potential for a crash.

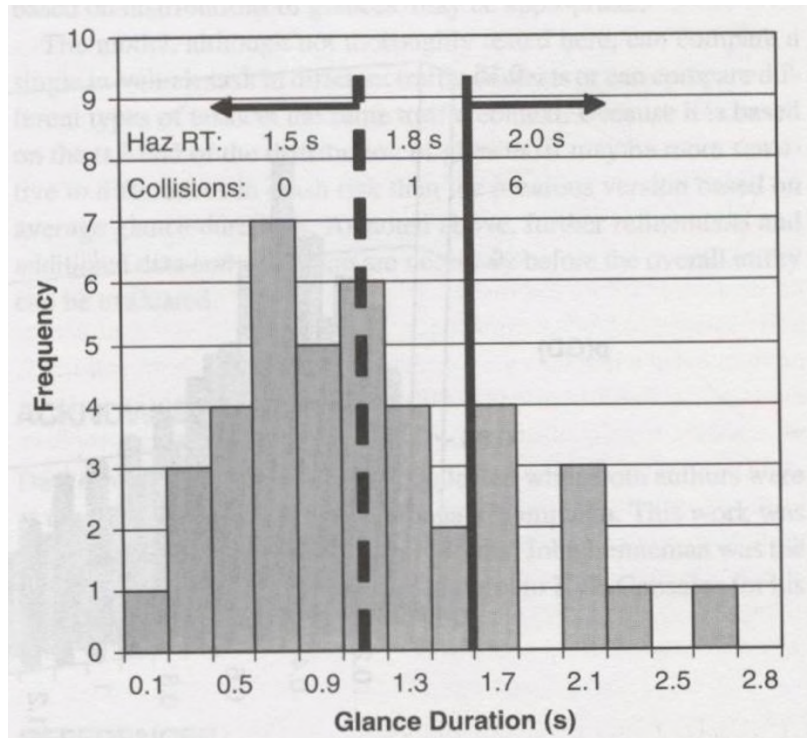
94. The study also characterized different in vehicle tasks (IVT) in terms of the number and duration of glances away from the roadway that were required to complete the task.

95. The graphs from the Horrey article below illustrate these distributions.

96. As can be seen, simpler tasks (top graph) result in fewer and generally shorter glances. More complex tasks (bottom graph) result in larger numbers of glances, with the overall average glance duration increasing:



97. One of the outcomes from this study was a relationship between the average duration of glances related to a task and the potential for a crash. This is illustrated in the figure below:



98. As can be seen, for average glance durations below 1.5 seconds (representing less interaction spanning less time) there were no collisions.

99. For tasks that involved average glance durations above 1.5 seconds and below 2 seconds, there was one collision.

100. And, for tasks involving average glance durations above 2 seconds (representing more interaction spanning more time) there were six collisions.

101. This analysis indicates that tasks that involve glances below 1.5 seconds are not distracting, in that they do not impact the driver's attention sufficiently to introduce any risk of collision. Tasks that involve glances between 1.5 seconds and 2 seconds represent possible distractions, because there is a risk that a collision could occur. And, tasks that involve glances above 2 seconds are definitely distracting,

that is these tasks would represent a true distraction because the risk of collision is more certain. Again, longer glances can obviously entail a greater number of interactions with a device like a mobile phone.

VII. THE '249 PATENT

A. Effective Filing Date

102. I understand that the application leading to the '249 patent was filed on May 6, 2019. The patent does not reference any other, earlier filed applications. As a result, I have used May 6, 2019 as the effective filing date of the '249 patent.

103. My opinions in this declaration were formed from the perspective of a POSITA as of May 6, 2019, including both the knowledge of a POSITA at that time as well as how a POSITA would have understood the prior art.

B. Overview

104. The '249 patent relates to a method for “determining and reporting mobile phone distraction of a driver.” (Ex. 1001, 1:7-8.)

105. The patent explains that “driver mobile phone distraction poses a significant crash and accident risk.” (*Id.*, 1:10-11.)

106. The patent then goes on to note that there are “existing systems” using “sensor data from personal mobile devices” to detect both phone movement and distraction. (*Id.*, 1:12-18.)

107. According to the patent, these existing systems used standard, routinely available GPS sensors, accelerometers, and gyroscopes. (*Id.*, 1:18-24.)

108. Next, the patent explains that “[i]n the existing systems,” an “application” running on the mobile device “automatically detect[s] the start and stop of each trip” using “location” information. (*Id.*, 1:31-51.) Then, after it is determined that the device is moving, the system “gathers sensor data” for purposes of “accurately estimate[ing] both the dynamics of the vehicle and the movement patterns of the mobile phone within the vehicle.” (*Id.*)

109. The patent also explains that it was standard practice to determine that a distraction occurred if “three conditions ... all hold true”: “A. Phone movement as inferred from gyroscope and/or accelerometer data. B. User interacting with phone, inferred particularly from phone screen state and phone-lock state. C. The vehicle speed during the segment exceeding a threshold.” (*Id.*, 3:5-15.)

110. These existing systems also did not stop analysis upon the simple detection of a distraction. Further analysis and assessment was also performed. For example, the collected data can be used to generate a “scor[e]” that is an “assessment of phone distraction.” (*Id.*, 2:12-29.)

111. After discussing these existing systems, the ’249 patent goes on to explain that it operates in the same general way as existing systems.

112. In particular, the system of the ’249 patent also employs mobile device sensors to detect phone movement, phone usage, and vehicle movement to determine

if a driver is distracted. Thus, it “builds on the approach” of the prior art. (*See id.*, 2:46-47.)

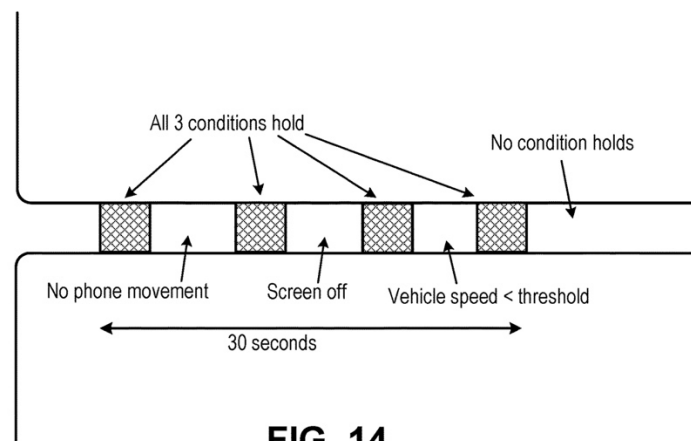
113. But, the patent also proposes what it calls “improvements” and “enhancements” to these existing systems. (*Id.*, 3:46-47.)

114. Among other things, these purported improvements/enhancements include “[t]he construction and use of ‘distraction episodes’ to assess, score, and inform users of phone distraction occurring on a trip” and “[t]he use of additional factors, termed ‘distraction context’, to identity user interaction with the phone in addition to screen state and phone-lock state....” (*Id.*, 3:47-61.)

115. The ’249 patent provides additional details regarding both “distraction episodes” and “distraction context.”

116. According to the patent, a “distraction episode” is “determined based on aggregations of one or more distraction events.” (*Id.*, 10:60-61.)

117. Figure 14 provides an example:



(*Id.*, Fig. 14.)

118. “Each of the intermittent periods” (shown with darker crosshatching) where the mobile device is moving, the user is interacting with the device, and the vehicle speed exceeds a threshold “can be considered distraction events.” (*Id.*, 1:10-12.)

119. The patent explains that it “avoids treating each” of the detected events “as a separate distraction episode, a treatment that would be inconsistent with the fact that the driver was effectively engaged in a distraction episode for the entire 30-second period including the intervening periods when fewer than all the conditions held true.” (*Id.*, 11:12-17.)

120. Instead, in the ’249 patent, the various “distraction events” are grouped into a single “distraction episode” spanning the entire 30-second period. (*See id.*)

121. Next, the ’249 patent explains that “distraction context ... broadly ... include[s] ... one or more circumstances or conditions associated with a distraction episode.” (*Id.*, 4:4-6.)

122. The patent includes examples of contextual information such as “whether the user is currently on a call,” “the identity of the foreground app ... currently running on the phone,” “user tapping on the screen,” and “motion of the vehicle” itself “indicative of the driver possibly being distracted[.]” (*Id.*, 12:65-13:20.)

123. Other examples include “combinations” of “orientation of the phone” and “phone operational states,” “[w]eather and [a]mbient conditions[,]” or the “time” when distraction occurs. (*Id.*, 15:17-22, 16:12-28.)

124. This contextual information can be used to “scor[e] ... a relevant distraction episode....” (*Id.*, 12:63-65; *see also id.*, 9:21-25.)

125. The patent next explains that its system also engages in a two-step determination process: it first determines if there is a “possible distraction episode,” and then it secondarily determines that this “possible distraction episode is a true distraction episode.” (*Id.*, 4:63-5:2.)

126. Based on my review, I see no explanation in the ’249 patent of what makes a distraction “true.”

127. For example, the patent never indicates whether absolute certainty of distraction, near certainty, or something else is required. No definition of a “true” distraction is provided.

128. The ’249 patent does, however, provide a handful of examples of secondary analyses that can be performed by its system.

129. For instance, “user feedback” can be “collect[ed] and leverage[d.]” (*Id.*, 16:40-43.) “[T]he user may indicate that the phone was being used by a passenger” making a possible episode not relevant. (*Id.*, 16:44-48.)

130. Additionally, the system can consider if the “time period spanned by the possible distraction episode is longer than a predetermined length.” (*Id.*, 4:63-5:2.)

131. Alternatively, the system can “[s]cor[e] relevant distraction episodes” in an effort to “better capture[] crash risk.” (*Id.*, 9:21-25.)

C. Prosecution History

132. As noted above, I have reviewed the ’249 patent’s prosecution history.

133. All of the originally filed claims of the ’249 patent were rejected in a July 2019 office action. (*See* Ex. 1002 at 82-102.)

134. In addition to making a double patenting rejection, the Examiner rejected the claims as obvious over U.S. Pub. 2016/0006860 to Neitzel and U.S. Pub. 2017/0105098 to Cordova. (*Id.* at 86.)

135. The applicant responded with an amendment in October 2019. (*See id.* at 119-136.)

136. As part of this, then-pending claim 1 (which eventually issued as current claim 1) was amended to require the generation of “discrete distraction events” as opposed to just “discrete events.” (*Id.* at 133.)

137. The applicant then went on to argue that Neitzel “detected a single instance for which the described criteria for disabling the device is met and did not attempt to detect another instance until after the vehicle had stopped and the process

was allowed to restart.” (*Id.* at 124.) Thus, according to the applicant, it purportedly did not “describe or make obvious determining a distraction episode that spans two or more of the discrete distraction events during the trip.” (*Id.*)

138. Cordova also purportedly “described identifying a single instance of driver distraction” and not multiple such distraction events forming a distraction episode as the claims required. (*Id.* at 125.)

139. The Examiner renewed the obviousness rejection in a November 2019 final office action citing the same prior art references. (*See id.* at 180-203.)

140. The applicant then filed a request for continued examination. (*See id.* at 216.)

141. This request was accompanied by another amendment. Here, the applicant added language to claim 1 requiring “separately” generating distraction events. It also added a limitation requiring that each event comprise “concurrent motion ... and interaction with the mobile device by an occupant of the vehicle.” (*Id.* at 223.)

142. Applicant then reiterated its prior argument, noting that both Neitzel and Cordova teach only detecting “a single instance” of distraction, and not multiple such instances forming an episode. (*Id.* at 228-229.)

143. After this response, the claims were allowed. (*See id.* at 248-256.)

D. Claims

144. For reference, claims 1-10 of the '249 patent are reproduced below:

1. A method comprising

receiving signals from one or more detectors of a mobile device while the mobile device is on a trip in a vehicle,

using the received signals from the one or more detectors to identify one or more physical states of the mobile device during the trip, the one or more physical states comprising motion of the mobile device along a trajectory of the trip,

based on the identified one or more physical states, separately generating two or more discrete distraction events separated in time, each of the discrete distraction events comprising concurrent motion of the mobile device and interaction with the mobile device by an occupant of the vehicle, and

determining a distraction episode that extends from a start to an end of an interval and encompasses two or more of the discrete distraction events occurring in the interval and during the trip in the vehicle, the determining of the distraction episode comprising determining a possible distraction episode and after the possible distraction episode is determined,

determining that the possible distraction episode comprises a true distraction episode.

2. The method of claim 1 in which the one or more physical states comprises an operational state of the mobile device.
3. The method of claim 2 in which the operational state comprises a state of locking of the mobile device.
4. The method of claim 3 in which the operational state comprises a state of a phone call.
5. The method of claim 4 in which the operational state comprises a power condition.
6. The method of claim 4 in which the operational state comprises an aspect of a foreground app running on the mobile device.
7. The method of claim 1 in which determining a distraction episode comprises determining that a physical state of the mobile device comprises no interaction by a user or that accelerometer or gyroscope values are lower than a threshold that differs from a threshold used in determining motion of the mobile device at the start of the distraction episode.

8. The method of claim 7 in which the end of the distraction episode is not determined until after a refractory period of no further movement of the mobile device or no indication of a continued distraction.
9. The method of claim 8 in which determining an end of the distraction episode comprises determining that a context of the mobile device indicates no further distraction.
10. The method of claim 9 in which determining that the possible distraction episode comprises a true distraction episode includes determining that a time period spanned by the possible distraction episode is longer than a predetermined length.

VIII. CLAIM CONSTRUCTION

145. I am not a legal expert or an attorney and offer no opinions on the law. I understand that claim construction is a matter of law. However, I have been informed by counsel of the legal standards that apply to claim construction in an *inter partes* review, and I have applied them in forming my opinions. I understand that during an *inter partes* review, the same claim construction standard used in federal district court is applied when addressing the meaning of claim terms.

146. I have been informed that the words of a claim are generally given the ordinary and customary meaning that the term or phrase would have to POSITA at

the time of the invention in view of the surrounding claim language, the specification and the file history (collectively, the “intrinsic evidence” or “intrinsic record”).

147. I also understand that courts may consider extrinsic evidence, such as expert and inventor testimony, dictionaries, and learned treatises (collectively, the “extrinsic evidence” or the “extrinsic record”), but that such extrinsic evidence should be given less weight than the intrinsic evidence.

148. In my opinion, the terms of the ’249 patent’s claims do not require further construction and can be afforded their plain and ordinary meaning for purposes of the analysis of the prior art that I am conducting in this declaration.

IX. UNPATENTABILITY ANALYSIS

149. For the reasons I explain in greater detail below, it is my opinion that as of the effective filing date of the ’249 patent, a POSITA would have considered claims 1-10 of the ’249 patent to be unpatentable as obvious over the prior art discussed in this declaration.

A. Overview of the Prior Art

150. The following paragraphs provide an overview of the main prior art references I discuss throughout this declaration.

1. Schmitt

151. Schmitt indicates on its face that it issued February 18, 2020 and was filed March 26, 2018. (See Ex. 1004, Cover.) In view of this date of filing, which

pre-dates the '249 patent's May 2019 filing, I understand that Schmitt is prior art under AIA § 102(a)(2).

152. Schmitt is not cited by the '249 patent and was not considered during prosecution. (*See generally* Exs. 1001, 1002.)

153. Schmitt relates to a “mobile device movement detection” and “distracted driving analysis system....” (Ex. 1004, 4:54-56; *see also id.*, 1:25-30.)

154. The system receives signals from a variety of “mobile device sensors 214” including “an accelerometer 216, a GPS receiver 218, a gyroscope 220, a microphone 222, a camera 224, and a magnetometer 226.” (*Id.*, 9:1-4; Fig. 2.)

