

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MERCEDES-BENZ GROUP AG,  
Petitioner,  
v.

THE PHELAN GROUP, LLC  
Patent Owner.

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Case (to be assigned)  
U.S. Patent No. 9,493,149

**DECLARATION OF DR. MARK EHSANI  
IN SUPPORT OF MERCEDES' PETITION FOR *INTER PARTES* REVIEW  
OF CLAIMS 1-18 OF U.S. PATENT NO. 9,493,149**

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I, Dr. Mark Ehsani, declare as follows:

## **I. INTRODUCTION**

### **A. Engagement**

1. I have been retained by Hogan Lovells US LLP on behalf of Mercedes-Benz Group AG (“Mercedes” or “Petitioner”), as an independent expert in this proceeding before the Patent Trial and Appeal Board (“PTAB” or “Board”). I understand that Mercedes is requesting that the Board institute an *inter partes* review (“IPR”) proceeding of U.S. Patent No. 9,493,149 (“’149”) (EX1001).

2. Specifically, I have been retained to offer my opinions regarding Claims 1-18 of the ’149 Patent and the prior art references set forth in the IPR petition. This declaration is directed to the challenged claims of the ’149 Patent and details the opinions I have developed, the conclusions I have drawn, and the basis for each.

3. I have no financial interest in either party or the outcome of this case. I am being compensated at my customary rate of \$500 per hour for my time on this case. My compensation is not dependent on the contents of my opinions or the outcome of this proceeding.

4. I am familiar with the technology described in the ’149 Patent as of its earliest possible priority date of July 2, 2008.

## **B. Background and Qualifications**

5. My name is Dr. Mark Ehsani. I am currently a Professor of Electrical Engineering at Texas A&M University at College Station, where I also serve as the Director of Advanced Vehicle Systems Research Program and the Power Electronics and Motor Drives Laboratory. All my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my 50 years of experience as an engineer, technical director, researcher, and research professor in energy systems, power electronics, motor drives, vehicle electrical and control systems, electric and hybrid vehicles and their control systems, and sustainable energy engineering.

6. I am over 18 years of age and would be competent to testify as to the matters set forth herein if called upon to do so. I understand that a copy of my current curriculum vitae, which describes my complete education and professional experience, is being submitted by Petitioner as Exhibit 1007. The following provides an overview of some of my experience that is relevant to the matters set forth in this declaration.

7. I earned a bachelor's and master's degree in electrical engineering from the University of Texas at Austin in 1973 and 1974, respectively. After receiving my master's degree, I worked as a Research Engineer with the Fusion Research Center at the University of Texas doing research and equipment development on high power

supplies and circuit breaker technology. I then earned a Ph.D. in electrical engineering in 1981 from the University of Wisconsin-Madison. During my doctoral studies I focused on energy and control systems and served as a Resident Research Associate with Argonne National Laboratory.

8. I have authored over 500 publications in pulsed-power supplies, high-voltage engineering, power electronics, motor drives, and advanced vehicle systems. I have co-authored twenty-four books on power electronics, motor drives and advanced vehicle systems, including Vehicular Electric Power Systems, Marcel Dekker, Inc. 2003, and “Modern Electric Hybrid Vehicles and Fuel Cell Vehicles – Fundamentals, Theory, and Design”, Third Edition, CRC Press, 2018. I currently serve on the editorial board of several technical journals and am the associate editor of IEEE Transactions on Industrial Electronics and IEEE Transactions on Vehicular Technology. Additionally, I have over 30 granted or pending US and EC patents.

9. My research has produced more than 500 journal and conference publications. More than 239 publications are in refereed journals. Many of my publications and research grants relate to vehicle control systems. Some examples include:

- M. Ehsani, R. L. Kustom, and R. E. Fuja, “Microcomputer Control of a Current Source DC-DC Converter,” IEEE Trans. on Industry Applications, Vol. IA-19, No. 5, September/October 1983, pp. 690-698

- M. Ehsani, and K. R. Ramani, “Direct Control Strategies Based on Sensing Inductance in Switched Reluctance Motors,” IEEE Trans. on Power Electronics, Vol. 11, No. 1, January 1996, pp. 74-82
- Y. Gao and M. Ehsani "Design and Control Methodology of Plug-in Hybrid Electric Vehicles," IEEE Trans. In Industrial Electronics, Vol. 57, No. 2, February, 2010.
- William Bradley, Kambiz Ebrahimi, Mehrdad Ehsani, “A General Approach for Current Based Condition Monitoring of Induction Motors, Part I: Introduction and General Theory,” submitted to IEEE Systems Journal.
- Y. Gao and M. Ehsani, “Electronic Braking System of EV and HEV – Integration of Regenerative Braking, Automatic Braking Force Control and ABS”, SAE Journal, Paper No. 2001-01-2478, August 2001
- Y. Gao and M. Ehsani, “A Mild Hybrid Drive Train for 42V Automotive Power Systems – Design, Control and Simulation”, SAE Journal, Paper No. 2002-01-1082, March 2002
- Y. Gao and M. Ehsani, “A Mild Hybrid Drive Train with a Floating Stator Motor— Configuration Control Strategy, Design, and Simulation Verification”, SAE Journal, Paper No. 2002-01-1878, June 2002

- H. Moghbelli, K. Ganapavarapu, R. Langari, and M. Ehsani, "A Comparative Review of Fuel Cell Vehicles (FCVs) and Hybrid Electric Vehicles (HEVs) Part I: Control Strategies, Power Train, Total Cost, Infrastructure, New Developments, Manufacturing and Commercialization," SAE Transactions Volume on Journal of Engines, paper # 2003-01-2299

10. In the past 45 years, I have served as a consulting engineer to over 60 companies in the U.S and internationally on power electronics and its applications, as well as vehicle electrical and electronics systems and controls. I've received several honors and recognitions including the Prize Paper Awards in Static Power Converters and motor drives at the IEEE-Industry Applications Society 1985, 1987, and 1992 Annual Meetings and the Avant Garde Award from IEEE Vehicular Technology Society.

11. I have presented several short courses relating to vehicle control in the U.S. and internationally. Some examples include, Invited Short Course at LeTourneau, Longview, Texas and Texas Instruments, Dallas Texas, January 12 & 26, 1996: "Design and Control of Switched Reluctance Motor Drives", U.S. Army Vetronics Institute 3rd Annual Winter Workshop at U.S. Army Tank-automotive RD&E Center Warren, MI, Jan 13, 2004: "Control of BLDC Machines with Improved Performance", Invited Short Course at Hyundai Motor Company, Suwon,

Korea, June 28, 2000: “Design and Control of Electric and Hybrid Electric Vehicles”, and Short Course at US Army Tank Automotive Command (TACOM), Warren, Michigan, January 2005: “Advanced Mobile Integrated Power System (AMPS).”

12. Based on my experience and education, I believe that I am qualified to opine as to the knowledge and level of skill of one of ordinary skill in the art at the time of the alleged invention of the '149 Patent, as well as the state of the art at that time.

**C. Information Considered**

13. I have reviewed the '149 Patent and its prosecution history, as well as the other materials referenced in Appendix A. Counsel has informed me that I should consider these materials through the lens of one of ordinary skill in the art related to the '149 Patent, at the time of the earliest purported priority date of the '149 Patent, and I have done so during my review of these materials. I have been asked to assume, for purposes of this Declaration, that the '149 Patent has a priority date of July 2, 2008.

14. My analysis is based on my years of education, research, and work experience, as well as my investigation and study of relevant materials. In my analyses, I have considered the materials that I identify in this Declaration and those listed in Appendix A.

15. I may rely on these and additional materials to respond to arguments raised by the Patent Owner. I may also consider additional documents and information in further analyses—including documents that may not yet have been provided to me.

16. My review and assessment of the materials provided in this proceeding is ongoing, and I will continue to consider any new material as it is provided. I reserve the right to review, supplement, and amend my analyses based on new information and on my continuing review of the materials already provided.

## **II. OVERVIEW OF THE '149 PATENT**

### **A. Background of the '149 Patent**

17. I have reviewed the '149 Patent and its prosecution history. The '149 Patent is directed toward “[a] driver authentication and safety system and method for monitoring and controlling vehicle usage by high-risk drivers.” ('149 Patent, Abstract, 2:21-26.) An “authorized vehicle owner” (e.g., “parent”) can create an “operating profile,” which is a “set of driving rules and conditions” for the “high-risk driver” (e.g., “teen”). (*Id.*, 6:59-64.) Restrictions in the operating profile are enforced by a “driver authentication system” which includes a “master control unit” that interfaces with the driver, and a “slave control unit” that alarms upon violating the operating profile. (*Id.*, 2:32-52; 5:53-67; Fig. 6.)

18. When entering the vehicle, driver identification information and operating profile restrictions are loaded to the “master control unit” using a “wireless identification and data logging module.” (*Id.*, 2:30-35, 6:65-7:33, Claim 1.) Upon identifying an authorized driver, driving activity is monitored by use of a GPS which provides “time of day, speed and location data associated with the vehicle.” (*Id.* at 2:57-59.) If the driver violates an operating profile restriction, a “real time alarm signal” is generated. (*Id.*, Abstract, 2:35-52.) “The alarm signal 445 can result in an actual audible alarm, or it can be used to ... communicate conditions to the driver, limit/disable radio functionality, govern mechanical operations (*e.g.*, lower/limit speed), remotely contact vehicle owners/fleet managers, and other electrical or mechanical functions[.]” (*Id.*, 7:51-63; *see also* 2:36-52, Abstract.) Drivers can authenticate themselves via a “wireless identification” module, such as by presenting an “iButton, radio frequency identification device (RFID), software, etc.” (*Id.*, 6:65-7:7, 2:32-35.) The system of the ’149 can also perform “data logging,” such as by recording the vehicle’s speed and location during operation. (*Id.*, 7:34-45.)

## **B. Prosecution History of the ’149 Patent**

19. I understand the ’149 Patent the ’149 Patent was filed on August 20, 2014, as a continuation-in-part of U.S. Patent No. 9,045,101 (“’101”), filed April 8, 2013, which is a continuation of U.S. Patent No. 8,417,415 (“’415”), filed on July 1, 2009, and purportedly claims priority to Provisional application no. 61/077,568,

filed on July 2, 2008. The '149 received one Office Action in which claims 1-18 were rejected under §112 for improper antecedent basis. (EX1002, 65.) When the Applicant corrected this error, the claims were allowed. (*Id.*, 93, 103-04.) No prior art rejections were made during prosecution. (*Id.*, 65, 103-04.)

20. I understand that several prior art references relied on in this Petition were not before the PTO during prosecution of the '149 Patent. Thus, I understand that the Petition presents substantially new arguments that were not considered during prosecution.

### **C. Priority Date**

21. I have been asked to assume, for purposes of this Declaration, that the '149 Patent has a priority date of July 2, 2008. Assuming this earliest date, I understand that all prior art references asserted in this Petition are prior art.

## **III. CLAIM CONSTRUCTION AND POSITA DEFINITION**

### **A. Claim Construction**

22. I understand that in an *inter partes* review, claims must be given their ordinary and customary meaning, as understood by one of ordinary skill in the art in light of the prosecution history. I apply that standard in my analysis below to the words and phrases in the claims of the '149 Patent.

## **B. Definition of a Person of Ordinary Skill in the Art**

23. A person of ordinary skill in the art (“**POSITA**”) in the field of the ’149 Patent and at the time of the invention would have at least a bachelor’s degree in electrical engineering, computer engineering, computer science, or similar disciplines, and at least two years of professional experience with research, design, and/or development of automotive electrical and control systems or an equivalent level of skill knowledge, and experience. The more education one has, the less experience needed to attain an ordinary level of skill. Similarly, more experience in the field may serve as a substitute for formal education.

## **IV. UNDERSTANDING OF LEGAL STANDARDS**

### **A. Anticipation**

24. I understand that a patent claim is invalid when the invention that it claims is not new. To establish that a claimed invention is not new (a.k.a., “not novel”), I understand that one may establish that a single publication, or other reference in the prior art discloses (explicitly or inherently) every element required in a patent claim (i.e., all features or “limitations” recited in the patent claim). I understand that a reference in the prior art “anticipates” a claimed invention if that reference discloses, either explicitly or inherently, every element of the claim.

25. I understand that “prior art” and “prior art reference” are legal terms of art referring to, for example, devices, methods, and publications that predate the earliest effective filing date of the claimed invention.

26. I understand that a prior art reference that anticipates a claim may disclose an element or limitation of a patent claim expressly or inherently. A prior art reference discloses an element or limitation of a patent claim inherently when the prior art’s disclosure necessarily requires or implies that the claimed element or limitation be present in the process, machine, manufacture, or composition disclosed. I understand there is still considered to be an inherent disclosure even if the author of the reference did not describe or understand the underlying inherent principle. I understand that one may establish that a prior art reference inherently discloses a claimed element or limitation through the use of other reference material or through testing.

27. I understand that the description in a written reference does not have to be in the same words as the claim, but all of the requirements of the claim must be there, either stated or necessarily implied, so that a POSITA looking at that one reference would be able to make and use the claimed invention.

28. I understand that any prior art reference that can be considered for purposes of determining whether it anticipates a patent claim may also be used to determine whether the reference renders that claim obvious, as discussed below.

## **B. Obviousness**

29. I understand that, even if a claim is not fully disclosed in a single prior art reference, the patent claim is invalid if the invention would have been obvious to a POSITA at the time of the invention. In particular, I understand that a patent claim is normally invalid as obvious if it would have been an “ordinary innovation” within the relevant field to create the claimed product or method at the time of the invention.

30. I understand that the relevant portion of pre-AIA Section 103, subsection (a) of the Patent Act states:

“A patent may not be obtained through the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.”

31. I understand that, by way of example only, a claimed invention is obvious if:

it combines prior art elements according to known methods to yield predictable results;

it simply substitutes one known element for another to obtain predictable results;

it uses a known technique to improve similar devices (methods, or products) in the same way;

it applies a known technique to a known device (method, or product) ready for improvement to yield predictable results;

it was “obvious to try” in that the inventor chose from a finite number of identified, predictable solutions, with a reasonable expectation of success;

known work in one field of endeavor prompted variations of it for use in either the same field or a different one based on design incentives or other market forces and those variations were predictable to one of ordinary skill in the art; or

some teaching, suggestion, or motivation in the prior art led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

32. When considering obviousness, I understand that I am to: (i) decide the level of ordinary skill in the field that someone would have had at the time the alleged invention was made; (ii) determine the scope and content of the prior art; (iii) determine what differences, if any, existed between the prior art and the Asserted Claims; and (iv) consider objective evidence of non-obviousness (also known as secondary considerations). Further, when considering obviousness, I understand that it is not necessary to seek out precise teachings, and it is permissible to consider the

inferences, common sense, and creative steps that a POSITA (who is considered to have an ordinary level of creativity and is not an automaton) would employ.

33. I understand that objective evidence relevant to the issue of obviousness may also be considered. This type of evidence is sometimes referred to as “secondary considerations,” and may include evidence of commercial success, long-felt but unsolved needs, failure of others, and unexpected results. I understand that any secondary evidence must have a nexus to the relevant claims. For example, I understand that commercial success must have a nexus to features of the alleged invention not disclosed in the prior art, and in particular the prior art references which support an obviousness theory. In other words, I understand that commercial success is material only if it comes from the merits of the claimed invention beyond what the prior art disclosed. With respect to secondary considerations, I understand that Patent Owner bears the burden of proof, and I have seen no evidence to date that any secondary considerations would establish non-obviousness.