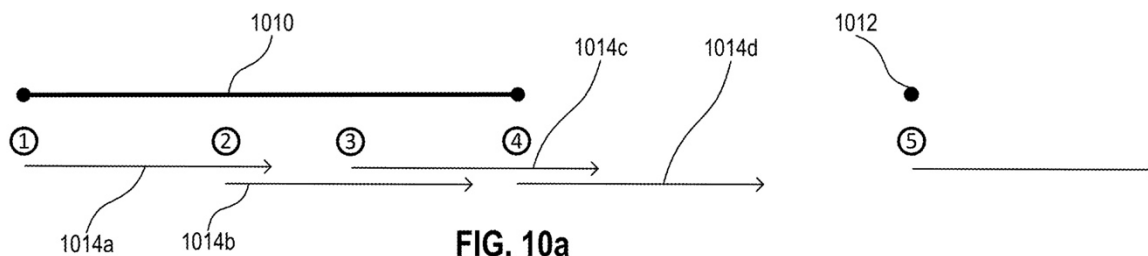
155. According to Schmitt, the GPS sensor allows the system to “determine whether a trip associated with the vehicle has started.” (*Id.*, 19:43-45, 49-51; *see also* Fig. 7.)

156. Then, if the mobile device is on a trip, the other sensors can be used to detect “device usage event[s] and/or ... device movement event[s].” (Ex. 1004, 22:51-54; *see also id.*, 1:25-27; 1:63-65; 2:40-42.)

157. Schmitt's system uses the detected usage/movement events to determine if a distraction “session” occurred. (*See id.*, 2:1-9, 2:40-42.)

158. Schmitt explains that a “session” entails “a plurality of events associated with the mobile device” that “occur[] within a respective threshold amount of time....” (*Id.*, 2:48-55.)

159. Figure 10a of Schmitt, which I have reproduced below, provides an example:



(*Id.*, Fig. 10a.)

160. As shown, events 1-4 form a “session” with a “duration 1010 based to the session start time and the session end time (e.g., the difference between the session end time and the session start time).” (*Id.*, 25:25-29.)

161. Schmitt also explains that its system assesses identified distractions for purposes of “calculate[ing] a risk score based on the movement of [the] mobile device.” (Ex. 1004, 1:35-43; *see also id.*, 4:62-5:6; 8:3-13; 14:63-66; Fig. 4.)

162. A “higher score” can be assigned to distractions that represent a greater risk, and “lower score” to less serious distractions. (*See id.*, 17:64-18:10.)

163. The score takes into “the intensity of phone movement” or the “frequency of mobile device movement events...” (*Id.*, 17:54-63.)

164. If the risk score is high enough, Schmitt explains that its system can respond by providing a notification or even disabling of the device. (*See id.*, 18:65-19:26.)

2. Olson

165. Olson indicates on its face that it issued October 24, 2017. (Ex. 1005, Cover.) In view of this date of issuance, which predates the '249 patent's May 2019 filing, I understand that Olson is prior art under AIA § 102(a)(1).

166. Olson is not cited by the '249 patent and was not considered during prosecution. (*See generally* Exs. 1001, 1002.)

167. Olson explains that it relates to “[s]ystems and/or methods ... for preventing a user of a user device ... from driving a vehicle ... while being distracted by the user device.” (Ex. 1005, 1:54-57; *see also id.*, Abstract.)

168. Olson's system first “determine[s] whether the user is actually driving the car” via a “[p]osition tracking system 240” like a “GPS system....” (*Id.*, 2:23-26; 4:39-48.)

169. Then, it determines if “usage instances” occurred by “collect[ing] usage data while the user drives the vehicle.” (*Id.*, 2:37-43.)

170. According to Olson, collected data includes accelerometer data tracking device “orientation” changes, “image data of the user viewing the display,” “monitor[ed] inputs/outputs,” or “track[ed] internal processes executed by the user device” such as telephone calls or text messages. (*Id.*)

171. Next, Olson’s system “determine[s] whether a user is distracted.” To do so, it tracks whether a “threshold” number of usage instances occurred within a “pre-selected time interval.” (*Id.*, 13:1-3, 13:39-53; Fig. 3.)

172. Figure 11, which is reproduced below, provides an example.

173. Here, a user device has detected a series of related “operations 1110-1150 along timeline 1160” for purposes of “determin[ing] whether ... the user of user device 210 is distracted.....” (*Id.*, 11:21-46.)

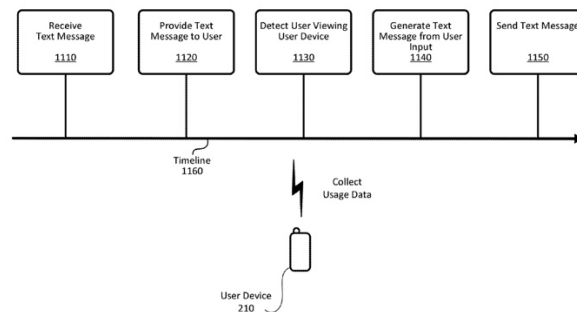


Fig. 11

(*Id.*, Fig. 11.)

174. Olson’s system is also able to distinguish distraction episodes that are “merely ... suspicious” from those that are “certain.” (Ex. 1005, 12:38-44.)

175. In this regard, “user device 210 may define distraction thresholds for different levels of confidence with respect to the user being distracted.” (Ex. 1005, 12:38-44.)

176. A “suspicious” distraction can generate a different response than a “certain” distraction. (*Id.*, 12:48-56.)

B. Ground 1: Claims 1-10 Are Obvious Over Schmitt

177. In my opinion, a POSITA would have considered Schmitt to be within the scope of the prior art and highly relevant to the patentability of the '249 patent's claims.

178. In my opinion, moreover, when viewed and considered in light of the knowledge possessed by a POSITA, Schmitt discloses all the limitations of and renders claims 1-10 of the '249 patent obvious.

179. In addition, not only would a POSITA have been motivated to combine and collectively consider the teachings of Schmitt to arrive at the subject matter claimed by the '249 patent, they also would have had a reasonable expectation of success when doing so.

1. Claim-By-Claim Analysis

a. Claim 1

[1-a] “1. A method comprising receiving signals from one or more detectors of a mobile device while the mobile device is on a trip in a vehicle,”

180. This, in my opinion, is taught by Schmitt.

181. Schmitt relates to a “mobile device movement detection system 101 in a distracted driving analysis system 100....” (Ex. 1004, 4:54-56; *see also id.*, 1:25-30.)

182. Schmitt explains that its system is meant to “[d]etect[] likely movement of a mobile device within a vehicle” for purposes of “reduc[ing] distracted driving and promot[ing] safety.” (*Id.*, 1:35-37.)

183. Moreover, the system can be used to detect movement/usage of a variety of different **“mobile device[s]”** as claimed.

184. This includes “a smartphone, tablet computing device, personal digital assistant (PDA), smart watch, netbook, laptop computer, and other like devices found within a vehicle 204.” (*Id.*, 8:60-64; *see also id.*, 4:62-5:1.)

185. Next, Schmitt’s system also **“receiv[es] signals form one or more detectors of a mobile device while the mobile device is on a trip in a vehicle.”**

186. According to Schmitt, “mobile device 212 includes a set of mobile device sensors 214, which may include, for example, an accelerometer 216, a GPS receiver 218, a gyroscope 220, a microphone 222, a camera 224, and a magnetometer 226.” (*Id.*, 9:1-4; *see also id.*, 9:15-25 (identifying “[a]dditional sensors”))

187. Schmitt explains that these sensors operate to “detect[] and record[] various conditions at the mobile device 112....” (*Id.*, 9:4-6.)

188. “Data collected by the mobile device sensors 214 may be stored, processed, and/or analyzed within the mobile device 212....” (*Id.*, 9:44-50.) The data is collected from the sensors while the device is on a “trip associated with the

vehicle” for purposes of detecting device movement and usage. (*See id.*, 19:43-64; Fig. 7.)

189. Figure 2 of Schmitt, which is reproduced below, shows a mobile device 212 with a collection of signal-generating sensors 214. These sensors, highlighted yellow for reference, include accelerometer 216, GPS receiver 218, gyroscope 220, microphone 222, camera 224, and magnetometer 226. As I explain above (*see supra* Sections VI.A-D), these are standard sensors routinely used to detect position and movement:

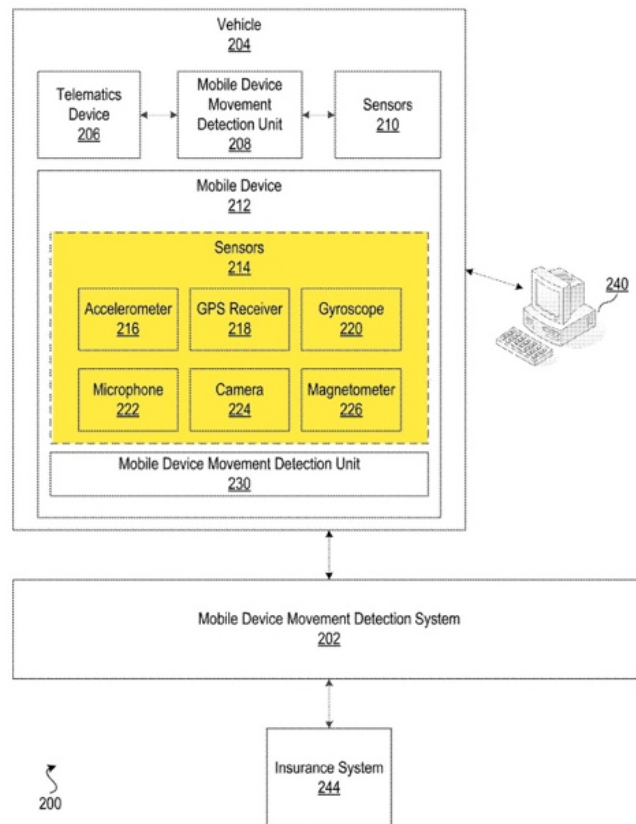


FIG. 2

(*Id.*, Fig. 2 (annotated).)

[1-b] “using the received signals from the one or more detectors to identify one or more physical states of the mobile device during the trip, the one or more physical states comprising motion of the mobile device along a trajectory of the trip,”

190. This, in my opinion, is taught by Schmitt. Schmitt identifies “*physical states of the mobile device during the trip*” “*using the received*” detector “*signals.*” For example, Schmitt uses the mobile device sensors 214 to detect device states such as movement and usage. (*E.g.*, Ex. 1004, Abstract, 1:27-30, 1:63-66, 2:40-42, 12:54-64, 20:8-11, 22:51-54.) Once again, device movement/usage is detected while the device is on a trip. (*See, e.g., id.*, 19:43-20:11; Fig. 7.)

191. Schmitt also explains that in its system/method, the “mobile device ... may determine whether a trip associated with the vehicle has started.” (*Id.*, 19:43-45, 49-51.)

192. This trip-start determination is “based on a distance the vehicle has traveled from a prior trip end location and/or ... a determination that the vehicle travels over a threshold speed ... for a threshold amount of time.” (*Id.*, 19:51-55.) “GPS data may be used to measure the speed of the vehicle.” (*Id.*, 19:55-56; *see also* Fig. 7.) This GPS data may be obtained from a “GPS receiver 218” integrated into the mobile device. (*Id.*, 9:1-4; Fig. 2).

193. Schmitt also describes that the motion detection system 230 includes a GPS receiver and other sensors that determine the motion vector of the device. For example, on connection with Figure 5 Schmitt describes: “At step 502, the

movement event detection module 306 may construct three-dimensional vectors representing the processed acceleration data (signals) at times t1 and t2.” (*Id.*, 16:37-41). “At step 504, the movement event detection module 306 may calculate a change in angle between the vectors at times t1 and t2.” (*Id.*, 16:46-48).

194. As described in the technical background section (*supra* Section VI.B), a POSITA would have understood that a vector is a quantity that includes both magnitude and direction, and thus the acceleration vector described by Schmitt represents a measure of the movement of the vehicle in a particular direction (i.e., “along a trajectory”) of the trip.

195. Thus, in my opinion, Schmitt teaches a system that uses **“received signals from the one or more detectors”** (the mobile device GPS receiver signals) **“to identify”** a **“physical state[] comprising motion of the mobile device along a trajectory of the trip”** (whether the device has travelled a sufficient distance or is travelling over a threshold speed for a threshold amount of time indicating that it is on a trip).

[1-c] “based on the identified one or more physical states, separately generating two or more discrete distraction events separated in time, each of the discrete distraction events comprising concurrent motion of the mobile device and interaction with the mobile device by an occupant of the vehicle, and”

196. This, in my opinion, is taught by Schmitt: Schmitt’s system detects distraction **“based on the identified one or more physical states.”** As explained

when discussing limitation [1-b], Schmitt's system uses data from sensors 214 to detect device movement both along with and relative to a vehicle.

197. Next, "FIG. 7" of Schmitt, reproduced below, "is a flowchart 700 of example steps for determining device movement..." (Ex. 1004, 19:43-45.)

198. Schmitt explains that the process shown in this figure begins at "step 708." If the mobile "device ... determine[s] that a trip associated with the vehicle has started" "(step 708: Y)" then it "proceed to step 710" and conducts additional analysis. (Ex. 1004, 19:49-64.)

199. "GPS data may" continue to be "collected at a particular frequency" over time to ensure that the trip continues. (*Id.*, 20:49-56.)

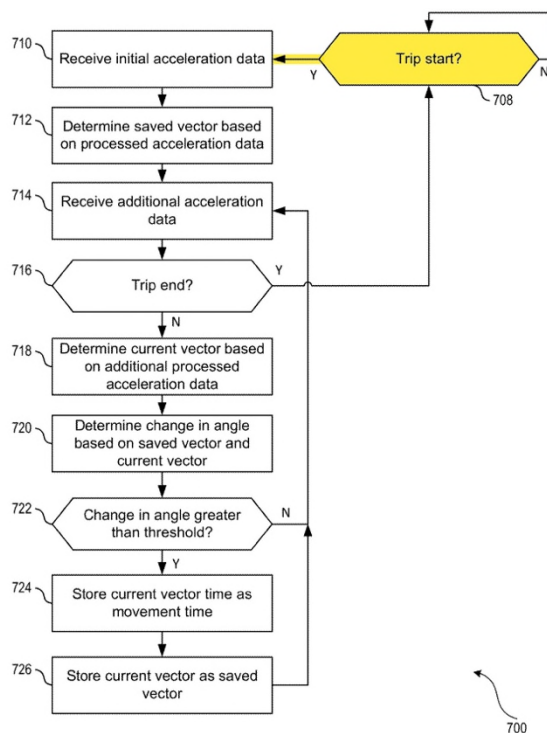


FIG. 7

(*Id.*, Fig. 7 (annotated).)

200. Schmitt describes that the start of a trip may be determined based on the change in position of the device, or the speed of the device as measured by GPS. For example: The device may determine that a trip has started based on a distance the vehicle has traveled from a prior trip end location and/or based on a determination that the vehicle travels over a threshold speed, such as for a threshold amount of time. For example, GPS data may be used to measure the speed of the vehicle. If the vehicle's speed exceeds a threshold speed S, the device may determine that a trip associated with the vehicle has started.” (*Id.*, 19:51-58).

201. As shown above, step 710 and the other steps that follow occur only if “Trip start?” step 708 (highlighted yellow) is satisfied. (*See id.*)

202. Because of this, in my opinion all of Schmitt’s subsequent steps (i.e. 710 et seq.) are all **“based on the identified one or more physical states.”** These steps—including the detection of device usage/movement via sensor data—will not occur unless it is first determined at step 708 that the device is on a trip.

203. In my opinion, Schmitt’s system also includes **“separately generating two or more discrete distraction events separated in time.”**

204. For example, Schmitt explains that its system operates to detect mobile “device usage event[s] and/or ... device movement event[s].” (Ex. 1004, 22:51-54; *see also id.*, 1:25-27; 1:63-65; 2:40-42.)