**V. CLAIMS 1-18 OF THE '149 PATENT ARE ANTICIPATED AND RENDERED OBVIOUS BY THE PRIOR ART**

34. I have been asked to provide an analysis as to whether the elements of Claims 1-18 of the '149 Patent are disclosed in the primary prior art references: U.S. Patent Publication No. 2003/0189482 (“Arshad”) (EX1007), U.S. Patent Application Publication No. 2007/0168125 (“Petrik”) (EX1008), and U.S. Patent No. 6,225,890 (“Murphy”) (EX1006). I was also asked to consider these references

in view of certain additional prior art, including U.S. Patent Application Publication No. 2004/0239510 A1 (“Karsten”) (EX1009), U.S. Patent Application Publication No. 2002/0141600 A1 (“Siwinski”) (EX1010), U.S. Patent Application Publication No. 2008/0114501 to Wu (“Wu”) (EX1011), U.S. Patent Application Publication No. 2007/0069873 A1 (“Kudo”) (EX1012), U.S. Patent Application Publication No. 2003/0181822 A1 (“Victor”) (EX1013), and U.S. Patent No. 5,222,152 (“Fishbine”) (EX1014.)

35. My analysis of these prior art references relative to the elements of Claims 1-18—specifically, how and where the prior art references disclose the limitations of the challenged claims—is provided below. The citations that I have included are not intended to provide an exhaustive list, but rather provide examples of how the references disclose or teach the elements of these claims.

**A. Grounds Based on Arshad in View of Petrik**

36. I have reviewed Arshad which is US2003/0189482. I understand that Arshad was filed April 3, 2003, and published October 9, 2003. I understand that Arshad is prior art under at least pre-AIA §102(b). I have reviewed Petrik which is US2007/0168125. I understand that Petrik was filed August 9, 2005 and published July 19, 2007. I understand Petrik is prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (e).

37. My review of the ‘149 Patent file history reveals that neither Arshad nor Petrik was not considered during prosecution of the ‘149 Patent.

38. Arshad discloses a system for “authoriz[ing]” fleet vehicle drivers and monitoring vehicle operation. (Arshad, Abstract, [0028].) A driver’s “transponder” communicates with an in-vehicle system to identify the driver and transmit “operational limits,” such as “maximum speed,” authorized “geographical area,” and “number of hours of authorized use.” (*Id.*, [0019], [0033], [0043], [0057].) If these are violated, Arshad’s system can “limit the speed” or disable the vehicle, “display a message,” or sound an “audio alarm.” (*Id.*, [0043]-[0045], [0063].)

**1. Ground 1a: Arshad in View of Petrik Renders Obvious Claims 1, 4-12, and 17-18**

**a) Independent Claim 1**

39. As viewed by a POSITA, Arshad in view of Petrik renders obvious independent Claim 1.

**(i) Claim 1[pre]: *A driver authentication and monitoring system, comprising:***

40. Arshad discloses the preamble of Claim 1 to the extent the preamble limits the scope of the claim.

41. Arshad’s system controls “access” to “[f]leet vehicles.” (Arshad, Abstract, [0005], [0008]-[0009]; *see also* Cl. 13, [0033] (referring to the “fleet

management **system**”<sup>1</sup>.) In Arshad, a driver’s “transponder 20” transmits data to an in-vehicle control system to “uniquely **identify** the person carrying the transponder.” (*Id.*, [0033], [0019], [0012], Cl. 7 (system is “mounted on the vehicle”).) After the driver is authenticated, a “**monitoring** controller 38” in the system monitors vehicle operation, “determines whether the operator is authorized” to take certain actions, and responds to unauthorized actions with “alert message[s]” or disablement of vehicle systems, among other things. (*Id.*, [0061], [0071]; *see also* [0028]-[0031], [0041]-[0045], [0072]-[0074].) *See also infra* Ground 1a, Claims 1[A]-1[C].

(ii) **Claim 1[A]: a wireless identification and data logging module,**

42. Arshad discloses Claim 1[A].

43. Arshad discloses that each driver has a wireless “**radio (RF)** transponder 20” that stores an “identification number” in its memory. (Arshad, [0019], [0031]-[0033].) The identification number is transmitted to a “reader circuit 14” in the vehicle, allowing Arshad to identify different drivers. (*Id.*, [0031]-[0034], [0010]-[0012], Cl. 7.) *See also infra* Ground 1a, Claim 1[B].

44. Moreover, each transponder issued for drivers has an “internal digital memory” in its microcontroller that stores, or logs, data and information. (Arshad, [0023], [0025]-[0027], Fig. 2.) **First**, “data stored in the memory of

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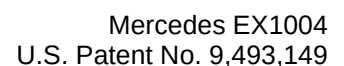
<sup>1</sup> All emphases in the Declaration are added, unless noted otherwise.

microcontroller 30” of the transponder “may include numeric or digital values that are remotely downloaded into the transponder and are indicative of (1) a total distance which the vehicle is authorized to travel for that operator, (2) a geographical area in which the vehicle may only be operated, (3) the allowed times and dates of operation, such as (i) the specific hours during the day when the vehicle may be operated or (ii) the specific dates on which it may be operated, (4) the total time of vehicle operation that is authorized, and (5) the subsystems that the operator is allowed or authorized to use.” (*Id.*, [0026], [0029], [0034], [0041], [0056]-[0057], [0060], [0068], [0071]-[0074].)

45. **Second**, “data stored in microcontroller 30 of the transponder” may include vehicle operational data like “distance traveled,” dates and times of events, service reminders, “vehicle conditions,” “fault or error conditions,” and amount of “consumables remaining.” (*Id.*, [0027].) This data may be wirelessly received by the transponder from reader circuit 14 in the vehicle. (*Id.*, [0025], [0029]-[0034].)

46. **Third**, each transponder has an “identification number stored in its memory microcontroller,” which can “can uniquely identify the person carrying the transponder.” (*Id.*, [0033].)

48. Arshad's "master control unit" includes "vehicle status and monitoring controller 38" coupled to "reader circuit 14" in the vehicle. (Arshad, [0028]-[0029].) Controller 38 is "mounted on [a] vehicle" and coupled to other "microprocessor-based controllers," and reader unit 14 is similarly in the vehicle. (*Id.*, [0019], [0028], [0010]-[0013].) Controller 38 and reader circuit 14 "wirelessly authenticate" drivers via a "wireless identification and data logging module," *e.g.*, (i) "antenna 58" through which reader circuit 14 transmits and receives radio signals and (ii) "transponder 20" carried by the driver:



(*Id.*, Figs. 1, 3 (annotated); [0020], [0024]-[0025], [0030]-[0033].) *See supra* Ground 1a, Claim 1[A]. Transponder 20 communicates with antenna 58 associated with reader circuit 14 via wireless “**radio frequency**” signals. (*Id.*, [0020]-[0025], [0029]-[0040].)

49. **First**, to wirelessly authenticate drivers, controller 38 issues “commands... to the control module” of reader circuit 14, including “to query for any transponder in range, and... to query for a specific transponder by its **embedded identification number**.” (*Id.*, [0031].) When controller 38 issues a general query, nearby transponders send “a response that includes their identification number.” (*Id.*, [0033].) Reader circuit 14 will then “single out and **identify** any transponder within range,” and the controller and reader circuit can communicate with identified transponders by sending “specific queries” including particular identification numbers. (*Id.*, [0032]-[0033].) Any nearby transponder is “energized and checks to see if it has” the queried identification number. (*Id.*, [0032].) If it does, it “responds with an affirmative message, and thereby establishes a communication session with controller 38.” (*Id.*, [0030]-[0033].)

50. **Second**, Arshad discloses that different drivers have different associated operating profiles, as each driver may have a “**different** degree[] of vehicle access,” and may be authorized to use different “vehicle functions, operations, systems or sub-systems.” (*Id.*, [0008], [0020]; *see also* [0010]-[0012].)

For example, a driver's transponder may store "**operational limits**," such as a "maximum speed," "maximum load on the engine," "total distance" of authorized travel, "geographical area in which the vehicle" can operate, "allowed times and dates of operation," "total time" of allowed operation, or "subsystems" that the operator can use. (*Id.*, [0043], [0057], [0026]; *see also* [0043]-[0044], [0074].) To associate an operating profile with a particular driver, once Arshad's reader circuit 14 "establishes the existence of a particular transponder" (by authenticating through identification numbers), it communicates with the transponder to "download information" from the transponder's memory "and thence to controller 38 for processing." (*Id.*, [0033]-[0034], [0008]-[0012], [0020].) *See* Ground 1a, Claims 1[A] *supra*, 1[F] *infra*. Arshad discloses that the operating profile, including the degrees of access and operational limits, can be "downloaded" from transponder 20 (*e.g.*, wireless driver identification and data logging module) to controller 38 (*e.g.*, master control unit), which accesses the operating profile information from the transponder to determine, for example, whether a driver is "authorized" to use the vehicle or a vehicle subsystem, or is approaching or exceeding an operational limit. (*Id.*, [0031], [0034], [0043]-[0044], [0057], [0071]; *see also* [0011], [0019], [0040], [0059]-[0060], [0068], [0073]-[0074].)

**(iv) Claim 1[C]: a GPS module providing at least location and speed information in association with movement of said motor vehicle;**

51. Arshad in view of Petrik renders obvious Claim 1[C].

52. Arshad discloses a “satellite navigation receiver 56” (*e.g.*, “GPS module”) that receives “radio transmissions from satellites” and provides monitoring controller 38 with “data indicative of the vehicle’s current location.” (Arshad, [0029], [0073], Fig. 3.)

53. It would have been obvious for such GPS module to also provide speed information of the vehicle. Petrik, in the same field of driving monitoring, discloses a “GPS based” system with an “in-vehicle monitoring unit” for authenticating drivers, monitoring vehicle operation, and taking actions such as issuing alerts and slowing or stopping a vehicle if the driver deviates from her operational limits. (Petrik, [0016]-[0026], [0030], Fig. 1.) Petrik uses a “GPS receiver module” to provide location **and** speed information and “keeps a constant log of the date, time, location, distance travelled and **speed** of the vehicle both in the units’ memory and in the smart card.” (*Id.*, [0001], [0025]-[0026], [0009], [0040].) GPS speed and location information is used by the in-vehicle unit to prevent the exceeding of speed limits and to determine if a driver has deviated from an allowed route. (*Id.*, [0025]-[0028], [0030].)

54. A POSITA would have been motivated to use GPS in Arshad to

determine both location and speed, as taught by Petrik, to have an accurate source of location, speed, and time information that could not be manipulated by the driver and that could be stored in vehicle operation logs. (Petrik, [0001], [0009], [0012], [0025]-[0028].) A POSITA would have had a reasonable expectation of success using a GPS module to provide both speed and location, as this would simply be use of a known component for its intended function to provide both speed and location information to the controller. Moreover, a POSITA would have understood that using GPS speed and location would provide the information necessary to determine if a driver has violated speed or geographic operational limits.

(v) **Claim 1[D]: a data logging device recording vehicle operation data associated with a use of said motor vehicle by said at least one driver comprising at least said location and speed information from said GPS module; and**

55. Arshad in view of Petrik renders obvious Claim 1[D].

56. In Arshad, “microcontroller 30” within transponder 20 can “receive[] data from the vehicle” and “store[] this data in its internal memory”—thus comprising a “data logging device recording vehicle operation data” (*e.g.*, distance travelled, time vehicle started/stopped). (Arshad, [0025]-[0027], [0030]-[0033].) *See supra* Ground 1a, Claim 1[A]. Further, Arshad discloses that each of its controllers includes “RAM memory 92 and ROM memory 94,” with the RAM memory being “used to store working variables required by the microprocessor.” (Arshad, [0075],

[0077]-[0078], Fig. 4.) Arshad's controllers store vehicle operational data, including location of the vehicle, as they compare operational data to the operating restrictions downloaded from the transponder. (Arshad, [0042]-[0045], [0057]-[0058], [0073].)

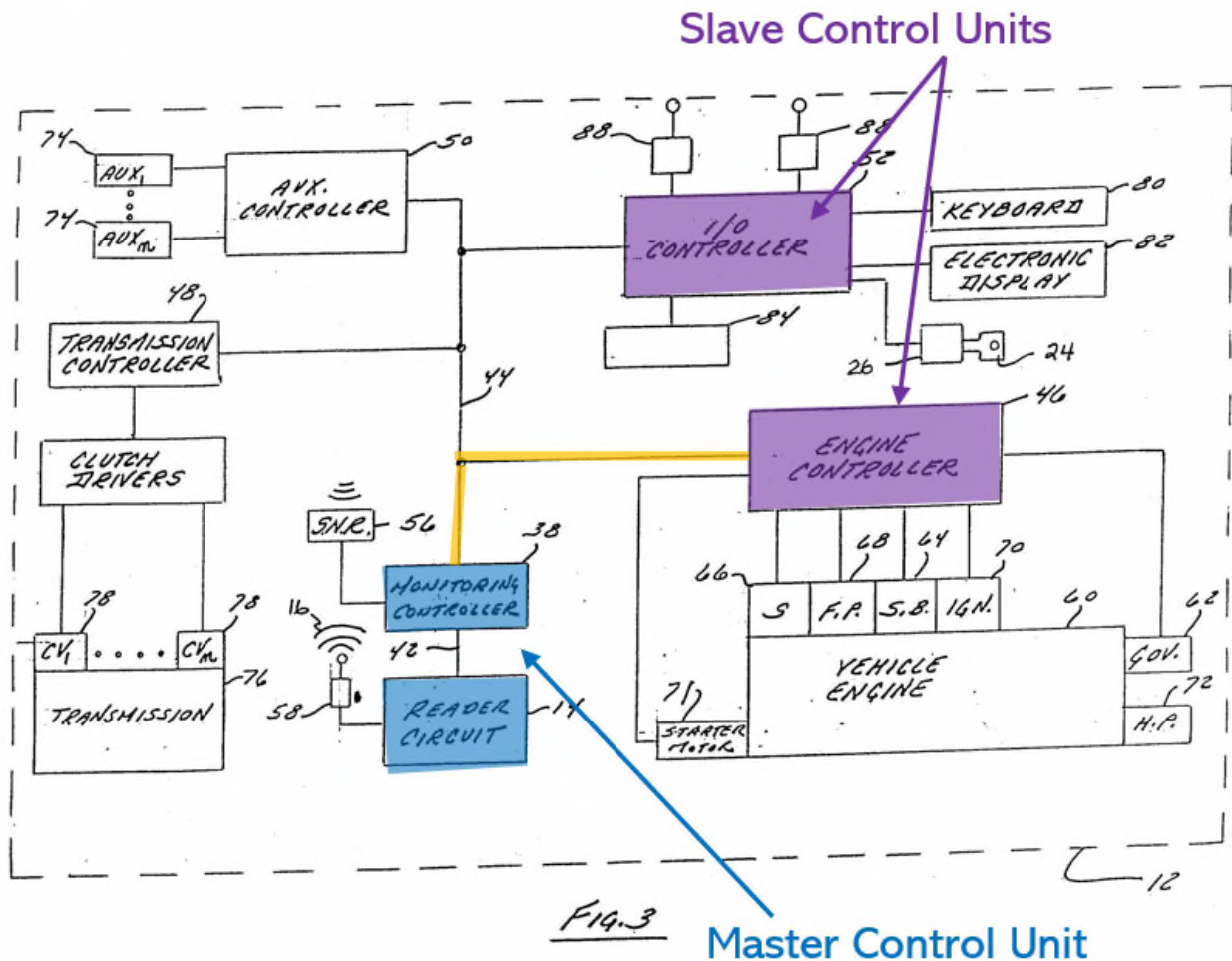
57. Additionally, Petrik discloses "automatically and irrefutably logging via GPS, ...vehicle location, vehicle speeds, speeding offences, distance covered etc. and recording these on a secure smart card as well as in the vehicle units' memory." (Petrik, [0009], [0012], [0018], [0025]-[0029].) It would have been obvious to a POSITA to modify Arshad to log GPS location **and** speed information from the GPS module in transponder 20, as well as in controller 38's memory. A POSITA would have understood this would provide a log of operational and infraction data that could not be manipulated by the driver. (Petrik, [0009], [0012], [0018], [0025]-[0029].)

(vi) **Claim 1[E]: a slave control unit in said motor vehicle and in communication with said master control unit, said slave control unit configured to receive commands from said master control unit and to generate an alarm signal if said at least one driver violates said operating profile unique to said at least one driver thereby providing feedback about said vehicle usage;**

58. Arshad discloses Claim 1[E].

59. **First**, Arshad discloses a "slave control unit" installed in the vehicle that is in communication with the "master control unit." "Engine controller 46" and I/O controller 52 are (e.g., slave control units) are "microprocessor-based

controller[s]” “coupled together with” monitoring controller 38 (e.g., master control unit) over “communication bus 44”:



(Arshad, Fig. 3 (annotated), [0028], [0041]-[0042].) Monitoring controller 38 “**communicates with**” engine controller 46 and I/O controller 52 by sending and receiving data “packets” over the bus—for example, monitoring controller 38 transmits packets to engine controller 46 to shut down the fuel pump or ignition or limit vehicle or engine speed, and engine controller 46 transmits “packets on bus 44”

indicative of engine operation to monitoring controller 38. (*Id.*, [0041], [0043]-[0045], [0054]-[0059], [0065], [0071]-[0074].)

60. **Second**, Arshad discloses engine controller 46 and I/O controller 52 are configured to receive commands from monitoring controller 38 (*e.g.*, master control unit) and to generate alarm signals<sup>2</sup> if the at least one driver violates the operating profile unique to that at least one driver thereby providing feedback about vehicle usage. When operational limits are exceeded, monitoring controller 38 transmits “packets” (*e.g.*, commands) to engine controller 46 and I/O controller 52 to take certain actions. (*Id.*, [0044]-[0046], [0058]-[0063], [0071]-[0074].) For example, in response to information from engine controller 46 that an engine limit was exceeded, monitoring controller 38 can transmit a packet instructing engine controller 46 to “shut down the fuel pump, the ignition system, or to limit the speed of the vehicle or the engine.” (*Id.*) Engine controller then generates an “alarm signal” when it prevents “the engine from exceeding the load and RPM limit by controlling the engine governor or throttle valve to maintain the engine at or below the load or RPM limit,” or when it “stops” the engine by sending signals to disable the fuel pump or ignition. (*Id.*, [0074], [0046]-[0050].) They are alarm signals because they related to

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<sup>2</sup> The ’149 broadly describes the “alarm signal” as a signal that “***can result*** in an actual audible alarm, or it can be used to control/govern operational aspects of the vehicle.” (’149, 7:45-63.)

control/govern operational aspects of the vehicle in a way that is perceptible to the driver and that provides feedback regarding vehicle operation. When the engine controller shuts down the engine, or slows the vehicle or engine, this would be perceived by the driver and the driver would recognize that the vehicle was being operated outside of the allowed limitations, which includes alarm signals.

61. And I/O controller is instructed to display “an alert message” indicating the limit being approach or profile condition violated, and may also “energize annunciator 84” to generate “a sound to get the operator’s attention.” (*Id.*) For example, Arshad indicates that the I/O controller can be instructed by the controller 38 to display certain messages that indicate a driver is about to or has exceed a limit or restriction like reaching geographic limits of allowed operation, or approaching the maximum allowed operational time. The I/O controller can also display messages related to the same conditions the engine controller generates alerts for. For example, when the engine is being operated over the allowed engine speed, the engine controller can take action to send signals so that the engine speed is reduced, and the I/O controller can also display a message stating that the engine is approaching or exceeding those same limits.

(vii) **Claim 1[F]: wherein said master control unit permits said at least one driver to operate said vehicle within said operating profile if said master control unit receives at least one of a unique identification code to permit said at least one driver to operate said vehicle within said operating profile and said at least one driver has not violated said operating profile.**

62. Arshad discloses Claim 1[F].

63. Arshad's controller 38 and reader circuit 14 (*e.g.*, master control unit) receive a "unique identification code" that permits the driver to operate the vehicle within her profile when she has not violated the profile. For example, each transponder stores an "**identification number**" to "**uniquely identify**" the driver carrying it, which is sent to reader circuit 14 to authenticate and establish communication sessions with particular transponders. (*Id.*, [0032]-[0034].) Once a driver is authenticated, *see supra* Ground 1a, Claim 1[B], controller 38 accesses the operational limits profile and permits vehicle operation within these limits. In particular, controller 38 will not allow vehicle operation "until [it] has received the data stored in transponder 20 and determined whether the operator is authorized to operate specific vehicle systems." (Arshad, [0040], [0034].) Controller 38 "compares" data from other controllers and sensors with "data it received from the transponder" to determine whether the driver has "attempted to exceed any of the operational limits that were indicated by the transponder data." (*Id.*, [0043]-[0045], [0040]-[0042], [0057]-[0063], [0071]-[0074].) If limits are exceeded (*e.g.*, violated),

controller 38 takes actions like shutting down or limiting vehicle subsystems or displaying a message indicating what limit has been exceeded. (*Id.*) For example, as explained above, the controller 38 can send commands or instructions to the I/O controller, which can then control a display and annunciator to alert the driver of the profile limitation that is or may be exceeded. And, controller 38 can send commands to the engine controller to control engine systems. *See also supra* Ground 1a, Claims 1[B], 1[E].

- b) **Dependent Claim 4: *The driver authentication and monitoring system of claim 1 further comprising configuring said wireless identification and data logging module as at least one of: a WIFI enabled device; an RFID enabled device; a Bluetooth enabled device; a cellular telephone; and a smart phone.***

64. Arshad in view of Petrik renders obvious Claim 4. Arshad discloses that its “**radio (RF)** transponder 20” is an RFID enabled device, as it is “preferably one of Texas Instruments RFID products.” (Arshad, [0023].) This RFID transponder is energized by the electromagnetic field from the reader circuit 14, and communicates with the reader circuit 14 using radio frequency signals. (*Id.*, [0019], [0024]-[0034].)

- c) **Dependent Claim 5: *The driver authentication device of claim 4 wherein said wireless identification and data logging module is further configured to wirelessly load said operating profile for said at least one driver into said master control unit.***

65. Arshad in view of Petrik renders obvious Claim 5. In Arshad, “**radio (RF)** transponder 20” stores “**operational limits**,” such as “maximum speed,” “maximum load on the engine,” “total distance” of authorized travel, “geographical area” where the vehicle can operate, “allowed times and dates of operation,” “total time” of allowed operation, or “subsystems” the operator can use. (*Id.*, [0043]-[0044], [0057], [0026], [0074].) This operating profile can be “**downloaded**” from transponder to controller 38 and reader circuit 14 (*e.g.*, master control unit) via “radio signals,” thereby wirelessly loading the profile into controller 38. (*Id.*, [0031]-[0034], [0043]-[0044], [0071]-[0074]; *see also* [0011], [0019], [0040], [0058]-[0060], [0068].) *See supra* Ground 1a, Claim 1[B].

- d) **Dependent Claim 6: *The driver authentication device of claim 4 wherein said wireless identification and data logging module is further configured to wirelessly receive driver specific vehicle performance and infraction data from said master control unit.***

66. Arshad in view of Petrik renders obvious Claim 6.

67. In Arshad, the data stored in its transponder may also include data “**downloaded**” from the vehicle itself, such as (1) the distance traveled ... (2) the date and times of specific events ... (4) vehicle conditions, such as a threshold or

maximum engine load experienced by the vehicle during operation ..., (5) fault or error conditions experienced during operation ...” (Arshad, [0026]-[0027].) Arshad’s transponder receives this vehicle performance information wirelessly from the master control unit through radio signals sent from the reader circuit 14. (*Id.*, [0025], [0029]-[0030].) For example, reader circuit 14 can send information to the transponder via the electromagnetic field 16 generated by its antenna 58. (*Id.*, [0019], [0025]-[0027], [0034].) This information can include “write instructions” that cause the microcontroller in the transponder to “receive data from the vehicle via field 16” and store “this data in its internal memory.” (*Id.*)

68. Petrik, similar to Arshad, discloses a fleet management system that authenticates and monitors drivers, and allows vehicle operation only within drivers’ parameters including speed limits, geographic route plans, and time limits. (Petrik, Abstract, [0016], [0024]-[0028].) Petrik’s monitoring unit uses a “smart card” to authenticate and log the “date, time, location, distance travelled and speed of the vehicle” both in the unit’s memory and smart card. (*Id.*, [0024]-[0026].) Additionally, Petrik’s system records “infraction data” in the smart card, as it records infractions such as “speeding offen[s]es” and violations of required rest times. (*Id.*, [0009], [0025]-[0028], [0033].)

69. It would have been obvious to a POSITA to modify Arshad’s transponder (*e.g.*, wireless identification and data logging module) to further

wirelessly receive infraction data, such as speeding offenses and other violations, from the controller, as taught by Petrik. A POSITA would have understood this could be done by wirelessly sending such infraction data from the controller's reader circuit antenna in the same manner and at the same time when it sends vehicle operation data to the transponder. (Petrik, [0009], [0024]-[0026], [0043]; Arshad, [0024]-[0027].) Arshad was ready for such improvement and a POSITA would have had a reasonable expectation of success because this would have involved simply using Arshad's existing wireless communications between reader circuit 14 and transponder 20, and the infraction data would be transmitted to and stored in the transponder in the same way as other data transmitted. A POSITA would have been motivated to send infraction data, as well the driver performance data, to the transponder as taught by Petrik in order to have an "irrefutable" log of any violations on the transponder that could be read by the fleet manager for the fleet manager to check on violations by particular drivers, and that could be used as proof of speed and violations in the case of any dispute. (Petrik, [0009], [0024]-[0026], [0043].) This would have achieved Arshad's goals of managing fleets of vehicles, as a fleet manager could check on driver performance and infraction information by reading the information of the transponder, which could capture all use and infractions regardless of which vehicles the driver may have operated. (Arshad, [0008]-[0013].)

- e) **Dependent Claim 7: *The driver authentication device of claim 6 wherein said wireless identification and data logging module is further configured to present said driver specific vehicle performance and infraction data.***

70. Arshad in view of Petrik renders obvious Claim 7.

71. **First**, in Arshad, the data stored in its transponder may be downloaded to the “controller 38 for processing” and displayed on “display 82,” which has “a region for ***displaying alphanumeric messages***” to “display a plurality of different messages indicating the data stored in transponder 20 as well as information regarding the status of the vehicle.” (Arshad, [0033]-[0034], [0056]-[0057].) For example, Arshad’s display 82 is already configured to display operating limitations to the driver and “display messages as these limits are approached” based on data received from the transponder to warn the driver. (*Id.*, [0056]-[0061].) The messages regarding impending conditions include “Only 15 minutes left to operate the vehicle” or “Only fifteen miles left to operate the vehicle.” (*Id.*, [0059].) And, Petrik discloses that “vehicle location, vehicle speeds, speeding offen[s]es, distance covered etc.” are stored on both smart cards and the in-vehicle units’ memory, and a POSITA would have been motivated to record such infractions on Arshad’s transponder. *See supra* Ground 1a, Claim 6. It would have been obvious to a POSITA to modify Arshad’s transponder in view of Petrik to present both vehicle performance and infraction data stored in the transponder on display 82, as this would notify the driver of prior performance and infractions upon restarting the

vehicle. (Arshad, [0033]-[0034], [0056]-[0061]; Petrik, [0009], [024]-[0025], cls. 75-77.)

72. **Second**, A POSITA would understand that such data stored on the smart card can be “presented” at other locations having a smart card reader, such as the Command Center, when read by a “smart card reader/writer.” (Petrik, [0016], [0030].) A POSITA would have been motivated to have Arshad’s transponder “present” its stored data regarding vehicle operations and infractions when read at locations such as a fleet dispatch or Command Center to present such data. (Arshad, [0009]-[0013], Petrik, [0009], [0016], [0026]-[0030], [0033].) That is, where a fleet manager wanted to check on the performance of the fleet drivers, instead of going vehicle to vehicle and trying to check vehicle data logs, the fleet manager could have the drivers bring them their transponders. The manager could then use a reader to communicate with the transponder, such that the transponder “presents” or sends the data by transmitting it using its antenna 32. (Arshad, 0025].) The data could then be presented to the fleet manager on, for example, a display or computer associated with the transponder reader. A POSITA would have been motivated for Arshad’s transponder to present such performance and infraction data to a fleet management computer or police computer when, for example, a driver attempts to dispute violations.

- f) **Dependent Claim 8: *The driver authentication device of claim 1 wherein said master control unit is further configured for wirelessly receiving data indicative of a speed of said motor vehicle, a location of said motor vehicle, and a time of day from at least one of: a WIFI source; an RF source; a Bluetooth source; and a smart-road network source.***

73. Arshad in view of Petrik renders obvious Claim 8.

74. In Arshad, controller 38 (*e.g.*, master control unit), as modified by Petrik, receives data indicative of vehicle speed, vehicle location, and time of day from a GPS source. *See supra* Ground 1a, Claim 1[C]. Controller 38 is coupled to a “satellite navigation receiver 56,” which receives “radio transmissions from satellites” to determine the “vehicle’s current location.” (Arshad, [0029], [0073], Fig. 3.) Further, Petrik’s master control unit includes “GPS receiver module” to provide “date, time, location and speed” data. (Petrik, [0012], [0025]-[0026].) A POSITA would have understood this GPS receiver module wirelessly receives data indicative of date, time, location and speed from an RF source – namely GPS satellites sending radio frequency spectrum signals to the GPS receiver. (Arshad, [0033]-[0034], [0056]-[0061].)

- g) **Dependent Claim 9: *The driver authentication device of claim 8 wherein said master control is configured for wirelessly receiving data indicative of a speed limit associated with a road said motor vehicle is currently traveling on from at least one of: a WIFI source; an RF source; a Bluetooth source; and a smart-road network source.***

75. Arshad in view of Petrik renders obvious Claim 9.

76. In Petrik, the monitoring unit is supplied with an “upgradeable software program,” which “contains a table of the geographical location of every speed zone change as per the 40Km/h, 45Km/h, 50Km/h, 55Km/h, 60Km/h, etc. road speed signs throughout the country and provides intelligent speed adaptation.” (Petrik, [0018]-[0019].) Petrik discloses a remote command center database of “geographical speed zone locations table of every speed zone as displayed by road speed signs throughout the country,” and that this speed zone table, indicative of speed limits associated with a road where the vehicle is currently traveling on, is wirelessly “downloaded” to its in-vehicle unit using “***Satellite/GPRS/GSM/Short Range/Bluetooth*** enabled wireless communications.” (*Id.*, Cls. 49-50, 52-54.) Thus, Petrik’s monitoring unit wirelessly receives data indicative of speed limits for roads on which the vehicle is travelling from an RF or Bluetooth source.