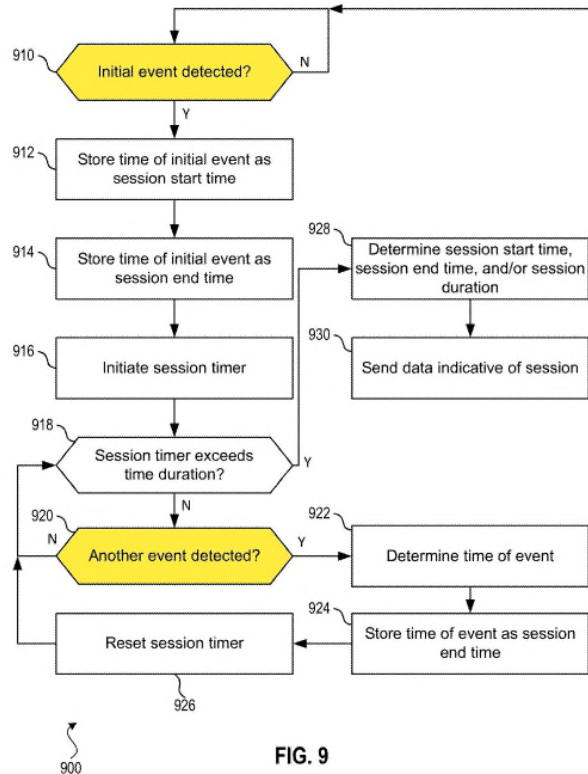
205. Rather than detecting just one such event, Schmitt’s system collects a “plurality” of such movement/usage events. It is also able to assess whether a particular “event ... occurs within a respective threshold amount of time from a prior event.” (*Id.*, 2:48-53.)

206. Figure 9, reproduced below, provides an example. The figure depicts “steps for determining instantaneous events and/or continuous events.” (*Id.*, 22:44-46.)

207. At step 910, “an initial event” is detected. (*Id.*, 22:51-52.)

208. Then, at later step 920, “the device may determine whether another event has been detected....” (*Id.*, 24:11-12.) After “event 2 is detected,” the process may repeat determining whether “another event (event 3) occurred” and so on. (*Id.*, 23:53-58.)

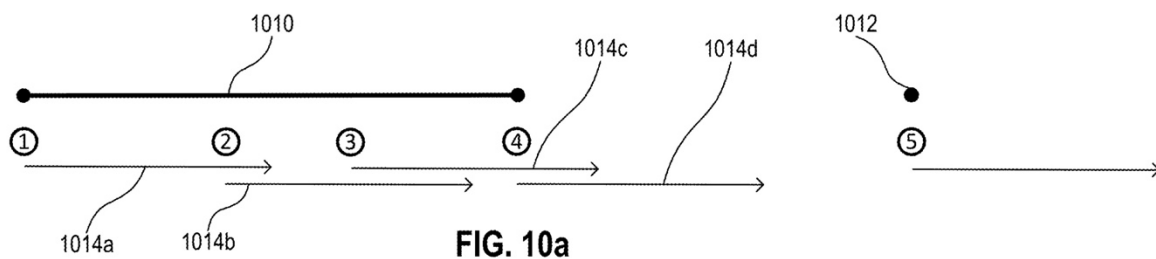
209. The below yellow highlighted Figure 9 shows the detection of an “[i]nitial event” (yellow highlighted step 910) and the later detection of “[a]nother event” (yellow highlighted step 920):



(*Id.*, Fig. 9 (annotated).)

210. Figure 10a, reproduced below, provides another example.

211. As shown in this figure, a series of events that include “event 1, event 2, event 3, ... event 4” and “event 5” were detected separately at different times:



(*Id.*, Fig. 10a, 24:21-23, 24:56-58, 25:1-5, 26:35-38.)

212. Next in my opinion, Schmitt’s system also monitors for both ***“motion of the mobile device”*** and ***“interaction with the mobile device by an occupant of the vehicle.”***

213. In particular, Schmitt explains that it monitors for “indications of distracted driving, such as mobile device movement (e.g., orientation changes) within the vehicle and/or mobile device usage within the vehicle.” (*Id.*, 19:36-42.)

214. To detect a “mobile device movement event,” “sensor data collected from the mobile sensors 214” is analyzed to “determine whether there is a threshold change in the direction of the acceleration of the mobile device 212.” (*Id.*, 12:54-64.)

215. This can include “mobile device movement (e.g., orientation changes) within the vehicle....” (*Id.*, 19:36-39.) Similarly, a “device movement event” can entail “a change in vector angles exceeding a threshold change in angle.” (*Id.*, 26:23-25.)

216. With respect to device usage, Schmitt explains that the system “monitor[s] ... for ... the user locking the mobile device, unlocking the mobile device, using an application of the mobile device (e.g., a texting application, an email application, a game application, etc.), or otherwise using the mobile device.” (*id.*, 22:30-36.)

217. Further, “[t]he mobile device ... may receive indications of mobile device usage from an operating system of the mobile device.” (*Id.*, 22:36-38.) “For example, on an ANDROID device, device usage may be recorded each time an ACTION_USER_PRESENT event is recorded from the operating system.” (*Id.*, 22:38-41.) Similarly, “[o]n an IOS device, device usage may be recorded each time a data not protected event is recorded....” (*Id.*, 22:41-43.)

218. Next, in my opinion, Schmitt teaches that “*each of the discrete distraction events*” can entail “*concurrent motion ... and interaction with the mobile device.*”

219. Schmitt explains that its system can be configured such that each discrete device usage “event” entails both mobile device movement relative to the vehicle and device usage.

220. Showing this, Schmitt explains that “[A]n initial event may be detected if a pair of device usage and device movement events is identified.” (*Id.*, 22:63-65 (emphasis added).)

221. Similarly, it explains that “[t]he device may detect an initial event (e.g., step 910: Y)” only “if a pair of usage and device movement events is detected.” (*Id.*, 23:5-7 (emphasis added).)

222. Likewise, according the Schmitt, the “event detected by the device may comprise a device usage event (e.g., device unlock, device lock, application usage,

etc.) and/or a device movement event (e.g., a change in vector angles exceeding a threshold change in angles.” (*Id.*, 26:10-15 (emphasis added).)

223. Moreover, per Schmitt, “[a] device usage event and a device movement event may occur at the same time” or with a particular “threshold amount of time from each other (e.g., 0.1 seconds....).” (*Id.*, 22:65-23:5 (emphasis added).)

224. Schmitt does not limit the simultaneous detection of movement and usage to just an “initial event.”

225. Instead, it repeatedly explains that every detected event can involve “phone movement and/or usage events.” (*Id.*, 19:39-42; *see also id.*, 1:25-27.)

226. In sum, in my opinion, a POSITA would have recognized that Schmitt teaches determining events involving “**concurrent**” device motion and usage.

[1-d(1)] “determining a distraction episode that extends from a start to an end of an interval and encompasses two or more of the discrete distraction events occurring in the interval and during the trip in the vehicle,”

227. In my opinion, this limitation is taught by Schmitt.

228. Schmitt explains that its system determines if “an event session” has occurred. (Ex. 1004, 2:1-9, 2:40-42.)

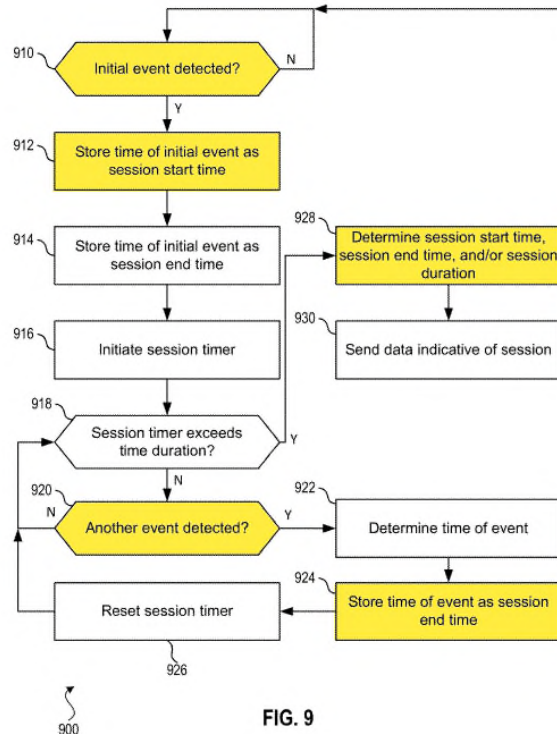
229. According to Schmitt, an “event session” spans “a plurality of events associated with the mobile device” that “occur[] within a respective threshold amount of time....” (*Id.*, 2:48-55.)

230. Schmitt's system determines that such a "session" occurred, and also determines "the start time of the event session, an end time of the event session, and/or a duration of the event session." (*Id.*, 2:58-62.)

231. Schmitt describes the process for determining session start, end, and duration in Figure 9, reproduced below.

232. Steps 910 and 912 define the start time of an initial event, and this sets the session start time. Steps 918 through 926 determine if another event occurs before a time threshold expires (A POSITA would have understood that this threshold time is set by the session timer, and this sets the maximum time between events within any given session). If an event does occur (detected at Step 920) before the session timer expires, the time of that event (determined at Step 922) is then set as the interim session end time (Step 924). The system then resets the session timer (Step 926) and cycles through Steps 918 and 920 waiting for another event to occur within the time threshold (set by the timer). If another event occurs within the time threshold, the process above repeats with the new event time replacing the previous interim session end time. If another event is not detected before the timer expires, the process moves to Step 928, and the session start time, end time and/or duration are determined. Specifically, the session start time is set as the time of the first event, and the session end time is set as the time of the last event in the session. (*See id.*, Fig. 9.)

233. At least an “[i]nitial event” and “[a]nother event” can be detected during a “session.” The time when an “initial event” occurred is “session start time” (step 912), while the time when the last “event” occurred is the “session end time” (step 924). These various steps have all been highlighted in yellow for emphasis:



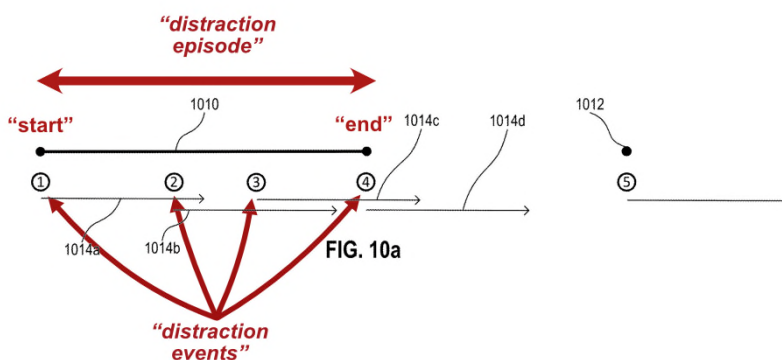
(*Id.*, Fig. 9 (annotated).)

234. As discussed above in connection with Figure 7, Schmitt explains that the system only proceeds to detect device movement and usage if it is first determined that the device is on a trip. (*See id.*, Fig. 7; *see also id.*, 19:49-64.)

235. Figure 10a, also reproduced below, provides another example of a session of events.

236. Here, a “session” with a “duration 1010 based to the session start time and the session end time (e.g., the difference between the session end time and the session start time)” has been detected by Schmitt’s system. (*Id.*, 25:25-29.)

237. The session is composed of “four events (e.g., event 1, event 2, event 3, and event 4)” each of which occurred within a particular “time duration” 1014a, b, or c of the immediately preceding event to form a “continuous event.” (*Id.*, 25:1-5)



(*Id.*, Fig. 10(a) (annotated).)

238. As shown, the above session with duration 1010—like all of Schmitt’s detected sessions—constitutes a “**distraction episode**” with a “**start**” (event 1) and an “**end**” (event 4) that span an “**interval**” (duration 1010) during a vehicle trip.

239. Further, this episode includes and spans multiple “**discrete distraction events**” (events 1-4) that occur during a trip in the vehicle.

[1-d(2)] “the determining of the distraction episode comprising determining a possible distraction episode and after the possible distraction episode is determined, determining that the possible distraction episode comprises a true distraction episode.”

240. In my opinion, this limitation is taught by Schmitt.

241. Schmitt's system both detects distraction events and performs a second level of analysis by "calculat[ing] a risk score based on the movement of [the] mobile device." (Ex. 1004, 1:35-43.) Put another way, the system first "detect[s] mobile device movement events" and then "determin[es] a risk score." (*Id.*, 4:62-5:6; 8:3-13; 14:63-66; Fig. 4.)

242. Schmitt explains that this "risk score" is calculated from "aggregated sensor data" and can be "based on a plurality of factors." (*Id.*, 8:3-13; 17:46-54.) For instance, Schmitt's "risk calculation equation[s]" can consider factors 1-*n*. (*Id.*, 18:11-30.)

243. One example factor that can be considered is the "frequency of mobile device movement events...." (*Id.*, 17:54-63.)

244. Schmitt next explains that its system can assign a "higher score" to distractions that represent a greater risk, and "lower score" to less serious distractions. (*See id.*, 17:64-18:10.)

245. Schmitt uses the calculated "risk score" to determine the type of response provided to a given distraction. (*See id.*, 12:52-54.) In this regard, "[t]he mobile device movement detection units ... may then generate and provide feedback to the mobile device 212 or vehicle 204 based on the calculated risk score." (*Id.*, 13:1-4; 18:42-44.)

246. The system “may recommend providing feedback” to the device user only if the “calculated risk score is above a predetermined threshold.” (*Id.*, 18:44-47.)

247. Schmitt also explains that different responses can be provided for different levels of risk. For example, a “more passive notification” can be provided if the risk score is lower, while an “alarm” “may issue” or the device may be disabled if the risk score is higher. (*Id.*, 18:65-19:26.)

248. In my opinion, a POSITA would have understood this to teach what this limitation requires.

249. In particular, Schmitt’s system first determines that a **“possible distraction episode”** occurred. This is the initially detected distraction “session.”

250. Then, Schmitt’s can then separately determine that this is a **“true distraction episode.”** It does so by applying a higher risk score that crosses a predetermined threshold to the identified “session.”

251. In my opinion, in view of the totality of Schmitt’s disclosure, a POSITA would have considered these higher risk distractions to be analogous to the claimed **“true”** distractions.

252. Schmitt explains that higher scores are applied to more intense and more frequent device usage. More frequent and more intense device usage is far more likely to be the result of distraction (and thus constitute a “true” distraction)

than less frequent and less intense device usage. For example, as discussed above in connection with claim element [1-d(1)], Schmitt describes that an event session (i.e. a “distraction episode”) may include only a small number of events, or it may include many events. In my opinion a POSITA would have understood that an event session comprising a small number of events (for example a low-risk event session) would represent a “possible distraction episode,” and an event session comprising more events (for example a higher risk event session) that necessitates a response would represent a “true distraction episode.”

253. As noted in my description of the '249 patent, the patent does not provide any definition of a “true” distraction episode. The '249 patent does, however, provide a handful of examples of secondary analyses that can be performed by its system.

254. For instance, the system can consider if the “time period spanned by the possible distraction episode is longer than a predetermined length.” (Ex. 1001, 4:63-5:2.), and alternatively, the system can “[s]cor[e] relevant distraction episodes” in an effort to “better capture[] crash risk.” (*Id.*, 9:21-25.).

255. In my opinion a POSITA would have appreciated that Schmitt’s risk score—which takes into account distraction intensity and frequency—is equivalent to the scores described by the '249 patent to “better capture[] crash risk.” (*Id.*, 9:21-25.)

256. As I have also explained (*see supra* Section VI.E), it was generally known in the art that a greater number of non-driving interactions by a driver spanning a longer period of time is more likely to lead to a crash. This is entirely consistent with Schmitt’s teaching that a higher risk score (and increased certainty of distraction) should be assigned to distraction sessions entailing more intense and frequent usage. These types of distractions can obviously be considered “**true**” as the claim here requires because they are far more likely to lead to a crash.

257. Next, in my opinion, a POSITA would have also understood that Schmitt calculates its risk score (and thus determines that a “true” distraction occurred) “**after**” the conclusion of a distraction session.