77. It would have been obvious to modify Arshad’s monitoring controller (*e.g.*, master control unit) to wirelessly receive speed zone tables from a command center database using RF or Bluetooth communications as taught by Petrik. (Petrik,

[0019], [0025]-[0026], Cls. 49-50, 52-54.) A POSITA would have understood having such speed limits in Arshad's monitoring controller would allow it to determine when speeding violations have occurred and keep a record of any of those violations. (Petrik, [0025]-[0026].) A POSITA would have understood this would further Arshad's fleet management goals, as fleet managers would be provided with information regarding how safely their drivers are operating the vehicles, in particular, based on the speed limits of the roads. (*Id.*) Further, a POSITA would have understood that Arshad's controller 38 wirelessly receiving a table with road speed limits, as taught by Petrik, would supply the controller with accurate speed limit information associated with the road on which the vehicle is currently traveling, allowing it to monitor compliance and provide warnings to the driver if a speed limit is being violated. As Petrik discloses, a POSITA would have understood that providing Arshad's controller with speed limit information would allow it to send commands to the engine, throttle and transmission controllers to automatically slow the vehicle and keep it within the speed limits. (Petrik, [0025]-[0026].) A POSITA would have understood this could be done, for example, by adjusting the throttle and engine speed, and/or by causing the transmission to shift gears based on the speed limits.

78. Arshad was ready for improvement in this way and a POSITA would have had a reasonable expectation of success because this would have involved

simply using known networked computers and communication networks for their intended functions. Moreover, this would have facilitated Arshad's goals of managing vehicle fleets and authorizing different degrees of vehicle operation, with, for example, drivers who consistently violate speed limits being given lower maximum speeds. (Arshad, [0008]-[0013].) Furthermore, a POSITA would have understood that Arshad's controller 38 wirelessly receiving a table with road speed limits, as taught by Petrik, would give the controller accurate speed limit information associated with the road on which the vehicle is traveling, allowing it to monitor compliance and provide warnings if an immediate speed limit is exceeded. As Petrik teaches, such speed limit information would allow the controller to send commands to the engine, throttle, and transmission controllers to slow the vehicle and keep it within the speed limit of the road.

**h) Dependent Claim 10: *The driver authentication device of claim 9 wherein said master control is configured to define a maximum speed limit and a geo-fence limit for said at least one driver according to said time of day.***

79. Arshad in view of Petrik renders obvious Claim 10.

80. In Arshad, controller 38 (*e.g.*, master control unit) “determine[s]” operating limits received from the transponder, such as “a geographical area in which the vehicle may only be operated” (*e.g.*, geo-fence limits), “maximum speed of authorized operation” (*e.g.*, maximum speed limits), “allowed times and dates of operation, such as (i) the specific hours during the day when the vehicle may be

operated or (ii) the specific dates on which it may be operated (*e.g.*, time of day limits). (Arshad, [0011]-[0013], [0026], [0057]-[0060].) A POSITA would have understood that “a maximum speed limit and a geo-fence limit for said at least one driver according to said time of day” means that either the speed limits or the geo-fence limits are adjusted or differ based on the time-of-day limits. For example, a driver may have different maximum speed limits for daytime and nighttime because of the visibility change and safety concerns. It would have been obvious to a POSITA to combine Arshad’s speed limits and geo-fence limits with its time-of-day operating limits, because Arshad’s system already considers them individually. A POSITA would have understood that the allowed geographic area or maximum speed could vary with the “dates” or “time of day” the vehicle is allowed to operate. For example, the geographic region could be limited to where the fleet vehicle driver is supposed to be working during the day, and to a different area at night when the workday is over. And, a POSITA would have understood that the maximum speed may be greater during the day, when visibility is better, and reduced at night when there is less visibility.

- i) **Dependent Claim 11: *The driver authentication module of claim 1 further comprising an alarm module configured to wirelessly receive data from at least one of said master controller, said slave controller, and said GPS module wherein said alarm module is further configured to present at least one of location data, speed data, and infraction data in real time.***  
**Dependent Claim 12: *The driver authentication module of claim 11 wherein said alarm module comprises at least one of: a cellular telephone; a smartphone; a computer; a vehicle integrated wireless communication device; a WIFI enabled device; an RFID enabled device; and a Bluetooth enabled device.***

81. Arshad in view of Petrik renders obvious Claims 11-12.

82. Petrik's system includes a remote "Command Centre" comprising "a **computer network** supporting an internet on-line facility" (e.g., an alarm module comprising a computer, which may be Bluetooth enabled) that is in "**real-time**" communication with Petrik's min-vehicle system and receives vehicle operation. (Petrik, [0010]-[0011], [0030]-[0032], Cls. 48-56.) The computer at the Command Centre receives vehicle operation data, including location, speed, and infractions in real-time from the in-vehicle unit. (*Id.*, [0030]-[0032], Cls. 49-51, 55, 58.) For example, in the case of an accident, the in-vehicle unit "automatically reports" to Command Centre "sudden change in speed" with "date, time and place coordinates." (*Id.*, Petrik, [0010]-[0011], [0024], [0032], Cls. 55, 61.) The Command Centre also receives automatic notifications when a vehicle violates its filed route plan or vehicle/driver details. (*Id.*, [0030], [0058]-[0060].).

83. The computer at Command Centre computer (*e.g.*, alarm module) presents location, speed, and infraction data to others in real-time. (*Id.*, Cls. 49-51, 55, 58-61.) This information for each driver and vehicle is maintained by the computer as part of an on-line facility, accessible in real time by dispatchers who can track drivers and vehicles. (*Id.*, [0030], Cls. 48-49, 55.) And, in the case of an accident, the Command Centre can “immediately” present date, time, and place coordinates of the vehicle to police and rescue crews and guide other vehicles around the accident area. (*Id.*, [0032], Cl. 61.) It would have been obvious to a POSITA to modify Arshad’s system to include a computer at the remote facility (*e.g.*, alarm module) capable of communicating with its in-vehicle system, as taught by Petrik. A POSITA would have understood that providing such a remote computer in communication with the in-vehicle unit would allow fleet managers to view real-time vehicle operation and violations data, thereby improving operational safety and flexibility. (Petrik, [0010], [0018], [0024], [0030], Cls. 48–51; Arshad, [0026]-[0027].) Arshad’s system was ready for such an improvement, as it includes multiple controllers communicating over a bus, and adding the two-way communication module would simply be the addition of another controller on this same bus to transmit data. A POSITA would have had a reasonable expectation of success, because this would have involved simply using known networked computers and communication interfaces for their intended functions. Moreover, this would have

facilitated Arshad's goals of managing fleets of vehicles and authorizing different degrees of vehicle operation to different drivers. (Arshad, [0008]–[0013].)

- j) Dependent Claim 17: *The driver authentication and monitoring system of claim 1, wherein said operating profile comprises at least one operating parameter including at least one of: a maximum allowable vehicle speed; an allowable vehicle location; allowable hours of operation; and a seatbelt usage.***

84. Arshad in view of Petrik renders obvious Claim 17. In Arshad, “operating limits” include (i) “maximum speed” (*i.e.*, maximum allowable vehicle speed), (ii) “geographical area in which the vehicle” can operate and “total distance of authorized travel” (*i.e.*, allowable vehicle locations), and (iii) “allowed times and dates of operation,” “number of hours of authorized use,” and “predetermined number of hours” the engine can be operated (*i.e.*, allowable hours of operation). (Arshad, [0011]–[0013], [0026], [0043]–[0045], [0057], [0059], [0072]–[0074].) *See also supra* Ground 1a, Claim 1[B] *supra*.

- k) Dependent Claim 18: *The driver authentication and monitoring system of claim 1 wherein said slave control unit generates an alarm signal for remotely alerting said authorized user when said at least one driver violates said operating profile.***

85. Arshad in view of Petrik renders obvious Claim 18. Arshad monitors whether a driver is operating the vehicle in accordance with her operating profile, and if she violates her profile, the system can “display a message” that provides an

alert “indicating what limit has been exceeded.” *See supra* Ground 1a, Claims 1[B],1[F].

86. Furthermore, Petrik discloses an “in-vehicle monitoring unit” that generates an alarm signal which “notifies” ***authorized personnel at a remote facility*** (*e.g.*, “Transportation Management Command Centre”), via a “SATELLITE/GPRS/GSM” link, when a driver violates her profile, such as by “divert[ing] inappropriately from the ‘filed’ route plan.” (Petrik, [0030], Cls. 58-60.)

87. It would have been obvious to a POSITA to modify Arshad to have its slave control unit (*e.g.*, engine controller 46) generate and send “alarm signals” to remote authorized personnel via a communications link, as taught by Petrik. *See supra* Ground 1a, Claim 11. A POSITA would have understood in view of Petrik that, after determining there is a violation, Arshad’s engine controller could generate an “alarm signal” causing system to transmit an alert to authorized persons at a remote facility. The inclusion of such a communications link to alert remote personnel would have been the mere addition of basic, well-known components for its intended purpose that could be used with the system already existing in Arshad. A POSITA would have understood that such profile-violation alerts in Arshad could likewise be transmitted to authorized personnel at the remote facility (*e.g.*, the Command Centre), as taught by Petrik. A POSITA would have also been motivated (and it would have been obvious to try) to have engine controller 46 generate such

alerts because it is already monitoring operation of vehicle components and can determine whether a profile violation has occurred. By having Arshad's engine controller and system send such an alert to authorized personnel at a remote facility, Arshad would be able to better "manage access to vehicles used in fleets," as remote personnel would be able to monitor driver operation in real-time and better ensure that drivers comply with profiles. (Arshad, [0007]-[0008].)

**2. Ground 1b: Arshad-Petrik in View of Karsten Renders Obvious Claim 3**

88. I have reviewed Karsten which is US2004/0239510. I understand that Karsten was filed July 23, 2004 and published December 2, 2004. I understand Karsten is prior art under at least pre-AIA 35 U.S.C. §102(b).

89. My review of the '149 Patent file history reveals that Karsten was not considered during prosecution of the '149 Patent.

**a) Dependent Claim 3: *The driver authentication and monitoring system of claim 1 further comprising: an impairment sensor wherein said slave control unit receives signals from impairment sensor and prevents said motor vehicle from starting when said transducer senses driver a driver impairment above a prescribed limit.***

90. Arshad-Petrik in view of Karsten renders obvious Claim 3.

91. In the same field of vehicle monitoring, Karsten discloses using a driver impairment and identification device that "prevents operation of a vehicle when an operator's breath alcohol concentration is above a predetermined threshold limit or

when the operator's identity is not verified." (Karsten, Abstract, [0011], [0043]-[0045], [0027]-[0029], [0017], Figs. 1-2.)

92. Karsten discloses a "breath alcohol detection device" that senses "breath alcohol content (BrAC)" for use with a vehicle and provides this information to an "interlock microprocessor 610." (*Id.*, [0006], [0012]-[0014], [0042]-[0043].) The "interlock microprocessor" is part of an "ignition interlock apparatus 150" which can "generat[e] an enable signal" or a "disable signal" to the vehicle's ignition via a "relay." (*Id.*, [0017], [0028], [0043]-[0044], Figs. 1-2.) If the BrAC reading exceeds a prescribed limit or "pre-programmed BrAC threshold," "the vehicle is not permitted to start." (*Id.*, [0042]-[0043].) Likewise, if the driver's identity is not verified, such as by analyzing sensed skin characteristics, the vehicle is prevented from being started. (*Id.*, [0026]-[0030], [0037]-[0043].)

93. It would have been obvious to a POSITA to include the breath alcohol impairment detection device of Karsten in the Arshad-Petrik system, because this would improve the safety and monitoring features in the Arshad-Petrik system. This would have been the simple addition of a known component (*e.g.*, a breathalyzer) into a similar driver authentication and monitoring system for the achieving its intended purpose – enhancing driver safety by preventing intoxicated drivers from starting a vehicle.

94. Furthermore, Arshad was ready for modification in this regard, and a

POSITA would have had a reasonable expectation of success in implementing Karsten's breath alcohol detection sensor in the Arshad-Petrik system. For example, Arshad's engine controller 46 (*e.g.*, slave control unit) already receives signals from "sensors," and is programmed to analyze data received from such sensors, and to send signals controlling engine components based on the data received. (Arshad, [0046]-[0050], [0074].) Similar to Karsten's "interlock microprocessor," Arshad's engine controller and can "enable" or "disable" the engine's ignition and starting motor "under computer control." (Karsten, [0039]-[0044]; Arshad, [0046]-[0050], [0074].) A POSITA would have been motivated to modify Arshad-Petrik to connect the breathalyzer of Karsten to Arshad's engine controller 46, allowing the slave control unit to "disable" the engine's starting motor to ensure driving safety if the driver's impairment was above the prescribed limit, as taught by Karsten. Such a modification would prevent intoxicated driving, thereby promoting Arshad-Petrik's fleet management goals and safety objectives. (*Id.*) Further, it would have been obvious for Arshad's I/O controller to display results of the breathalyzer. (*Id.*) That is, if the driver fails the breathalyzer, inputs could be sent to the I/O controller so it could display a notice to the driver that the breath test was failed, and the vehicle will not be started.

95. For example, a POSITA would have understood that fleet managers would be concerned with drivers operating fleet vehicles while intoxicated. To

prevent this, a POSITA would have understood that, as taught by Karsten, a simple solution is to provide an alcohol detection device in the vehicle and require the driver to prove their blood alcohol is below a certain limit before allowing the vehicle to start. This would help to ensure drivers are in an appropriate condition to operate their vehicles, and that the driver is not cheating by having someone else take the breath test for them. This fits with Arshad's teachings of identifying the operator before allowing vehicle operation, as Karsten similarly teaches that the driver must both verify their identity and pass the breath test before the vehicle can be started.

**3. Ground 1c: Arshad-Petrik in View of Murphy Renders Obvious Claim 10**

96. I have reviewed Murphy which is US 6225890. I understand that Karsten was filed March 20, 1998 and issued May 1, 2001. I understand Murphy is prior art under at least pre-AIA 35 U.S.C. §102(a).

97. My review of the '149 Patent file history reveals that Murphy was not considered during prosecution of the '149 Patent.

**a) Dependent Claim 10: *The driver authentication device of claim 9 wherein said master control is configured to define a maximum speed limit and a geo-fence limit for said at least one driver according to said time of day.***

98. Arshad-Petrik in view of Murphy renders obvious Claim 10.

99. Arshad's controller 38 (e.g., master control unit) determines operating limits regarding maximum speed, allowed geographic areas (geofence limits), and

hours of operation. *See* Ground 1a, Claim 10.