258. To begin, ordering the determinations in this way makes practical sense: a POSITA would have understood that a risk score should be applied to a completed event session (i.e., “distraction episode”), otherwise, the score would not be taking into account the totality of the circumstances resulting in the distraction).

259. Next, this timing is driven by the types of data Schmitt teaches as going into the score. As I have explained, Schmitt teaches that its system calculates its risk score using aggregated sensor data (as opposed to just single quantum of data). It also takes into account information collected over time, such as movement frequency.

260. Because of this, a POSITA would have understood that the score must be determined and calculated at the conclusion of a session. It is only at this time that sensor data has been aggregated. Similarly, movement frequency can only be taken into account after a period of related movement (like a session) has already occurred.

261. This is entirely consistent with how systems like that taught by Schmitt are designed to operate: risk scores are applied after distraction has already been identified. Showing this, like Schmitt, another prior art reference explains that in a score or grade is “generated” after an “estimate” of distraction “is completed.” (Ex. 1008, 7:64-66.)

b. Claim 2

262. Claim 2 depends from claim 1 and further requires:

“the one or more physical states comprises an operational state of the mobile device”

263. As I have explained above, Schmitt renders claim 1 obvious. It also teaches the additional limitation of claim 2.

264. Schmitt’s system is able to detect a variety of different mobile “device usage event[s].” (Ex. 1005, 22:51-54; *see also id.*, 1:25-27; 2:40-42.)

265. Schmitt explains that such detected events include the locking/unlocking of the device, application use, or any other event that results in

the generation of an operating system message reflecting user interaction with the device. (*See id.*, 22:30-43.)

266. In my opinion, all of these examples relate to ***“an operational state of the mobile device.”***

c. Claim 3

267. Claim 3 depends from claim 2 and further requires that:

“the operational state comprises a state of locking of the mobile device”

268. As I have explained above, Schmitt renders claim 2 obvious. It also teaches the additional limitation claim 3.

269. Schmitt explains that “the mobile device usage event” detected by its system “may comprise ... a mobile device unlock or a mobile device lock.” (Ex. 1005, 2:46-47; *see also id.*, 26:10-15.)

d. Claim 4

270. Claim 4 depends from claim 3 and further requires that:

“the operational state comprises a state of a phone call”

271. As I have explained above, Schmitt renders claim 3 obvious. It also teaches the additional limitation of claim 4.

272. Schmitt teaches that its system monitors for any type of mobile device usage indicative of distraction. (*See Ex. 1005, 22:30-43.*) Schmitt explains that such detected events include the locking/unlocking of the device, application use, or any

other event that results in the generation of an operating system message reflecting user interaction with the device. (*See id.*, 22:30-43.)

273. Schmitt describes that the mobile device 212 may be a smartphone (*Id.* 8:60-64). Schmitt further discloses examples of mobile devices running under the ADROID and iOS operating systems (*Id.* 22:36-43). In my opinion, a POSITA would have known that in devices such as smartphones based on iOS or ANDROID, the phone function is an application, and thus Schmitt's disclosure of an indication of the use of an application (*Id.*, 22:30-43) would include the indication of the use of the phone application, for example the arrival of an incoming call, the origination of a call, a call in progress, and the termination of a call, each of which would have been recognized by a POSITA as a "state of a phone call." Thus, in my opinion, while Schmitt does not explicitly identify the state of a phone call as being an operational state considered by the system (*i.e.*, a detected event), a POSITA would have, based on the above disclosures found it obvious to include the state of a phone call, as indicated by a smartphone application, to be a an operational state representing one of Schmitt's detected events. Indeed, Schmitt itself explains that its system can detect and consider "phone ... usage within the vehicle" when determining whether distraction has occurred during vehicle operation. (Ex. 1004, 10:29-37.)

274. Confirming this, other prior art I have reviewed lists “initiating a telephone call” as an example of device usage indicating distraction. (Ex. 1005, 9:25-29.)

e. Claim 5

275. Claim 5 depends from claim 4 and further requires that:

“the operational state comprises a power condition”

276. As I have explained, Schmitt renders claim 4 obvious. It also teaches the additional limitation of claim 5.

277. As an initial matter, Schmitt’s system monitors for device usage. Usage occurs when a device is powered on.

278. Next, Schmitt explains that its system monitors for “indications of mobile device usage from an operating system” such as “an ACTION_USER_PRESENT” event. (See Ex. 1004, 22:36-41.)

279. This type of event is generated by an operating system when the device is “powered up” and “the user has cleared the first authentication, and is now able to interact with the” device. (Ex. 1006, 4:41-5:10.)

280. Thus, separate and apart from the fact that Schmitt’s system requires device power to operate, the system also monitors for **“a power condition”** because it tracks operating system messages indicating that the device is on, awake, available to the user, and generating events.

f. Claim 6

281. Claim 6 depends from claim 4 and further requires that:

“the operational state comprises an aspect of a foreground app running on the mobile device”

282. As I have explained, Schmitt renders claim 4 obvious. It also teaches the additional limitation of claim 6.

283. Schmitt’s system monitors for a user “using an application of the mobile device (e.g., a texting application, an email application, a game application, etc.).” (Ex. 1004, 22:30-36.) Likewise, a “device usage event” can entail “application usage.” (*Id.*, 26:10-15.)

284. In my opinion, active, ongoing application use is an example of ***“an aspect of a foreground app running on the mobile device.”***

g. Claim 7

285. Claim 7 depends from claim 1 and further requires that:

“determining a distraction episode comprises determining that a physical state of the mobile device comprises no interaction by a user or that accelerometer or gyroscope values are lower than a threshold that differs from a threshold used in determining motion of the mobile device at the start of the distraction episode”

286. As I have explained, Schmitt renders claim 1 obvious. In my opinion, it also teaches the additional limitation of claim 7.

287. As noted in connection with claim 1, Schmitt’s system detects “event session[s]” where “a plurality of events associated with the mobile device” “occur[]

within a respective threshold amount of time....” (Ex. 1004, 2:1-9, 2:40-42; 2:48-55.)

288. Again, and as discussed in detail in connection with limitation [1-d(1)], this “event session” corresponds to the claimed **“*distraction episode.*”**

289. Schmitt explains that as part of determining an “event session,” its system determines the “end time of an event session.” (Ex. 1004, 2:58-62.)

290. To determine the session end time, Schmitt “initiate[s] a session timer.” (*Id.*, 23:31-35.) Then, “if the device does not detect another event within a threshold amount of time from the prior event (e.g., the initial event or another event), the device may end the session....” (*Id.*, 23:34-40; *see also id.*, 25:12-21; Figs. 9, 10a.) In other words, Schmitt’s system will determine that a session has ended if there has been no detected event (i.e., usage/movement) for a specified period of time.

291. Because Schmitt monitors for the cessation of device movement/usage, it determines **“*a physical state of the mobile device comprises no interaction by a user.*”**

h. Claim 8

292. Claim 8 depends from claim 7 and further requires that:

“the end of the distraction episode is not determined until after a refractory period of no further movement of the mobile device or no indication of a continued distraction”

293. As I have explained, Schmitt renders claim 7 obvious. It also teaches the additional limitation of claim 8.

294. This is taught by Schmitt for the same reasons I discussed for claim 7

295. In particular, Schmitt determines that a ***“distraction episode”*** (the “event session”) has ended after a ***“refractory period of no further movement”*** (“the device does not detect another event within a threshold amount of time from a prior event”). (Ex. 1004, 23:34-40; 25:12-21; Figs. 9, 10a.)

i. Claim 9

296. Claim 9 depends from claim 8 and further requires that:

“determining an end of the distraction episode comprises determining that a context of the mobile device indicates no further distraction”

297. As I have explained, Schmitt renders claim 8 obvious. It also teaches the additional limitation of claim 9.

298. This claim requires ***“determining that a context of the mobile device indicates no further distraction.”***

299. The ’249 patent explains that “contextual information” that can be used to determine if a vehicle driver is distracted “broadly ... includes ... one or more circumstances or conditions associated with a distraction episode.” (Ex. 1001, 4:4-6.)

300. Examples of “distraction context” are provided, including “the start and end locations of the trip,” the session of inputs like “phone tapping,” whether a device is mounted or held, a “phone call state,” or the “phone’s orientation and operational states.” (Ex. 1001, 2:30-34, 8:10-17; 11:52-54, 12:62-13:24.)

301. In my opinion, Schmitt’s system monitors for, detects, and considers the very same “**context of the mobile device**” when making distraction determinations (or relatedly, no distraction determinations).

302. In particular, Schmitt monitors for whether a “trip associated with the vehicle has started” or “ended.” (Ex. 1004, 19:49-51, 20:49-51; Fig. 7.) If the trip ends, Schmitt discontinues monitoring for device movement or usage. (*See id.*; *see also id.*, 22:20-43, 24:6-10; Figs. 7, 9.)

303. Further, Schmitt can determine if “mobile device movement occurs during safer driving conditions (e.g., non-peak traffic, high visibility, below average speed of the vehicle, etc.)” and respond differently if this is the case. (*See id.*, 19:17-26.)

304. Schmitt also explains that it monitors for various indications of device “usage” (or the absence thereof) like movement, orientation changes, and operational state. (*See* Ex. 1004, 1:25-27; 2:40-42; 22:51-54; Fig. 9.)

j. Claim 10

305. Claim 10 depends from claim 9 and further requires that:

“determining that the possible distraction episode comprises a true distraction episode includes determining that a time period spanned by the possible distraction episode is longer than a predetermined length”

306. As I have explained, Schmitt renders claim 9 obvious. It also teaches the additional limitation of claim 10.

307. Schmitt's system distinguishes between "higher" and "lower" risk distractions. (See Ex. 1004, 17:64-18:1-10.)

308. Schmitt identifies a number of "factors" that can be collected by its system "to calculate a risk score." (*Id.*, 19:8-10.)

309. One of the factors Schmitt's system collects is the distraction "session duration." (*Id.*, 25:20-29.)

310. Schmitt provides examples with both a longer "session duration 1010" including more events (Fig. 10a) and a shorter "session duration 1022" including fewer events (Fig. 10b). (See also *id.*, 25:25-29; 26:32-45.)

311. Likewise, Schmitt explains that its system is able to consider whether "mobile device movement events are frequent (e.g., above a threshold amount of mobile device movement events detected...)[.]" (*Id.*, 19:10-14.)

312. Schmitt explains that higher scores are applied to more intense and more frequent device usage. As explained, more frequent and more intense device usage is far more likely to be the result of distraction (and thus constitute a "true" distraction) than less frequent and less intense device usage.

313. For example, as discussed above in connection with claim element [1-d(1)], Schmitt describes that an event session (i.e. a "distraction episode") may include only a small number of events, or it may include many such events. In my opinion a POSITA would have understood that an event session comprising a small

number of events (for example a low risk event session) would represent a “possible distraction episode”, and an event session comprising many events (for example a higher risk event session) would represent a “true distraction episode.”

314. As noted in my description of the ’249 patent, the patent does not provide any definition of a “true” distraction episode. The ’249 patent does, however, provide a handful of examples of secondary analyses that can be performed by its system.

315. For instance, the system can consider if the “time period spanned by the possible distraction episode is longer than a predetermined length.” (Ex. 1001, 4:63-5:2.), and alternatively, the system can “[s]cor[e] relevant distraction episodes” in an effort to “better capture[] crash risk.” (*Id.*, 9:21-25.).

316. In my opinion a POSITA would have appreciated that Schmitt’s risk score is equivalent to the scores described by the ’249 patent to “better capture[] crash risk.” (*Id.*, 9:21-25; *see also* above discussion of limitation [1-d(2)])

317. In my opinion, these teachings render this claim obvious.

318. As explained, Schmitt’s system detects distraction sessions and records the duration of the distraction session prior to assessing risk.

319. Moreover, the total amount of movement and movement frequency are used to calculate total risk.

320. In my opinion, in view of this operation, a POSITA would have considered it highly obvious that distraction sessions extending over a ***“time period”*** that is ***“longer”*** as this claim requires obviously result in both a higher risk score and a higher degree of distraction certainty. This in turn makes the distraction more serious, a higher risk, and more likely to be a ***“true distraction episode”*** as this claim requires.

321. While Schmitt does not provide any specific rules for determining the risk associated with an event session, a POSITA would have understood that a longer distraction session entails a greater number of distraction events, and a corresponding increase in the time in which the driver is diverted from focusing on safe driving. Thus, the duration of the event session would be an obvious basis for assessing the risk associated with the session, and this would be an obvious way to distinguish a “possible distraction episode” from a “true distraction episode.”

322. Showing this, other prior art I have reviewed explains that use of a device “for a long time” is indicative of “potentially dangerous vehicle (or portable device) operation.” (Ex. 1008, 32:66-33:4.)

323. This is consistent with a POSITA’s understanding: the longer a driver is focused on a mobile device resulting in ongoing usage events occurring in relatively close temporal proximity, the more likely the driver is to be distracted.

2. Motivation to Combine

324. In my opinion, a POSITA would have considered it obvious and would have been motivated to apply and combine the various teachings of Schmitt in the manner discussed above.

325. First, a POSITA would have been motivated to implement Schmitt's system such that it premises its determination that a "usage event" occurred on concurrently detected device motion and usage.

326. Schmitt itself already contemplates and teaches that its system can detect and consider a "device usage event" and "device movement event" that "occur[s] at the same time." (Ex. 1004, 22:65-23:5; *see also id.*, 23:5-7; 26:10-15.)

327. Thus, a POSITA would consider the concurrent use of motion and usage/interaction data to be one of the multiple different design choices Schmitt already presents.

328. Not only was the concurrent use of motion and usage data a design option presented by Schmitt, but a POSITA would have understood that using both types of data concurrently would have resulted in improved and optimized system performance.

329. It was known in the prior art that considering usage along with movement "may better enable" a mobile device "to determine whether the user is distracted...." (Ex. 1005, 10:23-25.) This is generally consistent with how a

POSITA would understand distraction detection systems to operate: more data results in increased accuracy and reduced detection errors.

330. A POSITA would have understood that collectively considering both motion and usage data would similarly improve the detection accuracy of Schmitt's system and result in optimal performance compared to other options Schmitt presents, such as using only one or the other type of data.

331. By considering both usage and motion data concurrently, meaningful events could be more readily distinguished from less meaningful events. Put another way, by premising detection on multiple different types of related data, a given detected usage event would be more likely to actually be a usage event as opposed to just background noise.

332. In my opinion, this improvement in accuracy would have further motivated the concurrent use of both types of data as Schmitt already discloses when determining whether a device usage event occurred.

333. Second, in my opinion, a POSITA would have been motivated to implement Schmitt's system such that high risk scores are assigned to and operate to differentiate "true" distractions from distractions that are less problematic.

334. In operation, Schmitt's system causes a mobile device and/or vehicle to "provid[e] feedback" if a "calculated risk score" is high enough to be "above a predetermined threshold." (Ex. 1004, 18:44-47.)

335. Certain types of feedback contemplated by Schmitt are relatively non-invasive. This includes “passive” “notification[s] or warning[s].” (*Id.*, 18:47-55, 19:17-26.)

336. Other feedback provided by the system, however, is more extreme and intrusive. For instance, Schmitt’s system may “issue an alarm” or “disable the user interface of the mobile device.” (*Id.*, 19:7-17.)

337. In my opinion, the fact that different types of feedback can be generated, along with the severity of some of this feedback, would have motivated a POSITA to employ risk scores in a way that distinguish low risk, merely possible distractions from high risk, certain distractions. As I have explained, this is a concept that is already taught by Schmitt.

338. Doing so would allow the more extreme feedback to be employed only in situations where it is truly needed.

339. For example, low risk distractions would result in a simple, less intrusive notification. High risk, certain distractions, however, would result in the disabling of the user’s device.

340. Not only would this allow feedback to be more contextually appropriate, but designing the risk scores such that they differentiate possible from true distractions would also result in increased user confidence in the system.

341. Because there would be a greater certainty of distraction before issuing more extreme feedback like device disabling, users would be more likely to agree with and less likely to dispute a decision to issue feedback.

342. In my opinion, a POSITA would also have considered designing Schmitt's risk scores such that they are able to distinguish "possible" from "true" distractions to amount to nothing more than a routine design choice and an exercise in straightforward optimization.

343. Schmitt already allows for different "risk calculation equations" using "different factors with different assigned scores and/or weights." (Ex. 1004, 18:11-37.)

344. Further, the system is already intended to identify "more dangerous driving conditions." (*Id.*, 19:7-10.)

345. In my opinion, a POSITA would have been readily able to tailor Schmitt's existing risk scores along with any threshold to which these scores are compared to facilitate identification of not just risky distractions, but also "true" distractions as the '249 patent's claims require.

346. I understand that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.

347. In my opinion, this is all the '249 patent's requirement that a "true" distraction be identified does here. Differentiating between possible/true or low risk/high risk distractions entails nothing more than routine and straightforward calculation.

348. In my opinion, a POSITA would also have had a more than reasonable expectation of success.

349. As explained, Schmitt's system is already open to the collection and use of both motion and usage data. (*See, e.g.*, Ex. 1004, 22:63-23:7.)

350. Further, Schmitt explains that its risk scores can be calculated in a variety of ways using different calculations, factors, and thresholds. (*Id.*, 18:33-37.)

351. In my opinion, a POSITA would consider use of multiple types of data simultaneously, and the use of the risk scores to differentiate merely "possible" from "true" distractions to be straightforward variations on what Schmitt already teaches.

352. Given this, a POSITA would have every reason to believe and no reason to doubt that Schmitt's system could be designed to successfully include these features and operations.

C. Ground 2: Claims 1-10 Are Obvious Over Schmitt and Olson

353. In my opinion, a POSITA would have considered both Schmitt and Olson to be within the scope of the prior art and highly relevant to the patentability of the '249 patent's claims.

354. In my opinion, even if it is determined that Schmitt does not itself render claims 1-10 obvious, these claims would still be obvious when Schmitt is considered in view of the teachings of Olson (Ex. 1005).

355. In addition, a POSITA have been motivated to combine and collectively consider the teachings of Schmitt and Olson to arrive at the subject matter claimed by the '249 patent and would have had a reasonable expectation of success when doing so.

1. Olson Supplements Schmitt by Teaching a System that Identifies “True” Distractions

356. Again, as I explained when discussing limitation [1-d(2)] of claim 1, Schmitt’s system distinguishes between different types of distractions and assigns a risk score.

357. As also explained above, in my opinion, a POSITA would have considered it obvious to tailor these risk scores such that they are able to differentiate between “*distraction episode[s]*” that are merely “*possible*” from those that are “*true.*”

358. In the event it is determined that Schmitt’s determinations are not made with a sufficient degree of certainty to satisfy claim 1 (*i.e.*, the claimed determination of a “*true*” distraction episode requires absolute certainty and not just a high risk), in my opinion the claims would still be obvious. Olson teaches a system that makes this determination.

359. Olson teaches a “[s]ystem[] ... for preventing a user of a user device ... from driving a vehicle ... while being distracted by the user device.” (Ex. 1005, 1:54-57; *see also id.*, Abstract.)

360. Olson “collect[s] usage data” from a user’s mobile device “while the user drives the vehicle.” (*Id.*, 2:37-38; *see also id.*, 3:4-7; 6:60-64; 8:36-38.)

361. Collected usage data can include “any type of input/output” or “change[s] in orientation.” (*Id.*, 9:1-11.)

362. Olson monitors the occurrence of device usage over time to determine distraction.

363. More particularly, Olson’s system assesses detected “usage instances....” (*Id.*, 13:1-16.) “[A] single usage instance may include a single type of usage data, such as the user viewing a display ..., the user accessing an application ..., a user inputting information ..., etc.” (*Id.*, 13:12-16.) Accumulation of “usage instances” over a “time interval” indicate distraction. (*Id.*, 13:7-10, 13:39-53.)

364. Olson’s system also distinguishes distraction episodes that are “merely ... suspicious” from those that are “certain.” (Ex. 1005, 12:38-44.)

365. To accomplish this, “distraction thresholds” are defined “for different levels of confidence with respect to the user being distracted. For instance, user device 210 may define a distraction threshold that corresponds to merely being

suspicious that a user is distracted and another distraction threshold for being certain that the user is distracted.” (Ex. 1005, 12:38-44.)

366. Olson also explains why it operates to distinguish “merely ... suspicious” from “certain” distractions: doing so allows the system to provide different responses depending on the “level of confidence regarding the user actually being distracted.” (*Id.*, 12:45-60.)

367. In my opinion, one straightforward and obvious way a POSITA would have accomplished this would have been to employ a lower threshold for “suspicious” distractions, and a higher threshold for “certain” distractions.

368. In other words, fewer usage instances (passing a lower usage threshold) would give rise to a “suspicious” distraction, while more usage instances (passing a higher usage threshold) would result in a “certain” distraction.

369. Designing Olson’s thresholds this way (with a lower usage threshold for “suspicious” distraction and a higher usage threshold for “certain distraction”) is consistent with a POSITA’s general understanding that an “operator ... viewing [a] portable device for a long time” indicates “potentially dangerous vehicle (or portable device) operation.” (Ex. 1008, 32:66-33:4.) Short periods with little usage will result in a “suspicious” distraction, while longer periods with more usage will result in “certain” distraction. A POSITA would also have been familiar with this approach, for example, as described in the Technical Background section of this

declaration. As I explained, it was well known that longer distractions (involving more instances of interaction) are more certain in that they are more likely to result in a crash. (*See supra* Section VI.E.)

370. Olson explains that its system is designed to operate such that usage can continue to be tracked over time.

371. In particular, according to Olson, its system it “may ... respond to a usage data analysis” indicating distraction “by continuing to collect usage data....” (Ex. 1005, 14:19-22.) Likewise, Olson explains that its system “continue[s] to monitor the movements of user device 210” after a distraction determination is made. (*Id.*, 15:14-20.)

372. In such circumstances, because usage continues to be tracked, as usage instances accumulate the system would first determine there to be a “suspicious” distraction when the first, lower threshold is crossed. It would then later determine there to be a “certain” distraction when continued accumulation of usage instances result in the second, higher threshold being crossed. As I explain in the above technical background section, it was well-known that the longer a driver is distracted, the greater the risk of accident. (*See supra* Section VI.E.) Thus, longer distraction episodes (entailing more distraction incidents) are obviously more certain than shorter distraction episodes (entailing fewer distraction incidents).

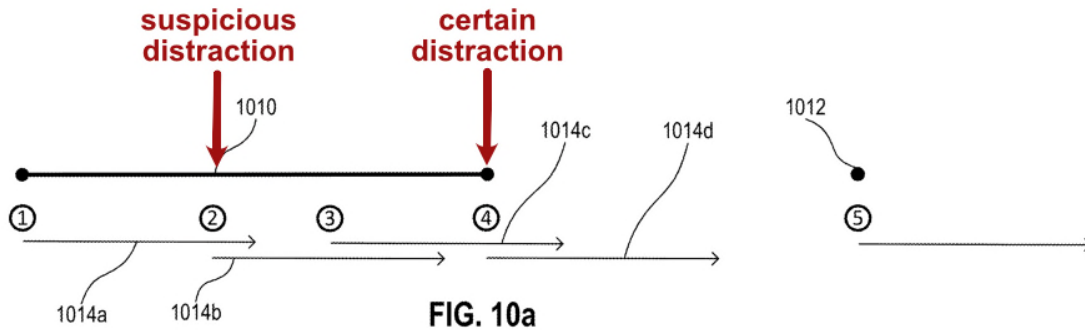
373. Applying Olson’s ability to distinguish “suspicious” from “certain” distractions using different thresholds to Schmitt results in the claimed subject matter.

374. In particular, a distraction session including a smaller number of distraction events would result in a determination that a “suspicious” distraction occurred.

375. However, if the distraction events continue over a longer time period, this would result in an upgrade of the previous “suspicious” determination to a “certain” distraction.

376. In a more specific example, a POSITA would have understood that a threshold of two distraction instances could indicate a “suspicious” distraction, while four distraction instances would be needed for a “certain” distraction.

377. Applying this to the example distraction session shown in Schmitt’s Figure 10a, a “suspicious” distraction would be determined to have occurred after event 2 (as the threshold of 2 events was crossed), while a “certain” distraction would later be determined to have occurred after event 4 (as the threshold of 4 events was crossed):



(Ex. 1004, Fig. 10a (annotated).)

378. This operation is exactly what this limitation requires. The system first determined a ***“possible distraction episode”*** (the initial “suspicious” distraction). And, it then determined ***“that the possible distraction episode comprises a true distraction episode”*** ***“after the possible distraction episode is determined”*** (the later “certain” distraction).

2. Motivation to Combine

379. In my opinion, a POSITA would have considered it obvious and would have been motivated to apply Olson’s teachings to Schmitt.

380. Schmitt explains that its system is designed to “provid[e] accurate ... methods for detecting” driver distraction in a vehicle. (Ex. 1004, 1:38-43.)

381. Further, the system is intended to operate such that it can distinguish between different detected distractions by “calculat[ing] a risk score.” (*See id.*; *see also id.*, 12:14-19.)

382. Varying types of “feedback” can be provided to the “mobile device or vehicle based on the risk score.” (*Id.*) Lower risk scores are intended to generate more “passive” notifications while higher risk scores can result in “alarms” or even the “disable[ing of] the” mobile device. (*See id.*, 18:54-25.)

383. In my opinion, a POSITA would have recognized that applying Olson’s ability to distinguish “merely suspicious” from “certain” distractions via the use of different thresholds would have furthered these goals and design considerations discussed in Schmitt.

384. According to Olson, because it can distinguish “merely suspicious” from “certain” distractions, its system allows for better identification of situations where a driver is “actually being distracted.” (Ex. 1005, 12:40-45.)

385. Again, Schmitt’s system is intended to have improved accuracy. A POSITA would have recognized that applying Olson would have furthered this goal.

386. More specifically, by distinguishing “merely ... suspicious” from “certain” distractions, Schmitt’s system would be better able to distinguish situations likely to involve true driver distraction from other, less troubling situations. And, this would avoid nuisance warnings while still assuring that dangerous distraction events were avoided. It would also help filter noise (detected distractions that are too short to be considered certain/true) from the system.

387. A POSITA would recognize that applying Olson would also lead to other benefits and improvements.

388. Olson explains that its system allows for more “customize[d] responses to the user being distracted according to a level of confidence...” (Ex. 1005, 12:44-60.)

389. Because of this customizability, less invasive responses, like an “audio message,” can be provided when the “user device ... is merely suspicious of the user being distracted.” (*Id.*)

390. Other responses like “disabl[ing] one or more features” of the device, vehicle braking, or even law enforcement notification can be generated when the “user device ... is certain of the user being distracted.” (*Id.*, 12:48-60, 14:61-65.)

391. As I have explained, Schmitt’s system is already designed to provide different feedback to a device users. (See Ex. 1004, 18:54-25.)

392. In my opinion, a POSITA would have recognized that applying Olson would have improved Schmitt by allowing the issuance of more serious feedback (like device disabling) to be limited to situations where it is most merited.

393. For example, because Schmitt’s system would be able to identify “certain” distractions (by monitoring for situations where driver distraction has been ongoing for longer resulting in more distraction events, the crossing of a higher threshold, and thus more certain distraction), the device could be disabled if the

distraction is certain while a simple notification could be provided if there is only suspicious distraction. Put another way, Olson would have allowed Schmitt to better tailor feedback to the detected distraction.

394. Similarly, a POSITA would also have recognized that use of Olson's different thresholds to distinguish "merely ... suspicious" from "certain" distractions would have improved Schmitt by allowing it to provide escalating driver feedback.

395. In this regard, a smaller number of distraction instances would initially and in the first instance produce a less invasive response (like a passive notification).

396. Continued and ongoing distraction, however, would produce increasingly invasive responses like device disabling or vehicle braking.

397. Because the system would start with a simple notification (due to the fact that a small number of distraction events results in only "suspicious" distraction), the driver would be first afforded with an opportunity to self-correct.

398. But, the system would then continue its response to distraction by disabling the device if the driver continued to be distracted despite the notification (due to the fact that the accumulation of further distraction events results in the upgrade to a "certain" distraction).

399. In my opinion, a POSITA would also have considered application of Olson to Schmitt to be nothing more than a routine, simple, and highly obvious design choice.

400. Schmitt already teaches a system that can limit feedback to circumstances where a “calculated risk store is above a predetermined threshold.” (Ex. 1004, 18:44-47.)

401. Schmitt also already explains that its system is able to track of whether “movement events are frequent (e.g., above a threshold amount...)[.]” (*Id.*, 19:7-14.)

402. In my opinion, a POSITA would consider Olson’s system to be a straightforward variation of this: it similarly employs thresholds to make distraction determinations.

403. A POSITA would have recognized that application of Olson to Schmitt entails nothing more than performing additional, analogous calculations using the data Schmitt already collects. In addition to calculating a risk score, the system would also apply usage thresholds to differentiate “suspicious” from “certain” distractions. In this combination, each of the systems would be performing the functions it had been known to perform. Schmitt’s system would continue to identify distraction event sessions and take tiered levels of action depending on the degree of distraction involved, based on Olson’s thresholds separating suspicious distractions from certain distractions, to achieve the predictable result of reducing risks from distractions while avoiding nuisance warnings.

404. I also understand that when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

405. In my opinion, when the teachings of the prior art are considered, this is what a POSITA would understand the '249 patent to do here: it simply uses prior art components in the same way those components operate in the prior art

406. In particular, Schmitt's system operates to detect mobile device movement / usage. It then provides feedback for purposes of reducing distracted driving and promoting vehicle safety. (Ex. 1004, 1:25-30, 1:35-37, 4:54-56.)

407. Olson has similar goals, but further allows for the distinguishing of "merely ... suspicious" and "certain" driver distractions. (See Ex. 1005, 1:54-57; 12:38-44.) Different responses can be provided depending on the certainty of distraction.

408. The combined system of Schmitt and Olson would continue to exhibit these very same benefits and advantages: the combined system would continue to detect distraction and provide feedback as Schmitt teaches. It would also be able to distinguish suspicious from certain distraction as taught by Olson for purposes of tailoring the feedback to the certainty of distraction.

409. In my opinion, a POSITA would also have had a more than reasonable expectation of success.

410. Schmitt and Olson both teach systems that collect similar data for similar purposes: both references' systems detect mobile device movement and usage and identify driver distraction. (*See, e.g.*, Ex. 1004, 1:25-37; Ex. 1005, Ex. 1005, 1:54-57; 2:37-38.)

411. Moreover, as I have explained, both references also teach that thresholds can be used when making distraction determinations. (*See* Ex. 1004, 18:44-47, 19:7-14; Ex. 1005, 12:38-44.)

412. In view of this similarity in structure and operation, a POSITA would have every reason to believe and no reason to doubt that Olson's teachings could be successfully used with Schmitt.

D. Ground 3: Claims 1-10 Are Obvious Over Olson

413. In my opinion, a POSITA would have considered Olson to be within the scope of the prior art and highly relevant to the patentability of the '249 patent's claims.

414. In my opinion, moreover, when viewed and considered in light of the knowledge possessed by a POSITA, Olson discloses all the limitations of and renders claims 1-10 of the '249 patent obvious.

415. In addition, not only would a POSITA have been motivated to combine and collectively consider the teachings of Olson to arrive at the subject matter

claimed by the '249 patent, they also would have had a reasonable expectation of success when doing so.