100. In addition, Murphy, in the same field of driver authentication and monitoring, discloses a controller that determines “whether the vehicle present location and/or speed are within permitted ranges corresponding to the permitted time interval.” (Murphy, Abstract, 2:46-53, 5:13-28, 12:16-27, 15:8-31.) It determines if “the vehicle present location and/or speed, as determined by [Murphy’s system], is within a permitted travel region and speed range corresponding to a permitted time interval that includes the present time.” (*Id.*) As such, Murphy discloses allowable vehicle speed and location (*e.g.*, geo-fence) being variable based on the time of day. *See also infra* Ground 2d, Claim 10.

101. It would have been obvious to a POSITA to combine both speed limits and geo-fence limits as determined by Arshad’s controller with its time-of-day operating limits, as taught by Murphy. Arshad’s controller already implements these operating limits to manage fleet operations, and their integration according to the time of day would further enhance the safety and efficiency of fleet monitoring, allowing operators to provide different geographic and speed limits based on where the drivers are supposed to be at different times of the day. Integrating these operating limits would merely involve the routine application of known operating limits, which are already stored and defined by Arshad’s controller, for their intended purpose.

**4. Ground 1d: Arshad-Petrik in View of Siwinski Renders Obvious Claims 13 and 14**

- a) **Dependent Claim 13: *The driver authentication device of claim 1 further comprising a phone governor module configured to receive at least one instruction from said master control unit said instructions comprising at least one of: restricting calls on said at least one driver's cellular telephone; powering off said at least one driver's cellular telephone; and disabling text messaging on said at least one driver's cellular telephone.***

**Dependent Claim 14: *The driver authentication device of claim 1 further comprising an Internet governor module configured to disables all integrated in-vehicle Internet related applications when said vehicle is in operation.***

102. I have reviewed I have reviewed Siwinski which is US 2002/0141600. I understand that Siwinski was filed March 29, 2001 and published October 3, 2002. I understand Siwinski is prior art under at least pre-AIA 35 U.S.C. §102(b).

103. My review of the '149 Patent file history reveals that Siwinski was not considered during prosecution of the '149 Patent.

104. Arshad-Petrik in view of Siwinski renders obvious Claims 13-14.

105. Siwinski, in the same field as Arshad-Petrik, discloses a vehicle system to “reduce or eliminate distractions” caused by “electronic devices,” like “**cell phones**” and “hand-held computers,” that are “portable” or “installed in the vehicle” and “**connected to the Internet.**” (Siwinski, Abstract, [0001]-[0002], [0004], [0008], [0014], [0021], Cl. 9.) In Siwinski, “main processor 30” receives data from “sensor

20” regarding whether the vehicle is “in motion,” and if it is, can communicate this to “processor 60” in the electronic device. (*Id.*, [0006], [0013]-[0016], [0020], Figs. 1-3.) “Processor 60” can then (a) “**disable**” the “audio output,” “voice input,” and “data network” connection, and limit information provided on a visual display, preventing the device from making calls or text messages, and (b) “**prohibit operation of the Internet connection,**” preventing the device from accessing “Internet-related information.” (*Id.*, [0016]-[0020], Cls. 1-8.) By preventing the electronic device from having connection to the cellular network, it can no longer make telephone calls or transmit or receive texts to disturb the driver while the vehicle is in motion, similar to the “do not disturb” or airplane mode on mobile phones. Likewise, by preventing operation of the Internet connection, the electronic device can also no longer use any Internet-related applications. This disablement of cellular or Internet access minimizes driver distraction, thereby promoting safer vehicle operation. Thus, Siwinski’s teaching also supports Arshad-Petrik’s goal of enhancing driving safety by reducing the risk of accidents caused by driver inattention.

106. It would have been obvious to apply these teachings to Arshad-Petrik and include in its system such a “governor module” disabling telephone calls, text messages, and in-vehicle Internet-related activities when the vehicle is in motion, as taught by Siwinski. (*Id.*, [0016]-[0020], Cls. 1-8.) All three references are analogous

art and in the same field of endeavor, as each are directed to monitoring and controlling vehicle operation and improving driver safety. (Siwinski, [0008]; Arshad, [0007]-[0009]; Petrik, [0003]-[0004].) Adding such a “governor module” to disable such activities to Arshad-Petrik would have been the mere inclusion of a well-known component in a vehicle safety system for their intended purpose. (Siwinski, [0008], [0016]-[0020], Cls. 1-8.)

107. Arshad-Petrik also suggests the modification, because its transponder can indicate whether the driver is “authorized to operate specific sub-systems, including “accessories” like the “radio,” “tape or CD player,” “navigation computer,” and “TV.” (Arshad, [0060].) “Cell phones,” “hand-held computers,” and portable or “permanently installed” electronic devices with Internet connections are simply additional examples of such “accessories.” Furthermore, controlling these accessories, as taught in Siwinski, would merely supplement the safety features of the Arshad-Petrik system and not impact its functioning.

108. Moreover, Arshad-Petrik would continue to control vehicle operation as before, with, for example, its “monitoring controller” (*e.g.*, master control unit) still monitoring the driver for compliance with her profile and controlling vehicle access and operations based on the operating profile. The only addition would be that the “monitoring controller” would now further control cellular phone and Internet usage, *e.g.*, additional “accessories.” These would be controlled in the same

manner as other accessories and as taught by Siwinski. Arshad-Petrik's monitoring controller can determine if vehicle is in operation using its speed data and then send a signal to the device to disable any activities, just like is taught in Siwinski. (Arshad, [0046]-[0047]; Siwinski, [0008], [0016]-[0020], Cls. 1-8.) A POSITA would have been motivated to control such accessories in Arshad-Petrik, as it would further reduce driver distraction and keep fleet drivers on task, to better achieve fleet management goals of Arshad-Petrik.

#### **5. Ground 1e: Arshad-Petrik in View of Wu Renders Obvious Claim 16**

109. I have reviewed Wu which is US2008/0114501. I understand that Wu was filed November 15, 2006 and published February 21, 2008. I understand Karsten is prior art under at least pre-AIA 35 U.S.C. §102(a) and §102(e).

110. My review of the '149 Patent file history reveals that Wu was not considered during prosecution of the '149 Patent.

111. Wu discloses a vehicle control system having "a controller 20, a battery 40... an engine control module 60... a starter motor 80, a fuel pump 90, and an ignition circuit 100." (Wu, [0020]-[0022], [0025]-[0027], Figs. 1-2.) Wu controls operations such as "starting" the vehicle and (de)activating the ignition, and "accessories" like lights. (*Id.*, [0020]-[0021], [0025]-[0026], [0030]-[0031], [0039].) This is done using a processor in the controller to send signals to "relays," which

(de)activate the components. (*Id.*, [0020]-[0021], [0025]-[0026], [0030]-[0031], [0039], Figs. 1-2.)

- a) **Dependent Claim 16: *The driver authentication and monitoring system of claim 1, wherein said slave control unit further comprises a power regulator module; a starter relay module; a definable relay module; a slave microcontroller; and an alarm synthesizer.***

112. Arshad-Petrik in view of Karsten renders obvious Claim 16. Each of the well-known components recited in Claim 16 is disclosed or would have been obvious based on Arshad or, at minimum, Arshad in view of Wu.

113. Claim 16 merely adds that the “slave control unit” includes certain well-known components—namely “a power regulator module; a starter relay module; a definable relay module; a slave microcontroller; and an alarm synthesizer.” These are standard components that a POSITA would expect to be present in a motor vehicle. For example, it was well-known to include a “power regulator,” typically in the form of a voltage regulator, to provide the voltage level required for electronic components in the vehicle to function properly. These voltage regulators would, for example, regulate the voltage from a vehicle’s 12V battery or alternator to deliver a stable 5V supply to vehicle electronic components while protecting against voltage spikes. As another example, starter relays are standard electrical components that activate a starter motor, which in turn rotates a crank of the engine so that the engine itself can start. As a final example, an “alarm synthesizer” is simply a known

component for electronically generating sounds. Additionally, the '149 broadly describes that the “slave control unit” as a collection of disparate components broadly describes the “slave control unit” as a collection of components across the vehicle that are connected and respond to commands, such as from the “master control unit.” ('149, Fig. 6, Abstract, 10:36-49 (describing that the slave control unit can include a number of components).)

114. Furthermore, voltage fluctuations in vehicle systems may lead to erratic behavior or potential damage to electronic components if they were directly connected to, for example, the battery or alternator, and Wu's disclosures teach that regulating power was a well-established practice in such systems. A POSITA would have understood this would merely require the use of a well-known, standard, component to perform its intended function. Arshad's “engine controller 46” (*e.g.*, slave control unit) includes a power regulator module. The “engine controller 46” includes a “driver circuit 102” that “controls the application of power” to “actuators” such as the “fuel pump, governor and ignition system.” (Arshad, [0077]; *see also* [0044], [0048]-[0049], [0064].) Furthermore, Wu discloses it was “standard” to include a power (or voltage) regulating device in vehicle controllers, like Murphy's, to “regulate the voltage level to 5V” or to voltage levels the system “requires.” (Wu, [0020], [0022], [0027]-[0028].) Because it is an electronic component which controls other electronic components, a POSITA would have understood Arshad's

engine controller 46 to have a “power regulator” to ensure receipt of a stable supply of the required voltage, including as taught by Wu. (Wu, [0020], [0022], [0027]-[0028].)

115. Furthermore, Arshad’s engine controller includes a starter relay module. The “engine controller 46” (*e.g.*, “slave control unit”) “is coupled to the engine starting motor 71 to turn the starting motor on or off under computer control.” (Arshad, [0049]-[0050].) The coupling would involve a starter relay to energize the starting motor. In a similar field, Wu discloses that such “starter relays” are commonly used to energize starter motors (Wu, [0020]-[0021], [0025]-[0026], [0030]-[0031], [0039], Figs. 1-2), and a POSITA would have understood that the coupling in Arshad’s system provides a well-known, commonly-used mechanism for activating and deactivating the starting motor.

116. In addition, Arshad’s engine controller also includes a definable relay module. “Engine controller 46” is “coupled to ignition system 70 of the engine” and can “energize or de-energize the ignition under computer control.” (Arshad, [0049]-[0050]; *see also* [0044].) Such coupling would involve a relay module to activate or deactivate the ignition system. In a similar field, Wu discloses that ignition systems can be energized and de-energized using an ignition circuit enabling means comprising a processor (like in Arshad’s engine controller) and a relay. (Wu, [0020]-[0021], [0025], [0031], [0039], Figs. 1-2.) A POSITA would have been motivated

to use such a processor and ignition relay, as taught by Wu, to implement the computerized control of the ignition system with Arshad's engine controller. This would have merely been the implementation of known components (*e.g.*, ignition relay) in a similar system for their intended purpose to achieve the same results (energizing or de-energizing the ignition). (*Id.*)

117. Moreover, Arshad discloses that its engine controller includes a slave microcontroller. The "engine controller 46" is a "microprocessor-based controller" that includes a microprocessor, RAM and ROM, sensor circuit, driver circuits, and a communication processor. (Arshad, [0028], [0075]-[0080], Fig. 3.) Because engine controller 46 receives instructions from the monitoring controller 38 (*e.g.*, master control unit), it is a slave microprocessor-based controller. Arshad's engine controller 46 includes a "driver circuit 102" that "controls the application of power" to "actuators" such as the "fuel pump, governor and ignition system." (Arshad, [0077]; *see also* [0044], [0048]-[0049], [0064].) Thus, its engine controller includes a slave microcontroller.

118. Further, Arshad renders obvious its engine controller including an alarm synthesizer. Arshad discloses its I/O controller can "energize annunciator 84" (*e.g.*, an "alarm synthesizer") to "generate a sound to get the operator's attention" when operational limits are exceeded. (Arshad, [0054], [0063], [0071]-[0072].) For example, if "engine controller 46" senses that "the vehicle is

approaching the time limit of engine operation,” a signal can be sent to the I/O controller which then activates the annunciator. (*Id.*, [0072].) Further, a POSITA would have been motivated to provide an annunciator with the engine controller, such that the engine controller could activate the annunciator to issue an audible alarm upon the engine controller determining allowed engine operational hours have been or will be exceeded. Engine controller includes driver circuitry like the I/O controller does, and it would have been obvious to use this driver circuitry to operate an annunciator immediately when the engine controller determines an operational limit of the engine is or will be exceeded. (Arshad, [0072], [0074].) Similarly, Wu discloses generating such audible alerts with a synthesizer, including an “operational amplifier” and “resistor,” and a POSITA would have understood this to be a common and simple way to implement the audible alerts in Arshad to provide better driving safety monitoring. (Wu, [0030].)

**6. Ground 1f: Arshad-Petrik in View of Kudo Renders Obvious Claims 2 and 15**

119. I have reviewed Kudo which is US2007/0069873. I understand that Kudo was filed September 27, 2006 and published March 29, 2007. I understand Kudo is prior art under at least pre-AIA 35 U.S.C. §102(b).

120. My review of the ‘149 Patent file history reveals that Kudo was not considered during prosecution of the ‘149 Patent.

- a) **Dependent Claim 2: *The driver authentication and monitoring system of claim 1 further comprising: a plurality of transducers comprising at least one of proximity sensors, head movement sensors, and eye movement sensors wherein said transducers send signals to said slave control unit and said slave control unit determines if said signals are indicative of a driving condition requiring a warning and in turn signals said master control unit to alert said driver.***

121. Arshad-Petrik in view of Kudo renders obvious Claim 2. In the same field of vehicle monitoring, Kudo discloses a vehicle with an “automatic cruise control system (ACC)” that provides control of acceleration, deceleration, and steering and having an “alarm function” for detected “obstacles.” (Kudo, [0019]-[0020], Fig. 1.) Kudo’s ACC includes transducers with “at least one of proximity sensors, head movement sensors, and eye movement sensors,” in the form of a “stereo camera 3” comprised of left and right CCD cameras that provide information to “image recognition unit 4” to determine the proximity (or distance) to preceding vehicles and other objects near the vehicle. (*Id.*, [0021]-[0028].) Information, including vehicle speed, steering wheel angle, yaw rate, and distances to preceding vehicles and other objects is input to Kudo’s “control unit 5.” (*Id.*, [0022]-[0025].) Control unit 5 uses this information to alert the driver, such as by automatically controlling acceleration, deceleration, and steering and by issuing an “alarm.” (*Id.*, [0027]-[0034], Figs. 1-2, 5, 7A-7B.) When determining whether to issue an alarm, Kudo first detects preceding vehicles and other objects such as “interrupting

vehicles” or “obstacles” ahead of the equipped vehicle. (*Id.*, [0027]-[0028], [0034]-[0035], [0039]-[0056].) Control unit then determines whether any detected “interrupting vehicles” or “obstacles” are within an “alarm area,” and if so, it issues an alarm by providing a message on “display 14,” issuing a voice message, and vibrating the steering wheel. (*Id.*, [0033]-[0045], [0053]-[0056], [0080]-[0084], Figs. 2-4; *see also* [0035]-[0079] (detailing alarm process).)

122. It would have been obvious for a POSITA to modify Arshad-Petrik to include a plurality of transducers, including proximity sensors such as the left and right CCD cameras, and use the data from them as taught by Kudo. A POSITA would have been motivated to include such cameras in Arshad-Petrik to be able to determine the distance to other vehicles and objects, and to (1) issue alarms when obstacles exist that are of concern to the driver, including obstacles in the forward path of the vehicle and (2) automatically adjust vehicle speed and steering where appropriate. Arshad and Petrik both disclose systems which, similar to Kudo, sense vehicle speed and automatically control engine components to automatically maintain a desired speed. (Arshad, [0044]-[0046]; Petrik, [0025]-[0026].) Thus, a POSITA would have understood that adding Kudo’s CCD stereo cameras to the Arshad-Petrik system would have simply been using a known component for its intended purpose, allowing Arshad-Petrik to consider the distance, or proximity, of other vehicles and objects when alerting the driver and controlling vehicle speed.