1. Claim-By-Claim Analysis

a. Claim 1

[1-a] “1. A method comprising receiving signals from one or more detectors of a mobile device while the mobile device is on a trip in a vehicle,”

416. This, in my opinion, is taught by Olson.

417. As claim 1 requires, Olson teaches a method performed while a ***“mobile device is on a trip in a vehicle.”***

418. Here, Olson explains that it relates to “[s]ystems and/or methods ... for preventing a user of a user device ... from driving a vehicle ... while being distracted by the user device.” (Ex. 1005, 1:54-57; *see also id.*, Abstract.) In my opinion, a POSITA would have understood that when the vehicle is being driven, it is “on a trip,” and thus a device in the vehicle while it is being driven is “on a trip in a vehicle.”

419. This “user device” may be a “mobile telephone,” “smartphone,” “tablet computer, etc.” (*Id.*, 1:55-56; 2:4-5; *see also id.*, 3:23-27.)

420. Olson also teaches a system that employs ***“detectors of a mobile device”*** generating ***“signals”*** during a trip.

421. For instance, information from a user device “may be gathered and analyzed to determine whether the user is distracted by the user device while

driving....” (*Id.*, 1:58-62; *see also id.*, 3:4-7.). In my opinion a POSITA would have understood Olson’s description that this information “may be gathered” to mean that the system “received” such information.

422. Many examples of signal generating detectors are provided by Olson.

423. For instance, Olson explains that the user device “may determine whether the user is actually driving the car” via an “integrated” “[p]osition tracking system 240” like a “GPS system” or a “system that performs cellular triangulation techniques” to “determin[e] changes in the location....” (*Id.*, 2:23-26; 4:39-48.)

424. The device can also “collect usage data while the user drives the vehicle.” (*Id.*, 2:37-38.) This collected usage data can include the “orientation of the user device” determined using accelerometers, “captur[ed] image data of the user viewing the display,” “monitor[ed] inputs/outputs,” or “track[ed] internal processes executed by the user device” like telephone calls or text messages. (*Id.*, 2:38-43; *see also id.*, 9:1-11; 9:19-42; 9:64-10:2; Figs. 8-10.)

[1-b] “using the received signals from the one or more detectors to identify one or more physical states of the mobile device during the trip, the one or more physical states comprising motion of the mobile device along a trajectory of the trip,”

425. This, in my opinion, is taught by Olson. Olson identifies “*physical states of the mobile device during the trip*” “*using the received*” detector “*signals.*” Again, as explained, Olson’s system uses device sensor data to detect device usage and movement during a vehicle trip. (*See, e.g.*, Ex. 1005, 2:38-43; Figs. 8-10.)

426. Next, in Olson, “user device 210” includes a “distracted driver prevention application 215” that “communicat[es]” with a “position tracking system 240 to determine whether the vehicle is moving.” (Ex. 1005, 3:30-42.)

427. As noted above, “position tracking system” can be “integrated into the user device” and may be a “GPS system” or “a system that performs cellular triangulation techniques” for tracking “the geographical movements of user device 210.” (*Id.*, 4:39-47.)

428. As a result, in my opinion, Olson also employs “**detectors**” (GPS or cellular triangulation systems integrated into the mobile device) to determine a “**physical state**” such as “***motion of the mobile device along a trajectory of the trip***” (tracking the device’s geographical movement to determine if it is present within a moving vehicle).

[1-c] “based on the identified one or more physical states, separately generating two or more discrete distraction events separated in time, each of the discrete distraction events comprising concurrent motion of the mobile device and interaction with the mobile device by an occupant of the vehicle, and”

429. This, in my opinion, is taught by Olson.

430. Olson’s system monitors for and detects “***interaction with the mobile device by an occupant of the vehicle***” as this limitation requires.

431. According to Olson, a “user device may collect usage data while the user drives the vehicle.” (Ex. 1005, 2:37-38; *see also id.*, 3:4-7; 6:60-64; 8:36-38.)

432. Collected “usage data” can include “any type of input/output communicated between the user and user device” “such as the user pressing a button or typing information into the user device” can be detected. (*Id.*, 9:1-11.)

433. Usage data can also include a “detect[ed] ... change in orientation of the user device 210 when the user moves” the device, or the “detect[ed] ... face of the user when the user glances at” the device’s display. (*Id.*; *see also id.*, 9:44-10:22; 10:46-59; Figs. 8-10.)

434. Next, Olson discusses how its system employs both vehicle movement and usage determinations when assessing distraction.

435. “FIG. 3 illustrates a flowchart of an example process 300 for preventing a user from driving while distracted by user device 210.” (Ex. 1005, 5:42-45.)

436. “[P]rocess 300 ... include[s] determining whether a user is driving (block 320).” (*Id.*, 7:9-12.) As I noted above, an integrated “position tracking system” can be used to determine “whether the user is driving by determining whether the vehicle is moving.” (*Id.*, 7:10-17.)

437. After the user is determined to be driving using the device integrated position tracking system, “process 300” proceeds to “collecting usage data (block 330).” (*Id.*, 8:36-37.)

438. Figure 3, reproduced below, has been annotated with color and numbers to show the performed multi-step process:

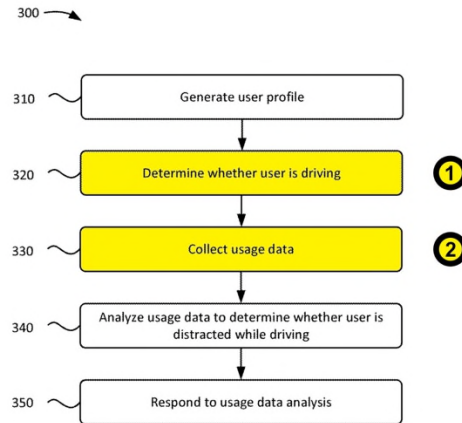


Fig. 3

(*Id.*, Fig. 3 (annotated).)

439. As shown, Olson proceeds to (2) collect usage data only after it has (1) already determined that the user device is moving along with a vehicle. (*See id.*)

440. Consistent with this depicted order of operation, Olson explains that it collects “usage data” “while the user drives the vehicle.” (*Id.*, 2:37-38 (emphasis added).) Likewise, Olson notes that its system “gather[s] information about the user while the user is driving.” (*Id.*, 3:5-6; *see also id.*, 6:60-62.)

441. Because usage information is collected during driving, Olson teaches a system that makes an assessment of device usage that is “**based**” on the previously “**identified ... physical state**” (the determination of device and vehicle movement).

442. Further, Olson teaches that each of its “**distraction events compris[e] concurrent motion of the mobile device and interaction with the mobile device.**”

443. More particularly, per Olson, “a single usage instance may include a collection of related usage data....” (*Id.*, 13:16-18.) Thus, “the relationship between

types of usage data and a usage instance by user device 210 may be ... many to 1...”
(*Id.*, 13:32-35.)

444. In one provided example, a single usage instance can entail a “user viewing user device 210 2 seconds after a text message has been received....” (*Id.*, 13:26-32. Similarly, “if user device 210 undergoes an orientation change from horizontal to vertical shortly after receiving a text message, the change in orientation may be used to infer that the user is reading the text message and, therefore, distracted....” (*Id.*, 10:25-35.)

445. Olson explains that device viewing can be determined via “detecting a change in orientation of user device 210 when the user moves user device 210....” (*Id.*, 9:1-11; 9:64-10:1.) This is done with “an accelerometer.” (*Id.*)

446. Thus, in sum, Olson teaches that individual instances of usage (called “usage instances”) can involve both detected device motion (like device orientation changes derived from accelerometer measurements) and contemporaneous user interaction (like text message receipt or transmission).

447. Next, Olson system detects repeated usage and “***generat[e] two or more discrete distraction events separated in time***” as required.

448. Olson explains that “[u]ser device 210 may ... collect degree, time frequency, and other types of information regarding the user viewing user device 210....” (*Id.*, 10:59-62.)

449. For instance, “[a]s shown in Fig. 11,” the “device ... may collect usage data corresponding to” multiple separate “operations 1110-1150 along timeline 1160.” (*Id.*, 11:22-25.)

450. In the example shown in the figure, the device: (1) first detects receipt of “a text message (block 1110)” at a first time, (2) detects provision of the “text message to a user ... by for example, generating a prompt (e.g., a beep, a ding, a ring, a vibration, etc.)” at a second later time (block 1120), (3) “detect[s] user viewing user device 210 (block 1130)” at a third later time, (4) detects the “generate a text message” response “from the user (block 1140)” at a fourth later time, and (5) detects “send[ing] the text message (block 1150)” at a final, fifth time. (*Id.*, 11:24-40.) Figure 11 is reproduced below for reference:

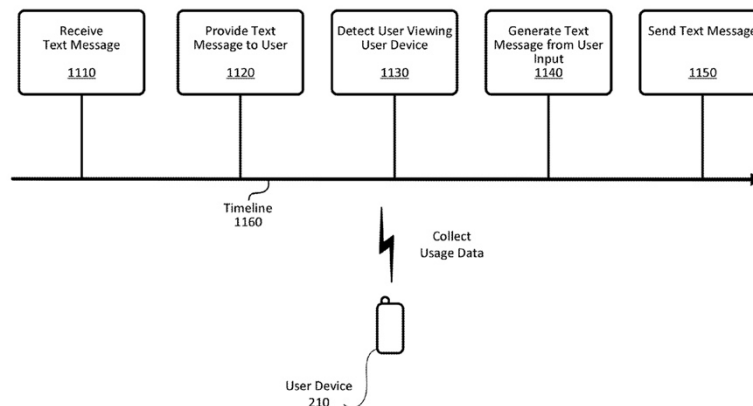


Fig. 11

(*Id.*, Fig. 11.)

451. So, in sum, Olson’s system operates to collect “[u]sage data corresponding to” separate “operations 1110-1150,” along with “time information (e.g., a timestamp)” corresponding to each of the operations. (*Id.*, 11:40-44.)

452. Similarly, Olson explains that its system considers multiple “usage instances” to determine if a driver is “distracted by user device 210.” (*Id.*, 13:1-16.)

453. “[A] single usage instance may include a single type of usage data, such as the user viewing a display ..., the user accessing an application ..., a user inputting information ..., etc.” (*Id.*, 13:12-16.) Many different “usage instances” can occur and be detected over a given “time interval.” (*Id.*, 13:7-10.)

454. Olson explains that by detecting these separate operations or usage instances over time, its system can “determine whether, and/or how severely, the user of user device 210 is distracted by user device 210.” (*Id.*, 12:3-5.)

455. In my opinion, each detected operation or usage instance 1110-1150 constitutes a “*separately generat[ed]*” “*discrete distraction event[.]*.”

456. And, as shown in Figure 11, these various detected operations or usage instances occurs at a different time causing them to be “*separated in time*” along timeline 1160 as this claim limitation requires.

457. Moreover, as I have explained, in Olson each of these usage instances can entail multiple types of usage data, including device movement / orientation

changes (detected via accelerometer) and an interaction event (like the sending or receiving of a text message). (Ex. 1005, 13:11-37.)

[1-d(1)] “determining a distraction episode that extends from a start to an end of an interval and encompasses two or more of the discrete distraction events occurring in the interval and during the trip in the vehicle,”

458. This, in my opinion, is taught by Olson.

459. Olson’s system operates to “determine whether the user is distracted by the user device while driving....” (Ex. 1005, 1:54-57.)

460. To do so, it “analyz[es]” collected “usage data....” (*Id.*, 12:6-8; Fig. 3.)

461. According to Olson, “[u]ser device 210 may implement one or more of a variety of techniques for analyzing usage data to determine whether driver ... is distracted.” (*Id.*, 12:10-12.) “For example, user device 210 may define a distraction threshold ... and determine that the driver is distracted when usage data exceeds the distraction threshold.” (*Id.*, 12:13-27.)

462. “FIG. 13 illustrates an example representation of usage instances over recurring time intervals in determining whether a user is distracted by user device 210.” (*Id.*, 13:1-3.)

463. “As shown, graph 1310 includes usage instances for three different time intervals, time interval A, time interval B, and time interval C.” (*Id.*, 13:39-41.) “In this example, the number of instances for time intervals A and B failed to equal or exceed distraction threshold 1340. However, the number of instances of time

interval C exceeded distraction threshold 1340 within pre-selected time interval 1350.” (*Id.*, 13:41-45.) This leads to the determination “that the user is distracted during time interval C....” (*Id.*, 13:47-49.) “[E]ach time interval may be a successive time interval (e.g., time interval B may begin at the conclusion of time interval A, time interval C may begin at the conclusion of time interval B, and so on).” (*Id.*, 13:49-53.)

464. In my opinion, Olson teaches what this limitation requires.

465. The annotated version of Figure 13 reproduced below exemplifies this.

466. Olson’s individual “usage instances” are the claimed **“discrete distraction events.”**

467. The series of usage instances that exceed threshold 1340 within time interval 1350 (red highlighted collection of “Usage Instances” spanning “Time Interval C”) are an example of a **“distraction episode.”** These usage instances occurred close enough in time that they caused distraction threshold 1340 to be exceeded. Because of this, they are sufficiently related to constitute a **“distraction episode.”**

468. As shown, this episode has a **“start”** (time 0) and an **“end”** (the time when interval C concludes) and spans an **“interval”** (time interval C):

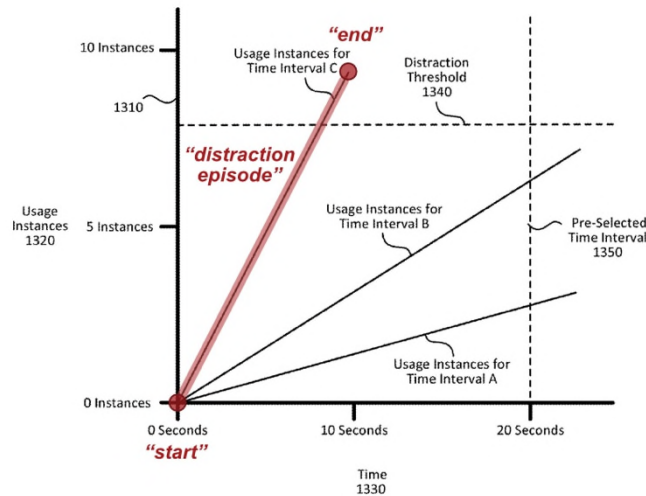


Fig. 13

(*Id.*, Fig. 13 (annotated)).

469. Figure 11 of Olson provides another, more specific example.

470. As shown in this figure, a user device detects “operations 1110-1150 along timeline 1160” for purposes of determin[ing] whether ... the user of user device 210 is distracted.....” (*Id.*, 11:21-46.)

471. Operations 1110-1150 are different instances of device usage, such as the receipt, viewing, and sending of text messages. (*Id.*)

472. As shown, each of these usage instances they occur at different times along “timeline 1160.” (*Id.*, Fig. 11.) Thus, each is an example of a **“discrete distraction event[].”**

473. Further, because in Olson the various events are related, occur close in time, and analyzed together to determine if “the user of user device 210 is distracted” (*id.*, 11:40-46), they collectively form a **“distraction episode.”**

474. Further, this episode has both a “**start**” (the time when first usage instance 1110 occurs) and an “**end**” (the time when last usage instance 1150 occurs):

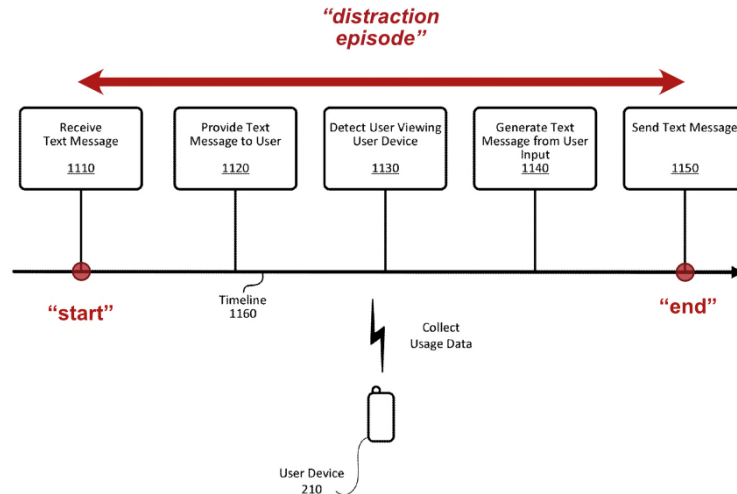


Fig. 11

(*Id.*, Fig. 11 (annotated).)

[1-d(2)] “the determining of the distraction episode comprising determining a possible distraction episode and after the possible distraction episode is determined, determining that the possible distraction episode comprises a true distraction episode.”

475. This, in my opinion, is taught by Olson.

476. Olson’s system distinguishes distraction episodes that are “merely ... suspicious” from those that are “certain.” (Ex. 1005, 12:38-44.)

477. To accomplish this, “user device 210 may define distraction thresholds for different levels of confidence with respect to the user being distracted. For instance, user device 210 may define a distraction threshold that corresponds to merely being suspicious that a user is distracted and other distraction threshold for being certain that the user is distracted.” (Ex. 1005, 12:38-44.)

478. Olson explains that by distinguishing “merely ... suspicious” from “certain” distractions, its system allows for different responses depending on the “level of confidence regarding the user actually being distracted.” (*Id.*, 12:45-60.)

479. For example, a user may simply receive an “audio message” if the distraction is only “suspicious.” (*Id.*, 12:48-51.) If the distraction is “certain,” however, device features may be disabled. (*Id.*, 12:52-56.)

480. Again, as I explain when discussing the combination of Schmitt and Olson above, to accomplish this a POSITA would have considered it obvious to employ a lower usage instance threshold for “suspicious” distractions, and a higher usage instance threshold for “certain” distractions.

481. More specifically, fewer usage instances would result in a “suspicious” distraction” (due to the lower threshold), while more usage instances would result in a “certain” distraction (due to the higher threshold).

482. Olson explains that its system collects and monitors for usage instances in a way that allows for multiple, sequential thresholds like this. In particular, its system “may ... respond to a usage data analysis” indicating distraction “by continuing to collect usage data....” (Ex. 1005, 14:19-22.) Likewise, the system “continue[s] to monitor the movements of user device 210” after a distraction determination is made. (*Id.*, 15:14-20.)

483. Because it can continue to collect and monitor for usage instances, as usage instances accumulate, Olson’s system would first determine there to be a “suspicious” distraction when the first, lower threshold is crossed.

484. And, it would then later determine there to be a “certain” distraction as usage instances continue to accumulate and the second, higher threshold is crossed.

485. Put another way, just as this limitation requires, Olson’s system will operate to first determine a ***“possible distraction episode”*** (the initial “suspicious” distraction determined when the first, lower threshold is crossed) and then determine ***“that the possible distraction episode comprises a true distraction episode”*** ***“after the possible distraction episode is determined”*** (the later “certain” distraction determined when the second, higher threshold is crossed).

b. Claim 2

486. Claim 2 depends from claim 1 and further requires:
“the one or more physical states comprises an operational state of the mobile device”

487. As I have explained, Olson renders claim 1 obvious. It also teaches the additional limitation of claim 2.

488. According to Olson, its system collects “[u]sage information” that “may include any type of input/output communicated between the user and user device 210.” (Ex. 1005, 9:1-3.)

489. Collected information includes “active inputs” like a “user pressing a button or typing information into the user device” or “providing audio commands via a microphone[,]” and “passive inputs, such as ... the user glanc[ing] at a display” or “mov[ing] user device 210...” (*Id.*, 9:4-11.)

490. Device outputs, along with the device’s “executing” of “one or more types of operations” like “initiating a telephone call” or “generating a text message” also constitute collected usage information. (*Id.*, 9:21-41.)

491. In my opinion, all of this collected usage information relates to the ***“operational state of the mobile device.”***

c. Claim 3

492. Claim 3 depends from claim 2 and further requires that:
“the operational state comprises a state of locking of the mobile device”

493. As I have explained, Olson renders claim 2 obvious. It also teaches the additional limitation of claim 3.

494. Olson explains that its system is able to collect a variety of “usage data.” (Ex. 1005, 8:36-37.)

495. This collected “[u]sage data may include” any “type of information that may be relevant to determining whether the user of” a “user device ... is, or may become distracted by” the device. (*Id.*, 8:37-41; *see also id.*, 9:1-5.)

496. For instance, as I explained in connection with claim 2, Olson’s system can both “monitor inputs/outputs of the user device, and track internal processes executed by the user device.” (Ex. 1005, 2:37-43.)

497. Further, Olson’s system is able to determine “whether the user has been, or is, viewing user device.” (Ex. 1005, 12:24-25.) Because of this, the system can determine whether a “[u]ser device” merely “receive[s] a text message,” or whether the user actually opens or activates the device for purposes of “viewing” this message. (*See id.*, 11:24-36.)

498. Olson does not use the phrase “***state of locking.***” Regardless, in my opinion a POSITA would have understood that this is one of the many types of usage data Olson’s system detects.

499. Again, Olson teaches that any usage data pertinent to distraction is collected and considered. Whether the device is in a locked or unlocked state is one such type of data. An unlocked state is indicative of usage, while a locked state is indicative of non-usage.

500. Consistent with this, it was generally known in the art that “mobile device usage” can be detected from “a mobile device unlock or a mobile device lock.” (*E.g.*, Ex. 1004, 2:46-47.)

501. Further, as explained, Olson’s system is meant to be able to differentiate situations where a user activates and uses a device (*see, e.g.*, Ex. 1005, 11:24-36; Fig. 12) from those where the user does not activate the device (*e.g., id.*, 10:25-30).

502. In my opinion, a POSITA would have recognized that device locking/unlocking data could obviously either facilitate or supplement Olson’s ability to make these types of determinations. For instance, lock state could be employed to determine if the receipt of a text message should either be considered usage (if the device is unlocked at or shortly after receipt) or non-usage (if the device remains locked).

d. Claim 4

503. Claim 4 depends from claim 3 and further requires that:

“the operational state comprises a state of a phone call”

504. As I have explained, Olson renders claim 3 obvious. It also teaches the additional limitation of claim 4.

505. One of the pieces of usage data that can be monitored for by Olson’s system is the “initiating [of] a telephone call.” (Ex. 1005, 9:25-29.)

e. Claim 5

506. Claim 5 depends from claim 4 and further requires that:

“the operational state comprises a power condition”

507. As I have explained, Olson renders claim 4 obvious. It also teaches the additional limitation of claim 5.

508. Olson’s system collects various mobile device “usage data.” This includes “active” and “passive” “inputs/outputs of the user device” and data relating to the performance of “internal processes executed by the user device.” (Ex. 1005, 2:37-43; 8:36-37.)

509. Input/out and internal process data will obviously only be generated if the device is in a powered-on state.

510. Because Olson detects a multitude of types of usage (and collects associated data) that requires power, a POSITA would understand that Olson also identifies **“a power condition”** of a mobile device as this limitation requires.

f. Claim 6

511. Claim 6 depends from claim 4 and further requires that:

“the operational state comprises an aspect of a foreground app running on the mobile device”

512. As I have explained, Olson renders claim 4 obvious. It also teaches the additional limitation of claim 6.

513. As shown in Figure 12, Olson teaches that both receipt of “a command from the user to open [an] application” and whether the user device is “display[ing] the application to the user” are “usage data” that may be employed in making a distraction determination. (Ex. 1005, 11:47-55, 63-67; Fig. 12.)

514. Thus, just as this limitation requires, Olson considers whether there is a **“foreground app running on the mobile device.”**

g. Claim 7

515. Claim 7 depends from claim 1 and further requires that:

“determining a distraction episode comprises determining that a physical state of the mobile device comprises no interaction by a user or that accelerometer or gyroscope values are lower than a threshold that differs from a threshold used in determining motion of the mobile device at the start of the distraction episode”

516. As I have explained, Olson renders claim1 obvious. It also teaches the additional limitation of claim 7.

517. Olson explains that after its system has made a distraction determination “user device 210” can “continue to monitor the movements of user device” for purposes of “re-enabl[ing] ... disabled features of user device 210 upon determining that the user is no longer driving the vehicle.” (Ex. 1005, 15:14-20.) I note that a POSITA would have understood that the acceleration or gyroscope value thresholds for determining the end of a distraction period (or “episode”) would be lower than those used to determine the start of the episode. It was well-known to employ hysteresis (where in the threshold level depends on the direction that the threshold is crossed) when implementing thresholds to avoid instability when the quantity being measured is near the threshold. As described in the technical background section of this declaration, if a single threshold is used, then if the measured value is at or near the threshold, the system may jitter back and forth from one state to another. For example, if an air conditioner thermostat is set to “70 degrees” the system will cause the air conditioner to turn on at 70 degrees, but the

threshold to turn off will be below 70 degrees (for example 68 degrees), so that the system is not turning on and off all the time when the temperature is at 70 degrees.

518. While Olson provides an example where this re-enabling decision is made upon a determination that the device user is “no longer driving the vehicle” (*id.*), it also would have been obvious to monitor for usage to end.

519. Olson itself explains that “user device 210” is able to “analyze[] usage data for a user and determine[] that the user is not distracted.” (*Id.*, 14:16-17.)

520. This is all this claim requires: ***“determining that a physical state of the mobile device comprises no interaction by a user.”***

h. Claim 8

521. Claim 8 depends from claim 7 and further requires that:

“the end of the distraction episode is not determined until after a refractory period of no further movement of the mobile device or no indication of a continued distraction”

522. As I have explained, Olson renders claim 7 obvious. It also teaches the additional limitation of claim 8.

523. Again, Olson teaches a system that can detect driver distraction from mobile device movement and orientation changes. (*See* Ex. 1005, 9:1-11; 9:64-10:1.)

524. In addition to detecting distraction, the system also determines when there is no distraction: Olson “analyze[s] usage data for a user and determine[s] that the user is not distracted.” (Ex. 1005, 14:16-17.)

525. Relatedly, if the system has determined that the driver is distracted and “disabled” device features, it will “continue to monitor the movements of the user device” to determine when the distraction has ended for purposes of “re-enabling the disabled features....” (*Id.*, 15:14-20.)

526. Moreover, as part of making usage determinations, Olson’s system “collect[s] degree, time, frequency, and other types of information....” (*Id.*, 10:59-62; *see also* 11:12-16.)

527. Collection of this information allows Olson’s system to track when a series of related “usage instances” occur along a “timeline.” (*Id.*, 11:21-46; Fig. 11.) The system can also detect “successive” series of “usage instances” occurring at “time intervals” that do not “begin[]” until after “the conclusion” of another, different proceeding series of usage instances. (*Id.*, 13:49-53.)

528. So, in sum, Olson collects a variety of usage, non-usage, and usage time information.

529. This allows it to: (1) determine device usage and distraction from movement and other data, (2) collect usage time and frequency information, (3) determine that a previously distracted user is no longer distracted, and (4) recognize that one series of related usage instances indicating distraction has ended while another has begun.

530. This operation renders what this claim requires obvious. Given that Olson determines usage and non-usage, collects usage time information, and can assess whether successive usage intervals are happening one after another, the system would obviously be able to determine that distraction has ended by considering whether there has been no device movement and usage for a period of time. In fact, such a determination is a necessary pre-requisite for determining when a particular interval of usage has ended (such that monitoring for the next interval can begin).

531. This, in my opinion, is all this claim requires: determining that a *“distraction episode”* has ended after a *“refractory period”* of *“no indication of a continued distraction.”*

i. Claim 9

532. Claim 9 depends from claim 8 and further requires that:

“determining an end of the distraction episode comprises determining that a context of the mobile device indicates no further distraction”

533. As I have explained, Olson renders claim 8 obvious. It also teaches the additional limitation of claim 9.

534. As I explained above when discussing claim 9 and the Schmitt reference, the '249 patent explains that “contextual information” relating to distraction includes, among other things, “the start and end locations of the trip....” (Ex. 1001, 2:30-34.)

535. Olson considers this same type of device “*context*” information to determine that there is “*no further distraction.*”

536. Olson’s system can determine that a driver is no longer distracted by a user device if “the movements of the user device” indicate that “the user is no longer driving the vehicle.” (Ex. 1005, 15:14-20.)

537. The system is also able to “differentiate between whether, for example, the user has pulled the vehicle over in order to operate user device ... in a safe environment or whether the user is merely stopped at a traffic light, in a traffic jam, etc.” (*Id.*, 4:51-57.). Both of these situations represent the claimed context that indicates no further distraction.

j. Claim 10

538. Claim 10 depends from claim 9 and further requires that:

“determining that the possible distraction episode comprises a true distraction episode includes determining that a time period spanned by the possible distraction episode is longer than a predetermined length”

539. As I have explained, Olson renders claim 9 obvious. It also teaches the additional limitation of claim 10.

540. As explained, Olson’s system distinguishes between “suspicious” and “certain” distractions using predetermined “thresholds.” (See Ex. 1005, 12:38-60.)

541. The system can employ both “usage instances” and “time” thresholds when making this type of determination. (*Id.*, Fig. 13.)

542. Olson also explains that its system can consider whether a given value is both “less than” or “greater than” a given threshold. (*See id.*, 16:51-64.)

543. It also considers usage “degree, time, and frequency ... information” to assess “how severely the user is distracted.” (*Id.*, 10:59-62; 11:12-16.)

544. In my opinion, a POSITA would have considered it highly obvious that distraction sessions extending over a “**time period**” that is “**longer**” as this claim requires would obviously result in a higher degree of distraction certainty.

545. As described in detail in the Technical Background section of this declaration, a POSITA would have understood that longer distraction sessions likely entail greater numbers of related distraction events, and a corresponding increase in the time in which the driver is diverted from focusing on safe driving, and this longer distraction sessions represent more “true” distractions than shorter distraction sessions.

546. This in turn makes the distraction more serious and more likely to be a “certain” or a “**true distraction episode**” as this claim requires.

2. Motivation to Combine

547. In my opinion, a POSITA would have considered it obvious and would have been motivated to apply and combine the various teachings of Olson in the manner discussed above.

548. First, a POSITA would have been motivated to implement Olson’s system such that it simultaneously or concurrently considers both device motion and interaction data when determining whether a “usage instance” has occurred.

549. Olson itself already contemplates and teaches that a “single usage instance” can “include a collection of related usage data.” (Ex. 1005, 13:16-24.)

550. In my opinion, a POSITA would consider the concurrent use of motion and interaction data to be nothing more than one of the multiple different design choices Olson already presents.

551. Relatedly, Olson explains that considering both device motion and interaction concurrently can increase the accuracy of its system.

552. For example, detecting movement and “[d]etermining an orientation of user device 210 may better enable user device 210 to determine whether the user is distracted....” (*Id.*, 10:23-25.)

553. In one example, Olson explains that the device can determine that no usage occurred (even if some event like text message receipt occurred) if “the display-side” is “facing downward.” (*Id.*, 10:25-30.) But, if the device “undergoes an orientation change from horizontal to vertical shortly after receiving a text message, the change in orientation may be used to infer that the user is reading the text message and, therefore, distracted by user device 210.” (*Id.*, 10:30-35.)

554. In my opinion, this would have further motivated a POSITA to employ both motion and interaction data with Olson’s system.

555. Olson explains that its system can respond to detected distraction in a variety of ways.

556. The response can be a simple notification. But, it can also entail “activating a braking system of the vehicle” or “communicating a warning to ... law enforcement...” (Ex. 1005, 13:65-14:8.)

557. Given the severity and seriousness of certain of these responses—in particular braking and law enforcement notification—a POSITA would have been motivated to ensure Olson’s usage determinations are as accurate as possible. A POSITA would have recognized that increased accuracy could be achieved by employing employ more data, including both motion and interaction data, when making such a determination.

558. Put another way, by simultaneously considering multiple types of data, a POSITA would have recognized that Olson’s system would be better able to better distinguish events that should not be considered usage instance from events that should be so considered.

559. This improved accuracy derived from the consideration of more data would in turn avoid unnecessary and unjustified responses, like application of the brakes or notification of law enforcement when the driver is not actually distracted.