123. A POSITA would have understood Kudo's proximity sensors and generating of alerts based on data could be implemented in Arshad-Petrik in the same manner as other sensors that are included in Arshad-Petrik and used to generate alerts. For example, Arshad's engine controller 46 and I/O controller 52 are already configured to receive information from numerous sensors and inputs regarding operation of the vehicle, and can analyze received sensor information to determine if any actions are required. (Arshad, [0046]-[0050], [0054]-[0060], [0074].) Thus, Kudo's proximity sensors, when in Arshad, would likewise provide signals to Arshad's engine controller and/or IP controller (*e.g.*, slave control units), so that they could determine if there is a driving condition that may require a warning and have monitoring controller 38 (*e.g.*, master control unit) warn the driver if the condition requires a warning. This would have simply been providing additional information (proximity to other vehicles and objects) that is similar to information already provided (engine operating information) in the same manner by transmitting it over bus 44. (Arshad, [0064]-[0074].) Distance to other vehicles is the type of information Arshad already teaches that monitoring controller 38 would consider, because Arshad discloses "[c]ontroller 38" constantly monitors data from other controllers, including data "indicative" of "events" or "error conditions experienced" by the controllers. (*Id.*, [0042], [0069]-[0074].)

124. A POSITA would have been motivated to have engine controller 46 or

I/O controller send data regarding proximity to other vehicles to monitoring controller 38, so that it can receive this data and consider all vehicle operation information when issuing commands. For example, where the vehicle is traveling fast and there is a preceding vehicle a certain distance away, engine controller 46 can alert monitoring controller 38 regarding this condition and then wait for a command on what action to take. (*Id.*, [0043]-[0046], [0072], [0074].) Moreover, sending these signals from the proximity sensor to the engine controller for initial determinations would have been at least obvious to try, as the controllers in Arshad all have inputs and processing capabilities, and can send information back to monitoring controller for overall consideration. Having engine controller 46 or I/O controller send such a signal to monitoring controller 38 would also be consistent with Arshad's approach of keeping all controllers on bus in "constant communication with each other" (Arshad, [0064]), and allowing monitoring controller to determine the "priority" of the limit being exceeded before determining which actions the Arshad-Petrik system should take. (*Id.*, [0043]-[0045].)

125. A POSITA would have had a reasonable expectation of success, as the Arshad-Petrik system was ready for such improvement. The engine controller in Arshad-Petrik, similar to Kudo's control unit 5, can control vehicle speed, and a POSITA would have been motivated to include sensing and control for braking and steering as well. (Arshad, [0046]-[0050], [0074]; Kudo, [0018], Fig. 1.) As such, the

engine controller in Arshad-Petrik can continue functioning in the same way, sensing information relevant to engine operations, determining a driving condition that may require a warning, alerting the monitoring controller 38 of this, and receiving commands from the monitoring controller 38 to control the governor, throttle, fuel pump and engine speed in a manner that would maintain safe distances to a preceding vehicle. (Arshad, [0046]-[0050], [0074]); Kudo, [0024]-[0030].)

- b) Dependent Claim 15: *The driver authentication device of claim 2 further comprising a steering control module, a braking control module, and an acceleration control module configured to receive at least one instruction from said master control unit said instructions comprising at least one of: reducing said vehicles speed; increasing said vehicles speed; and altering said vehicles direction.***

126. Arshad-Petrik in view of Kudo renders obvious Claim 15.

127. Kudo discloses a steering control module, braking control module, and an acceleration control module. *See supra* Ground 1f, Claim 2. Kudo discloses a “power steering control unit 13” (*e.g.*, steering control module), “throttle control unit 10” (*e.g.*, acceleration control module), and an “automatic brake control unit 12” (*e.g.*, a braking control module.) (Kudo, [0024]-[0030].) For the reasons stated above, it would have been obvious for a POSITA to modify Arshad-Petrik to include a steering control module, braking control module, and acceleration control module, as taught by Kudo, and to have them receive commands from Arshad’s monitoring controller 38 (*e.g.*, master control unit), to provide for automatic cruise control of

the vehicle in a manner that maintains a safe distance when following a preceding vehicle. *See also supra* Ground 1f, Claim 2.

128. A POSITA would have understood such commands could be sent from the monitoring controller (either directly or through the engine controller) to a throttle, braking system, and steering control system, as taught by Kudo, to decrease or increase vehicle speed or alter vehicle direction based on monitored driving conditions. A POSITA would have had a reasonable expectation of success, as the monitoring controller already receives information from various sensors and controllers related to vehicle operation and issues commands to controllers to operate vehicle subsystems. Adding commands to steering control, acceleration control (which Arshad already discloses) and braking control systems would have merely been additional control of known vehicle sub-systems in a known manner and would have provided greater overall vehicle control within the driver's operational limits. (Arshad, [0046]-[0050], [0074].)

**7. Ground 1g: Arshad-Petrik in View of Victor Renders Obvious Claim 2**

129. I have reviewed Victor which is US2003/0181822. I understand that Victor was filed February 19, 2003 and published September 25, 2003. I understand Victor is prior art under at least pre-AIA 35 U.S.C. §102(b).

130. My review of the '149 Patent file history reveals that Victor was not considered during prosecution of the '149 Patent.

- a) **Dependent Claim 2: *The driver authentication and monitoring system of claim 1 further comprising: a plurality of transducers comprising at least one of proximity sensors, head movement sensors, and eye movement sensors wherein said transducers send signals to said slave control unit and said slave control unit determines if said signals are indicative of a driving condition requiring a warning and in turn signals said master control unit to alert said driver.***

131. Arshad-Petrik in view of Victor renders obvious Claim 2.

132. In the same field of vehicle monitoring, Victor discloses a system for “monitoring the physiological behavior of a driver” and issuing alerts when a driver is inattentive. (Victor, Abstract, [0026]-[0029], [0032]-[0035], [0048], Fig. 2, Cls. 1-2, 4.) Victor discloses transducers, including sensors for measuring a driver’s “eye movement,” “eye-gaze direction,” “eye-closure” and blinking amounts, “head movement,” and head position and orientation. (*Id.*, Abstract, [0026]-[0029], [0048], [0060], Fig. 2, Cls. 1-2, 4.) Victor further discloses sensors to detect the “traffic environment” around the vehicle, including “proximity detection means.” (*Id.*, [0060]-[0063], Cl. 12.)

133. The alerts in Victor’s system issued based on information from the sensors can be visual warnings to drivers like “displayed icons,” audible warnings, and driver-stimulation warnings like seat vibrations. (*Id.*, [0032]-[0044].) Victor’s system can also vary “collision” and “lane change” warnings based on whether the driver is “attentive” or not. (*Id.*, [0026], [0060]-[0063], Figs.12-13, Cl. 13.) The

system provides continuous feedback regarding driver attentiveness and stores “post-trip feedback” files accessible by fleet managers. (*Id.*, [0053]-[0056].)

134. It would have been obvious to a POSITA to include Victor’s eye movement, head movement, and proximity sensors in the Arshad-Petrik system and have them provide signals to the engine controller 46 (*e.g.*, slave control unit) to determine if the signals are indicative of a driving condition requiring a warning, and to signal the monitoring controller 38 (*e.g.*, master control unit) to alert the driver, because this would improve the safety and monitoring features in the Arshad-Petrik system. The engine controller 46 is already configured to receive information from numerous sensors regarding operation of the vehicle and can analyze received sensor information to determine if any actions are required. (Arshad, [0046]-[0050], [0074].) It would be obvious for the engine controller to further monitor the data from the sensors as taught in Victor, and to signal the master control unit if actions may be required. (*Id.*)

135. This would have simply been providing additional information (sensor data related to driver attentiveness or potential collisions) that is similar to information already provided (*e.g.*, vehicle operation information) in the same manner by transmitting it over bus 44. (Arshad, [0064]-[0074].) Driver attentiveness or potential collisions are the type of data Arshad teaches monitoring controller 38 would already consider, as Arshad discloses “[c]ontroller 38” constantly monitors

data from other controllers, including data “indicative” of “events” or “error conditions experienced” by the controllers. (*Id.*, [0042], [0069]-[0074].) This modification as taught by Victor would be the use of known components for their intended purpose to increase driver safety and monitor fleet vehicle operation. (*Id.*)

136. Furthermore, just as Arshad warns the driver when operating limits are approached or exceeded, it could also warn the driver or control operation of the vehicle, as taught by Victor, based on sensor data related to driver behaviors and proximity determination. (*Id.*; Victor, Abstract, [0026]-[0029], [0048], [0060], Fig. 2, Cls. 1-2, 4.) By monitoring driver attentiveness and proximity to other vehicles as taught by Victor, Arshad’s driver operation limitations could be adjusted to make driving behaviors safer. (*Id.*; Victor, [0044], [0060]-[0063].) For example, where Arshad’s engine controller determines the driver is inattentive or is very close to another vehicle, Arshad could reduce operational limits like maximum speed or instruct the engine controller to slow or disable the vehicle or reduce engine speed. (Arshad, [0044]-[0046].)

137. A POSITA would have been motivated to have engine controller 46 send data related to driver attentiveness and proximity to other vehicles to monitoring controller, because in this way the controller can process this feedback and consider all vehicle operation information when issuing commands. For example, where the driver is determined to be fatigue or not looking at the road, or

where a collision with a preceding vehicle is becomes more imminent, engine controller 46 can signal monitoring controller 38 of this occurrence and then wait for a command on what action to take. (*Id.*, [0043]-[0045], [0072], [0074].) Additionally, sending these signals from sensors to the engine controller for initial determinations would have been at least obvious to a POSITA to try, as the controllers all have inputs and processing capabilities, and can send information back to monitoring controller for overall consideration. Having engine controller 46 send such a signal to monitoring controller 38 would also be consistent with Arshad's approach of keeping all controllers on bus in "constant communication with each other" (Arshad, [0064]) and allowing monitoring controller to determine the "priority" of the limit being exceeded before determining which actions the Arshad-Petrik system should take. (*Id.*, [0043]-[0045].)

**8. Ground 1h: Arshad-Petrik-Victor in View of Kudo Renders Obvious Claim 15**

138. Arshad-Petrik-Victor in view of Kudo renders obvious Claim 15. Arshad-Petrik-Victor renders obvious Claim 2, and for the additional limitations of Claim 15, it would have been obvious to modify Arshad-Petrik-Victor to include steering control, braking control, and acceleration control modules, as taught by Kudo, to better manage and monitor fleet. *See supra* Ground 1f, Claim 15.

## **B. Grounds Based on Murphy**

139. I have reviewed Murphy which is U.S. Patent 6,225,890. Murphy was filed on March 20, 1998, and issued on May 1, 2001. I understand Murphy is prior art under at least pre-AIA 35 U.S.C. § 102(b).

140. My review of the '149 Patent history reveals that Murphy was not considered during the prosecution of the '149 Patent or its parent patents.

141. Murphy is directed towards “imposition or restrictions on or control of use, or inappropriate use, of a vehicle by a vehicle operator, in a manner that minimizes the possibility of evasion by a (restricted) operator.” (Murphy, 1:3-7.) Specifically, Murphy discloses a system that monitors a designated vehicle, authenticates the identity of a driver based on identity indicium (e.g., fingerprint and/or information on a token or smart card) and restricts use within certain operating parameters (e.g., time, location, and/or speed restrictions). (*Id.*, Abstract, 2:20-34, 5:18-26.) If the restrictions are violated, the system “takes at least one of 12 Control Actions” including “disable[ing] the vehicle at a selected time so that the vehicle no longer operates” or “reduc[ing] the vehicle speed to a selected speed range, using a vehicle ‘governor’.” (*Id.*, 5:29-60.)

**1. Ground 2a: Murphy Anticipates and Renders Obvious Claims 1, 8, 11-12, and 17-18**

**a) Independent Claim 1**

142. As viewed by a POSITA, Murphy anticipates or renders obvious independent Claim 1.

**(i) Claim 1[pre]: A driver authentication and monitoring system, comprising:**

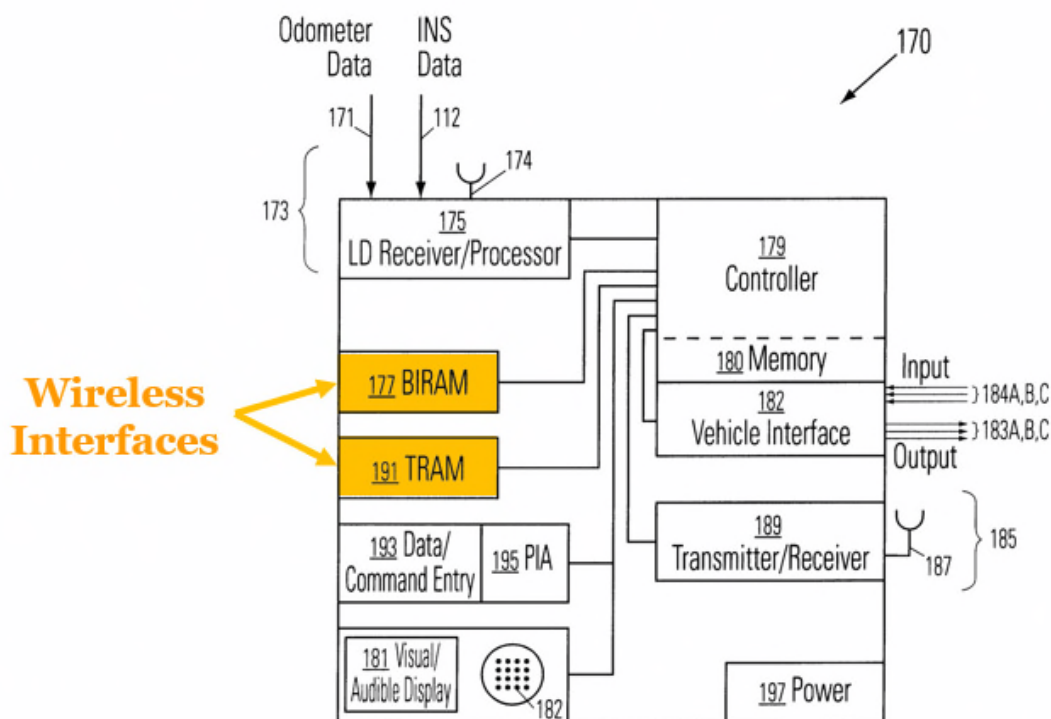
143. Murphy discloses the preamble of Claim 1 to the extent the preamble limits the scope of the claims. Murphy discloses “[a] **system** for restricting use of a vehicle by a selected vehicle operator to permitted time intervals and permitted vehicle travel corridors.” (Murphy, Abstract.) Murphy describes a system “used to **monitor operation of the vehicle** by a teenager or other inexperienced driver, with restrictions imposed with restrictions imposed upon vehicle operation channel, total vehicle mileage, vehicle maximum speed and/or time interval of operation of the vehicle.” (Murphy, Abstract, 15:1-8, 11:60-64, 19:3-12; *see also* Fig. 1, Figs. 6-7.). Murphy’s system also includes a “controller” that can “**authenticate**” drivers. (*Id.*, 13:28-42, 14:46-15:31, 6:55-7:29, Figs. 6-7.) *See infra* Ground 2a, Claim 1[B].

**(ii) Claim 1[A]: a wireless identification and data logging module;**

144. Murphy discloses and renders obvious Claim 1[A].

145. Murphy’s in-vehicle system can “authenticate” drivers via multiple interfaces, as depicted in Fig. 6, including (1) a “token receiving analysis

mechanism” (TRAM) and a “token or smart card” and (2) a “biometric indicium receiving and analysis mechanism” (BIRAM):



(Murphy, Fig. 6 (annotated), 13:28-42, 14:46-15:31, 6:55-7:24, Fig. 7.) Murphy can further include a “data entry module” (e.g., keypad) and “personal information analysis (PIA) module.” (Murphy, 14:55-65, 7:15-7:29, Cl. 39.) Similarly, Figure 7 depicts the same TRAM (205) and BIRAM (203). (*Id.*, Fig. 7, 7:24-29, 15:8-31.) For these reasons, and as I discuss herein, Figures 6-7 are largely the same and are simply different types of diagrams. As Murphy discloses, Figure 6 is a “schematic view of [an] apparatus,” whereas Figure 7 “illustrates” the “system.” (*Id.*, 3:13-16.)

146. For example, when a driver of the car or other vehicle “activates the vehicle by turning on the ignition system and thereby activates the driver control system,” Murphy’s system prompts the driver to “provide[] a sample of his/her ident indicium (a biometric indicium and/or token or keypad entries).” (*Id.*, Abstract, 7:49-54, Fig. 2, Abstract.)<sup>3</sup> Its TRAM can receive a “token or smart card (referred to collectively as a ‘token’ here)” with “personal information on the (putative) token holder and/or information on limitations under which the token holder can operate a vehicle” logged. (*Id.*, 6:55-7:14, 14:46-61; *see also* 2:32-34, Cl. 38.)<sup>4</sup> The “token or smart card” can be “insert[ed]” in or “**present[ed]**” to the TRAM. (*Id.*, 6:55-7:14.) These smart cards presented use contactless technologies such as radio frequency identification (RFID) technologies<sup>5</sup> to transmit data wirelessly to the reader. Because

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<sup>3</sup> Murphy states that “ident indicium” refers to “a biometric indicium and/or to a[n] information contained in a token and/or to information entered via a keypad, according to whatever is presented for identification.” (*Id.*, 7:24-29.)

<sup>4</sup> It would also have been obvious in view of Arshad for Murphy’s “identification and data logging module” to be wireless and log data. *See infra* Ground 2b, Claims 1, 4, 6.

<sup>5</sup> RFID smart cards has been used and well-known in the industry as of 1998. *See, e.g.,* <https://scispace.com/pdf/applications-and-opportunities-for-radio-frequency-45ehip8oar.pdf> (Moscow subway system using RFID smartcards in 1998), <https://pcac.org/app/uploads/2014/09/In-your-Pocket-Smart-Cards.pdf> (Washington D.C. metro system implementing RFID smartcards in 1998); U.S. Patent Application Publication 2008/0046739 (“Adams”), [0022], [0027]).

no physical insertion is required, the communication between the smart card and the TRAM occurs via wireless communication.

147. Similarly, Murphy's BIRAM can receive the driver's "thumbprint, fingerprint, handprint, partial or full facial image, retina, iris, voice sample, cursive signature, blood vein pattern, blood sample or other suitable biometric indicium." (*Id.*, Abstract, 4:39-5:12; *see also* 2:20-34, 16:50-17:2, Cl. 37.) A POSITA would understand that when Murphy's BIRAM receives a driver's "partial or full facial image, retina, iris, voice sample" to identify the driver, such an identification process includes wirelessly identifying the driver using her facial image, retina, or iris scan or a voice sample recording, because it includes contactless authentication. In this regard, Murphy further discloses that the BIRAM can be implemented using various "[s]ystems for obtaining and analyzing" biometric indicia, including a "portable fingerprint scanning apparatus that optically scans, **records**, and **transmits fingerprint images** over a **wireless** channel to a mobile unit for analysis and verification," as taught by US5,222,152 ("**Fishbine**"). (*Id.*, 17:63-19:2; Fishbine, Abstract, Fig. 1, 1:8-12, 3:4-4:51, 5:10-14, Cl. 1.)<sup>6</sup> Moreover, Murphy discloses "fingerprint images" in such "scanning apparatus" are "recorded" (*e.g.*, logged) using an "image recorder," enabling the images to be displayed by the apparatus and

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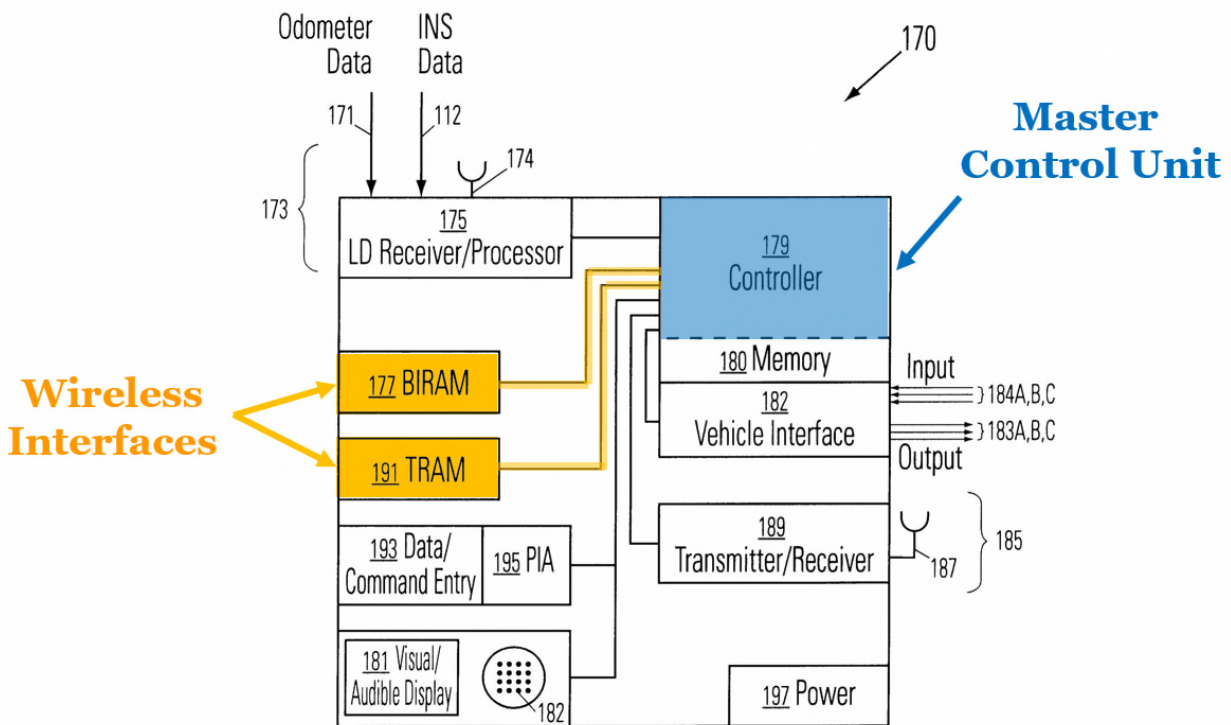
<sup>6</sup> I understand that Murphy incorporates Fishbine by reference and makes clear that it is part of Murphy's disclosure. (Murphy, 17:63-19:2.)

wirelessly transmitted to another device for identity verification. (*Id.*) Murphy's BIRAM logs other information too, including how many times the "driver fails to provide a legible/interrogatable biometric indicium." (Murphy, 6:35-39.) *See also infra* Ground 2a, Claim 1[D].

(iii) **Claim 1[B]: a master control unit in a motor vehicle for wirelessly authenticating at least one driver via said wireless driver identification and data logging module and associating an operating profile with said at least one driver;**

148. Murphy discloses and renders obvious Claim 1[B].

149. In Murphy's system, the "ident indicium" obtained from the wireless driver identification and data logging module (*e.g.*, TRAM and token, BIRAM) is "sent to the **controller** module 179 and associated memory module 180" for "**authenticating** the identity" of the driver:



(Murphy, Fig. 6 (annotated), 6:46-7:24, 13:36-40, 15:8-54, Fig. 7.) As I discussed in Claim 1[A], the authentication is wireless, because Murphy’s TRAM and BIRAM wirelessly receive the “ident indicium.” *See supra* Ground 2a, Claim 1[A]. The controller (*e.g.*, master control unit) “**compares** [the received] indicium **with indicia stored**” in the system (*e.g.*, in a “database with identities and matching indicia”) to identify the driver. (*Id.*, 5:12-24, 15:8-21; *see also* 2:26- 38, 7:49-63, 10:45-11:27, 14:46-65, 15:55-16:11, 16:50-17:62, Figs. 2-3, 6.)

150. Murphy’s system authenticates and monitors “restricted operators” (“ROs”). (Murphy, 1:9-28.) In Murphy, an operator may be “restricted” because she has “physical, mental or emotional impairment,” “recent convictions” for “driving

under the influence of alcohol or drugs,” is of “advanced age” or “very young,” or is “transport[ing] hazardous materials.” (*Id.*, 1:9-28, 3:20-47.) In other words, Murphy is designed to monitor and control vehicle use when a high risk driver is involved. For example, a “very young” driver may have “not yet acquired” safe “driving and reaction skills,” and therefore poses a high risk if she is allowed to freely operate a vehicle. (*Id.*, 3:20-47.) Murphy contemplates reducing the risk posed by high risk drivers by, for example, only allowing them to operate the vehicle “within a permitted travel corridor,” such as “to commute to and from work during restricted workday hours.” (*Id.*)

151. Murphy’s system can divide drivers into categories, including (1) ROs (“restricted operators”) and (2) drivers who are “identified and authorized[] but not an RO,” as well as (3) “unidentified” drivers, (4) drivers whose “identification indicium (presented) is too degraded to permit determination of the driver’s identity,” and (5) drivers who have “failed to present a sample of the requested identification indicium.” (Murphy, 7:64-8:2, 2:35-53; *see also* 1:66-2:16, Fig. 2, 3:20-47, 7:49-9:44, 5:18-26, 11:60-67, 17:3-13.) Different drivers have different “operating profiles.” “***Different driving restrictions*** are imposed[] depending upon the category to which the operator belongs,” including on “permitted time intervals and permitted travel corridor(s) and speeds for travel.” (Murphy, 7:64-8:2, 2:35-53; *see also* 1:66-2:16, Fig. 2, 3:20-47, 7:49-9:44, 5:18-26, 11:60-67, 17:3-13.) In other

words, for example, if a driver is categorized in the system as a restricted operator, she may be limited to driving at certain times of the day and limited to low speeds, whereas identified and authorized drivers who are not categorized as restricted operators may be able to drive for longer periods of the day and with higher speed restrictions. Similarly, as an additional example, drivers who are categorized as “unidentified” may be limited to driving only in certain nearby corridors or areas.

152. Drivers can also be assigned with their own “**individualized**” driving restrictions, such as individualized restrictions limiting “maximum speed,” “geographic region” and “routes,” “maximum accumulated” mileage and time, and “time intervals” when the vehicle can be driven. (*Id.*, 6:8-17, 17:14-29; *see also* 15:66-16:11, 17:14-29, 6:55-7:14, Fig. 2, 8:29-53, Fig. 3, 10:45-11, Abstract, Claims 3, 10.) That is, in addition to allowing driving restrictions to be imposed on different categories of drivers, Murphy allows additional driving restrictions to be imposed on each individual driver. For example, driver John Doe may be limited to driving at a maximum speed of 50 mph and driving from 9 am – 5 pm, whereas driver Jane Doe may be limited to driving at a maximum speed of 65 mph and driving from 8 am – 8 pm.

153. Murphy’s driving restrictions for each driver, whether they are “individualized” for the specific driver or are based on the category or classification of the driver (or both), are an “operating profile,” because they specify how the

driver can operate the vehicle based on the restrictions. Murphy discloses that the “operating profiles” for different drivers can be stored in a “database” or “memory” in its system that the controller can access. (*Id.*, Fig. 6, 13:35-41, 14:51-65, 15:55-16:11.) Similarly, Murphy teaches that the operating profiles can be stored in other components as well, such as in a “schedule module 211” which is separate from the controller and which provides the profile restrictions to the controller for use. (*Id.*, 15:8-31 (discussing schedule module storing “limitations on operation for each authorized vehicle operator”), Fig. 7.) Notably, Murphy further discloses that “[f]or *each authorized driver* whose name or other identifying characteristics are contained in the database that is part of the controller module 209, *information in one or more of the following categories may be stored* in the database: (1) name or other identifier; (2) corresponding ident indicium or indicia; (3) schedule applicable to driver; (4) actual range of vehicle locations; (5) actual range of vehicle speed; (6) actual times of vehicle operation; (7) present ‘state’ of the vehicle (vehicle loaded/unloaded, type or vehicle load, passengers present, etc.); and (8) corresponding Control Actions applicable to various circumstances. This information *may be contained in the controller module 209 and/or the schedule module 211 and/or the vehicle activity log module 217.*” (*Id.*, 15:65-16:11.)