560. Next, in my opinion a POSITA would also have been motivated to implement Olson’s system such that it is able to first determine a possible/suspicious distraction, and then later upgrade this determination to a true/certain distraction.

561. Olson already teaches that it able to distinguish “merely ... suspicious” from “certain” distractions. (*E.g.*, Ex. 1005, 12:38-44.)

562. In my opinion, a POSITA would have recognized that making “suspicious” and “certain” distraction determines sequentially (instead of just at different times) would allow for escalating responses.

563. For example, a small number of distraction instances would produce a less invasive response (like a notification) after a lower usage threshold was exceeded.

564. Continued distraction instances causing a second, higher usage threshold to be exceeded would produce increasingly invasive responses like device deactivation, vehicle braking, or law enforcement notification.

565. A POSITA would have been motivated to implement Olson to employ this type of sequential response for multiple reasons.

566. For instance, because sequential, escalating responses would be provided, it would afford the driver with an opportunity to self-correct. The system would start by providing only notification after a small number of distractions and would escalate the response only if distraction continued.

567. Further, by requiring a greater number of distraction instances before issuing more extreme responses, these responses would be more likely to be generated in circumstances where they are actually merited.

568. In my opinion, a POSITA would also have had a more than reasonable expectation of success.

569. As I have explained, Olson’s system is already open to the collection and use of both motion and interaction data. (*See, e.g.*, Ex. 1005, 10:25-35; 13:16-18; 13:32-35.)

570. Further, Olson explains that collected usage data can be analyzed in variety of ways. (*Id.*, 12:10-12.)

571. In my opinion, a POSITA would consider use of multiple types of data simultaneously, and the sequential determination of a “suspicious” and “certain” distraction to be nothing more than variations on what Olson already teaches.

572. Given this, a POSITA would have every reason to believe—and no reason to doubt—that Olson’s system could be designed to include these features and operations.

E. Secondary Considerations of Non-Obviousness

573. Based on my review of the ’249 patent’s prosecution history, I note that no secondary considerations of non-obviousness were identified in connection with the patent’s claims.

574. I am not separately aware of any evidence of commercial success, skepticism, failure of others, industry praise, unexpected results, or the like. Instead, as discussed above, it is my opinion that the subject matter embraced by the '249 patent's claims was known in the art and would have been expected to function as a working system and method for detecting distracted driving.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willfully false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1101 of Title 18 of the United States Code.

Date: 9/25/2023

Location: Petaluma, CA

Signature: 
SCOTT ANDREWS

ATTACHMENT A

Scott Andrews

(650) 279-0242

scott@cogenia.com

Petaluma, CA

Summary

Creative, energetic, and innovative internationally recognized technical executive experienced in general management, systems engineering, advanced product development, advanced technology, business development, strategic planning, and program management

- Location Based Technologies
- Vehicle Information Systems
- Vehicle Electrical/Electronics Systems
- ITS and Related Industries
- Communications Systems
- Mobile Information Technology
- Multimedia/Internet Computing
- Mobile Technology Test Instrumentation
- Vehicle Safety and Control Systems
- Enterprise Software

Experience

12/2001-Present Cogenia Partners, LLC

Systems engineering consulting supporting and mobile information, mobile electronics and automotive safety and entertainment systems development

Current Engagements:

- Expert witness for patent litigation, contracts and trade secrets:
 - General Motors, related to various automotive systems
 - Lordstown Motors, related to infotainment systems
 - Uber, related to location based systems
 - USAA, Related to vehicle location systems
 - Cummins Diesel, related to cloud based vehicle data collection
 - Progressive, related to location based insurance systems

Prior Engagements/Projects:

- Technical consultant for connected vehicle security credential management system management concepts; Sponsored by Transport Canada
- Technical consultant for sensor supplemented message validation system for vehicle to vehicle communication based collision warning/avoidance systems. Sponsored by US DOT NHTSA
- Technical consultant for connected vehicle security credential management system deployment; Sponsored by US DOT NHTSA
- Subject matter expert and co-principle investigator on DSRC performance Measures development project for U.S.DOT NHTSA.
- Subject matter expert on communications data delivery system study to understand optimal roadside unit placements to support security credential management in connected vehicle systems; Sponsored by U.S. DOT RITA
- Developed systems engineering methodology for vehicle E/E systems; Applied methodology on project for Yazaki to reverse engineer the E/E architecture for a 2004 BMW 5 series vehicle.
- Co-Principal investigator for Integrated Advanced Transportation System; A 30+ year future technical feasibility assessment and strategy for U.S. DOT Federal Highway Admin. (FHWA).
- Technical consultant to American Association of State Highway Transportation Officials (AASHTO) for connected vehicle deployment analysis and strategy.

- Chief System Architect for the Vehicle Infrastructure Integration (VIIC) program (BMW, Chrysler, Daimler Benz, Ford, GM, Honda, Nissan, Toyota, VW); A connected vehicle research program funded by U.S. DOT FHWA.
- Technical consultant to Michigan State DOT (Enterprise Pooled Fund) to develop a system architecture and deployment strategy for Rural ITS.
- Telematics delivery architecture development for a Fortune 100 service provider
- Technical consultant to the Vehicle Safety Consortium developing Dedicated Short Range Communications (DSRC) standards for safety systems;
- Designed novel super capacitor based high performance hybrid vehicle as part of an early stage startup company; Developed performance requirements, conceptual designs and patented integrated electrical system architecture concept.
- Toyota Motor Sales – 10 year technology survey;
- Connected Vehicle Trade Association- Transferred AMI-C specifications to ISO TC 22, TC 204 AND OSGi. Developed OSGi Vehicle Interface Specification;
- Expert witness for:
 - Orbital Sciences, related to vehicle fleet management
 - Volkswagen, related to vehicle control technologies
 - Apple, related to mobile communications device control
 - Google, related to map displays
 - Platform Sciences, related to location based fleet management
 - Unified Patents, various location based technology cases
 - Uber, related to display of multiple terminals on navigation display
 - Directed Electronics, related to vehicle remote start systems
 - ZTE, related to cell phone location and orientation systems
 - Audi, America, related to vehicle control systems
 - Club Car, related to golf cart navigation systems
 - Unified Patents, various location based technology cases
 - Toyota, related to vehicle communications systems
 - American GNC vs. LG, related to MEMS sensors
 - Dale Progress, Ltd. vs. Toyota, related to vehicle information display systems
 - Blackberry vs. SNAP, related to display of multiple terminals on navigation display
 - Location Services vs. Google, related to augmented reality displays
 - Alert Signal vs. Apple, related to cell phone messaging systems
 - AGIS vs. LG related to cell phone messaging systems
 - Maxell vs. ASUS, related to cell phone navigation systems
 - AGIS vs. HTC, related to cell phone location systems
 - AGIS vs. Huawei, related to cell phone location systems
 - AGIS vs. LG
 - Michigan Motor Technologies vs. Hyundai, related to vehicle control systems
 - Princeton Digital vs. Konami et al, related to video game display systems
 - Delphi, related to automotive safety systems
 - ATT vs. Vehicle IP relating to cell phone navigation systems
 - VW/Audi vs. Beacon, relating to traffic information systems
 - VW/Audi vs. Blitzsafe relating to mobile device integration and mobile audio systems
 - T-Mobile vs. TracBeam relating to wireless location technologies
 - VW/Audi vs. Joao relating to remote service architecturesApple Computer

- vs. Porto relating to cell phone navigation systems
- Mercedes vs. Adaptive Headlamp Technologies relating to adaptive headlamps
- Liberty Mutual, Geico and Hartford vs. Progressive Insurance relating to usage based insurance systems
- Toyota vs. American Vehicular Sciences (AVS) relating to occupant sensing systems
- Lenovo and Amazon vs. Pragmatus relating to device tracking
- Ford in a patent vs. Eagle Harbor Holdings relating to Bluetooth systems and mobile device integration in the vehicle
- Bentley vs. Cruise Control Technologies relating to adaptive cruise control
- Google vs. Walker Digital relating to 3D navigation displays
- Volkswagen/Sirius-XM vs. case relating to traffic information systems
- Volkswagen, Ford and GM in patent cases vs. Affinity Labs, relating to the iPod interface
- Honda vs. American Calcar, relating to telematics equipment and user interfaces
- Alpine, Denso and Pioneer Corporation in an International Trade Commission patent case vs. Honeywell, related to navigation systems
- BMW vs. American Calcar, relating to telematics equipment and user interfaces

4/2000 to 12/2001 Cogenia, Inc.

President and Chief Executive Officer, Founder

Founded company in 2000 to develop enterprise class data management software system. Responsibilities included development of business concept and plan, corporate administration including financial and legal management, leadership of executive team in product development, fundraising, business development, organizational development, and investor relations. Raised \$2.2M between 8/00 and 5/01 from individuals and funds;

1996 to 4/2000 Toyota Motor Corporation, Japan

Project General Manager, R&D Management Division

Responsibilities included the conceptualization and development of multimedia and new technology products and services for Toyota's future generations of passenger vehicles in the United States and Europe, Heavy emphasis on strategy for information systems, and on development of technical concepts for computing and Internet oriented systems. Led automated vehicle Development program leading up to 1997 Automated Highway Systems (AHS) demonstration in Sand Diego, CA; Supported technology acquisition for hybrid vehicle control systems; Working under direction of Toyota board members, established the Automotive Multimedia Interface Collaboration (AMI-C), a partnership of the world's car makers to develop a uniform computing architecture for vehicle multimedia systems, and led all early technical, planning and legal work. Provided technical management of technical contracts with Carnegie Mellon University Robotics Lab (Image based collision warning systems), and the development of Toyota's position on the US Intelligent Vehicle Initiative.

1983 to 1996 TRW, Inc.

Held a series of increasingly responsible positions in program management, technology development and business development.

1993 to 1996 TRW Automotive Electronics Group

Director, Advanced Product Planning/Development

Scott Andrews

Specific responsibilities included leadership and overall management of advanced development programs such as Automotive Radar, Adaptive Cruise Control, Occupant Sensing, In Vehicle Information Systems, and other emerging transportation products; Managed remotely located advanced development laboratory performing approximately \$6M in annual development projects.

1983 to 1993 TRW Space & Electronics Group

Manager, MMIC Products Organization

Developed TRW's commercial GaAs MMIC business. Responsibilities included development of business strategy and business plan, and overall management of customer and R&D programs. Developed extensive international business base and took operation from start-up to \$5M sales per year in under two years. Developed the first single chip 94 GHz Radar (Used for automotive cruise control and anti collision systems).

1979-1983 Teledyne Microwave

Developed high reliability microwave components. Developed CAD tools.

1977-1979 Ford Aerospace, Advanced Development Operation

Designed, tested and delivered microwave radar receiver systems

Education

MSEE Stanford University, 1982

BSEE University of CA, Irvine 1977

TRW Senior Leadership Program 1992

Publications

1. Two Dimensional Vehicle Control for Obstacle Avoidance in Multi-Lane Traffic Environments; Published in the proceedings of the 1998 IEEE International Conference on Intelligent Vehicles.
2. Automotive Multimedia Interface Collaboration; Briefing Presented to the 9th VERTIS Symposium, April 1999, Tokyo Japan.
3. Privacy and Authenticity in Telematics Systems; Published in the Proceedings of the Society of Automotive Engineers World Congress, 1999
4. Automated Highway Systems Acceptance and Liability; Briefing presented to the Automated Vehicle Guidance Demo 98 Conference, Rinjwoude, The Netherlands, June 1998.
5. What is Telematics? Briefing presented at IIR Telematics Conference Scottsdale, AZ, December 2001
6. Advanced Telematics Services: A Hard Look at Reality; Briefing presented at IIR Telematics Conference Scottsdale, AZ, December 2001
7. Consumer Electronics and Telematics; Briefing presented at Eye For Auto Telematics Update Conference Las Vegas, NV, January 2003

8. The Automotive Multimedia Interface Collaboration Software and Network Architecture: Extending the Concept of Platform Independent Computing; Briefing Presented to the Future Generation Software Architectures in the Automotive Domain Conference, San Diego, CA, January 2004
9. Quality, Choice and Value: How New Architectures are Changing the Vehicle Lifecycle; Briefing presented at IEEE Convergence Conference, October 2004
10. Critical Standards for the Next Generation of Telematics Systems and Services; Briefing presented at the Telematics Update Conference, December 2004
11. VII System Overview; Briefing presented To Transportation Research Board, ITS and V-HA Committees 2007 Mid-Year Meeting; July 2007
12. Testing and Development of In-Vehicle Equipment and Private Applications (P08-1634); Briefing presented to the Transportation Research Board Annual Meeting, Washington, DC, January 2008
13. A Comparison of Communications Systems for VII; Presented at the ITS World Congress, New York, NY, October, 2008
14. Vehicle Infrastructure Integration Systems Overview; Presented at the ITS America Annual Meeting, June 1 2009, National Harbor, Maryland
15. Telematics Standards: Logical Next Steps; ITS International, August 2009
16. IntelliDriveSM Overview; ITS International, May 2009
17. Time Synchronization and Positioning Accuracy in Cooperative IntelliDriveSM Systems; Presented at the 2010 ITS America Annual Meeting, June 2010, Houston, Texas
18. Systematic Development of Positioning Requirements for Vehicle Applications; Presented at the 18th World Congress on Intelligent Transportation Systems , November, 2011, Orlando, Florida
19. The Interpretation of GPS Positioning Accuracy and Measurement Integrity in a Dynamic Mobile Environment; Presented at the 18th World Congress on Intelligent Transportation Systems, November, 2011, Orlando, Florida
20. Connected Vehicle Positioning Requirements and Possible Solutions; Presented at the 22nd World Congress on Intelligent Transportation Systems, October, 2015, Bordeaux, France
21. Connected Vehicle Performance Requirements; Presented at the 22nd World Congress on Intelligent Transportation Systems, October, 2015, Bordeaux, France

Patents

1. Mobile Body Reporting Device And Its System; Patent Number: JP11118902; 4/30/1999
2. Multiformat Auto-Handoff Communications Handset; Patent Number: US5,649,308; 07/15/1997
3. A Communications Terminal Device, A Communications System, And A Storing Medium For Storing A Program To Control Data Processing By The Communications Terminal Device; Patent Number: EP0867850, A3; 09/30/1998
4. Communication System For Controlling Data Processing According To A State Of A Communication Terminal Device; Patent Number: US 6,122,682 3/23/1998
5. Method And Apparatus For Controlling An Adjustable Device; Patent Number: US 5,864,105; 01/26/1999
6. Automatic Brake Device; Patent Number: JP2000108866; 4/18/2000
7. Visual Field Base Display System; Patent Number: JP2000029618; 01/28/2000
8. Intersection Warning System; Patent Number: US 5,926,114; 07/20/1999
9. Security For Anonymous Vehicular Broadcast Messages; Patent Number: US 7,742,603 3/27/2006
10. Digital Certificate Pool; Patent Number: US7,734,050 3/27/2006
11. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 7,802,263 9/21/2010
12. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 8,209,705 6/26/2012
13. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 8,566,843 10/22/2013
14. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 9,575,817 2/21/2017
15. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 9,705,765 7/11/2017

16. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 10,002,036 6/19/1028
17. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 10,031,790 7/24/1018
18. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 10,248,477 4/2/1019
19. System for Location Based Triggers for Mobile Devices; Patent Number 9,973,899 5/15/2018
20. System for Location Based Triggers for Mobile Devices; Patent Number 10,194,291 1/29/2019
21. System for Location Based Triggers for Mobile Devices; Patent Number 10,194,292 1/29/2019
22. System for Location Based Triggers for Mobile Devices; Patent Number 10,349,243 7/9/2019
23. System for Location Based Triggers for Mobile Devices; Patent Number 10,499,215 12/3/2019
24. System for Location Based Triggers for Mobile Devices; Patent Number 10,631,146 4/21/2020
25. System for Location Based Triggers for Mobile Devices; Patent Number 10,735,922 8/4//2020