154. Once a driver is authenticated by Murphy’s system, the controller accesses her associated profile and permits her to operate the vehicle in accordance

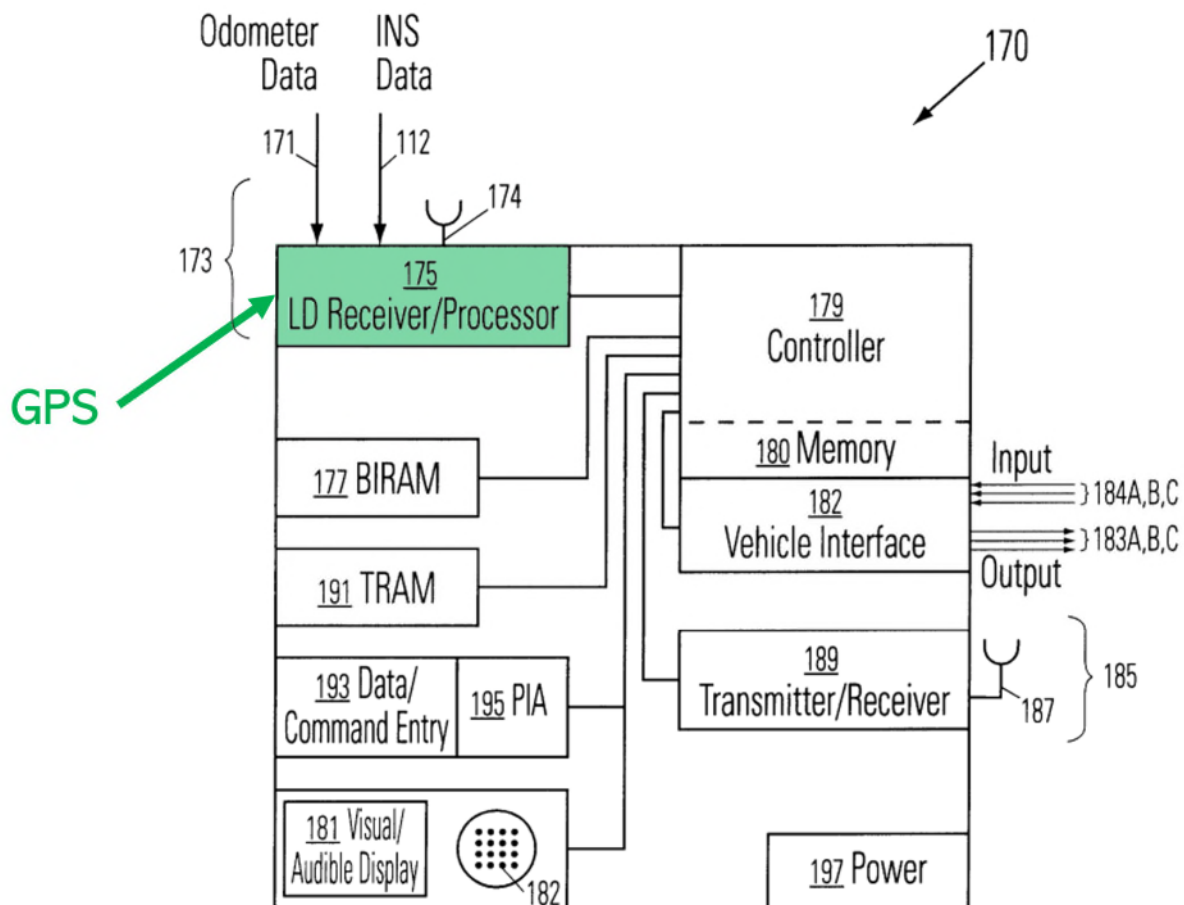
with it. In particular, when “[ident] indicum is satisfactorily presented and analyzed, the system allows operation of the vehicle” and will monitor “whether the vehicle location and/or speed are within **permitted ranges for the driver** and... whether the present time and/or accumulated time or mileage are within **permitted ranges for the driver.**” (*Id.*, Abstract, 8:28-49, Fig. 2; *see also* 2:46-53, 5:13-28, 6:55-7:14, 7:49-8:14, 8:54-61, Fig. 3, 10:45-11:19.) The controller can access the “**limitations** on vehicle operation **for each** authorized vehicle **operator**” and can use this and vehicle information to “determine[] which Control Action(s), if any, should be imposed.” (*Id.*, 15:9-42, Fig. 7; *see also* 13:53-16:17, Fig. 6, 17:14-62, 12:6-27.) *See infra* Ground 2a, Claim 1[F].

(iv) **Claim 1[C]: a GPS module providing at least location and speed information in association with movement of the motor vehicle;**

155. Murphy discloses Claim 1[C].

156. Murphy discloses that a “location determination (LD) module” that is “part of an LD system, **such as GPS**, GLONASS, LEO, Iridium or LORAN, including an LD signal antenna [] and an LD signal receiver/processor connected to the antenna [], is located on the vehicle [].” (Murphy, 3:48-64.) Murphy further discloses “the LD module [] **determines the present location, present speed...** and observation time... of the antenna [], and thus **of the vehicle** [], in a manner well known in the art.” (*Id.*) Murphy’s LD module can be integrated into its system, and

“[i]nformation on... vehicle location and/or... speed and/or... time and/or accumulated operating time and/or... mileage is sent by the LD module 173 to the controller module 179” for determining whether to take control actions. (*Id.*, Fig. 6 (annotated below), 3:48-64, 13:28-65; *see also* Abstract, Fig. 2, 7:49-9:44, 14:23-45, Fig. 7, 15:32-54, 3:64-4:38, Fig. 5, 13:11-26, Claims 1, 10.) One can also see from Figure 6 below that the LD module 175 (*e.g.*, GPS module) is connected and in communication with the controller 179:



(*Id.*, Fig. 6 (annotated), 13:28-65; *see also* Abstract, 14:23-45, Fig. 7, 15:32-54, 3:64-4:38, Fig. 5, 13:11-26, Cls. 1, 10, Fig. 2, 7:49-9:44.) Murphy’s information on vehicle location and/or speed and/or time provided by the LD module thus includes “location and speed information in association with movement of” the vehicle. That is, the location and speed information are determined by the GPS as the vehicle moves. (*See also id.*, Fig. 2 (showing feedback loop that system repeatedly determines vehicle location and speed to assess whether each location and speed as vehicle travels are within permitted ranges), 7:49-9:44, Claim 10 (reciting “when said **vehicle is in motion**, determining the present speed of said vehicle”).

(v) **Claim 1[D]: a data logging device recording vehicle operation data associated with a use of said motor vehicle by said at least one driver comprising at least said location and speed information from said GPS module; and**

157. Murphy discloses Claim 1[D].

158. Murphy’s system includes an “**operations log**” that includes “**periodic recording of the present observation time, vehicle location and/or vehicle speed in a memory ...**” (Murphy, 12:1-5, 15:42-54, Fig. 7; *see also id.*, Fig. 6, 13:53-15:65, 14:18-22.) The operations or vehicle activity log thus records both vehicle “location” and “speed” information from the LD (*e.g.*, GPS) module. It also allows the vehicle location and speed from the LD module to be stored for “subsequent review and analysis if desired” (including when the driver violates her profile) and “copied from

or removed from the system for subsequent analysis or storage.” (*Id.*, 5:52-54, 15:42-16:11, Fig. 7.)

159. Murphy discloses that the same speed and location data stored in the “vehicle activity log” may also, or alternatively, be recorded in “the controller module 209 and/or the schedule module 211....” (*Id.*, 15:66-16:11.) The controller module 209 and schedule module 211 are thus further examples of “data logging device[s]” which record location and speed data from the LD module (GPS) of Murphy.

160. Moreover, Murphy discloses that “vehicle location and selected status parameters” from the LD module can be stored in a remote “base station” for use in determining whether to take “control actions” remotely. (*Id.*, 4:15-27, 1:66-2:24, 16:30-49.) As discussed, status parameters from the LD (or GPS) module in Murphy include vehicle location and speed. Thus, the “base station” is another example of the claimed “data logging device,” as it is a remote computer that is part of Murphy’s “system” that can record vehicle operation (including location and speed) from Murphy’s LD (or GPS) module.

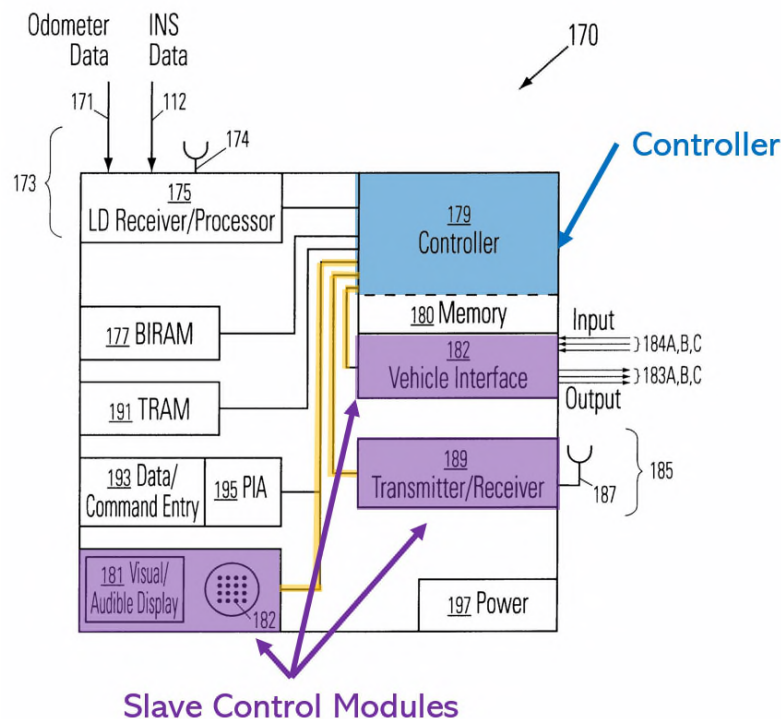
- (vi) **Claim 1[E]: a slave control unit in said motor vehicle and in communication with said master control unit, said slave control unit configured to receive commands from said master control unit and to generate an alarm signal if said at least one driver violates said operating profile unique to said at least one driver thereby providing feedback about said vehicle usage;**

161. Murphy discloses Claim 1[E].

162. Murphy discloses “slave control units” installed in its in-vehicle system that (a) are in communication with and receive commands from the controller and (b) generate an “alarm signal”<sup>7</sup> if the driver violates her profile, thereby providing feedback about the vehicle usage. For example, Murphy has numerous “modules” in communication with its controller, including: (x) a “vehicle [or control action] interface module,” (y) a “visual and/or audible display [or feedback] module” and (z) a “telecommunication module”:

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<sup>7</sup> The ’149 broadly describes that the “alarm signal 445 can result in an actual audible alarm, or it can be used to control/govern operational aspects of the vehicle.” (’149, 7:45-63.)



(Murphy, Fig. 6 (annotated); *see also id.*, 13:28-15:8, Fig. 7, 15:1-54, 16:12-16:49.)

The vehicle interface and controller modules are in “communication” with each other, including about “which Control Action(s), if any, should be imposed” and whether “vehicle components” have been “acivat[ed].” (*Id.*)

163. Murphy’s system can take different “Control Actions” if a driver violates her profile, including:

- (1)...disabl[ing] the vehicle at a selected time so that the vehicle no longer operates...
- (2)...disabl[ing] use of selected vehicle accessories...
- (3)...reduc[ing] the vehicle speed to a selected speed range...
- (4)...forc[ing] the vehicle to operate only in selected lower gears...
- (5)...turn[ing] on at least one of the lights, exterior flashers and

horn continuously or periodically... **(6)**...activat[ing] an on-board alarm the is visually or audibly perceptible to a person outside the vehicle... **(7)**...transmit[ing] an alarm (optionally silent) to a selected facility that is spaced apart from the vehicle... **(8)**...activat[ing] an air bag or other disabling device on the driver's side of the vehicle... **(9)**...allow[ing] the vehicle to operate for at most a selected cumulative time interval... **(10)**... allow[ing] the vehicle to operate only within one or more selected time intervals... **(11)**...allow[ing] the vehicle to operate for at most a selected cumulative vehicle mileage... and **(12)**...tak[ing] no action at that time but optionally log[ging] the activity and allow[ing] the driver to operate the vehicle without restriction for a selected time interval.

(Murphy, 5:13-54; *see also* 17:30-63, 6:1-18.)

164. Murphy's controller (*e.g.*, master control unit) performs a "comparison" of vehicle location, speed, time, and accumulated operating time and mileage with "vehicle operation restrictions that may be imposed" on the driver, and if it determines the driver has violated her profile and a "Control Action" should be "imposed on vehicle use," it "communicates this information to a Control Action [or vehicle] interface module 215 for implementation." (*Id.*, 13:28-14:22, 15:9-16:11, 13:66-14:17, Figs. 6-7; *see also* 16:50-17:63, Cls. 1, 10, Abstract, 1:66-2:6,

2:20-53, Figs. 2-3, 7:49-9:44, 10:45-11:27.) If the vehicle interface module (*e.g.*, slave control unit) receives such a command, it will generate an “alarm signal” by “controlling or restricting operation” of the “vehicle component[s], such as vehicle engine, vehicle transmission system, vehicle fuel supply, vehicle power supply and accessories...” that are connected to its “output terminals” and that are to be controlled—thereby providing feedback. (*Id.*; *see also* 15:55-16:11, 16:50-17:63, Cls. 1, 10, Abstract, 2:20-53, Fig. 2, 7:49-9:44, Fig. 3, 10:45-11:27.)

165. Likewise, the controller can command the “display [or feedback] module” to “announc[e] or visually display[]that a violation has occurred...,” providing feedback to the driver. (*Id.*, 5:29-60, 13:61-65, 15:47-50, Figs. 6-7, 12:6-15, 10:29-40.) The controller can also command the telecommunication module 185 to transmit a “selected **alarm signal**” to an “information processing facility” when a driver violates her profile, providing feedback to personnel at the remote facility. (*Id.*, 14:23-45, Fig. 6, Abstract, 2:6-9, 12:16-27, 4:15-27; *see also* Cls. 7, 9, 12, 15, 18.)

(vii) **Claim 1[F]: wherein said master control unit permits said at least one driver to operate said vehicle within said operating profile if said master control unit receives at least one of a unique identification code to permit said at least one driver to operate said vehicle within said operating profile and said at least one driver has not violated said operating profile.**

166. Murphy discloses Claim 1[F].

167. Murphy's controller (*e.g.*, master control unit) receives a "unique identification code" that allows a given driver to operate the vehicle using her "operating profile." In the scenario of the TRAM and token, Murphy teaches its token can be "***specific to the person*** who presents" it, has "built into it a ***circuit or pre-programmed information*** in a storage medium that imposes selected restrictions on operation of the vehicle and/or ***that identifies the token holder,***" and may rely upon "digitized data" that is "***encoded*** or encrypted" and stored in its memory. (*Id.*, 6:55-7:14; *see also* 2:33-34, 14:46-54, Cl. 38.) Thus, the token provides a "unique identification code," which is sent to the system and controller via the TRAM, in the form of "encoded" or "pre-programmed" "information" that is "specific to" and "identifies the token holder." That the token can be used to authenticate and identify a driver likewise confirms this. For example, if the token did not provide a unique code to identify the driver, then the system could not use it to identify the "token holder" and distinguish her from other drivers. Similarly, the BIRAM can receive "***samples*** of an ***ident indicium***" unique to the driver, such as, a "fingerprint," "facial scan," and "voice sample." (*Id.*, Abstract, Cl. 37, 2:20-45, 4:39-5:28, 6:46-54, 15:55-16:28, 16:50-17:2, 17:63-18:19; *see also* 7:15-24.)<sup>8</sup>

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<sup>8</sup> After its identifier module receives "ident indicium" from the BIRAM, TRAM, or PIA, Murphy will transmit the "ident information, ***or a representation thereof,***" to the controller for comparison. (Murphy, 15:9-21.)

168. Once controller authenticates the driver, *see supra* Claims 1[A]-1[B], it permits her to operate the vehicle in accordance with her profile. Specifically, when “[ident] indicum is satisfactorily presented and analyzed, the system allows operation of the vehicle” but will monitor “whether the vehicle location and/or speed are within ***permitted ranges for the driver*** and... whether the present time and/or accumulated time or mileage are within ***permitted ranges for the driver.***” (Murphy, Abstract, 8:28-49, Fig. 2; *see also* 2:46-53, 5:13-28, 6:55-7:14, 7:49-8:14, 8:54-61, Fig. 3, 10:45-11:19.) The “controller” can receive the “***limitations*** on vehicle operation ***for each*** authorized vehicle ***operator***” and can use information it receives on the status of the vehicle (*e.g.*, location, speed, time) “for comparison... with any vehicle operation ***restrictions that may be imposed on an identified []***” driver. (*Id.*, 13:53-65, 14:46-65, 15:9-36; *see also* Figs. 6-7, 15:66-16:11, 17:14-29, 12:6-27.)

169. For example, if Murphy’s system determines “present vehicle location and/or speed” is not within a “permitted travel region and speed range corresponding to a permitted time interval” for the driver, then the controller module can use this and the “corresponding Control Actions applicable to various circumstances” for the driver to determine what control action to take. (*Id.*, 5:12-60, 15:55-16:11; *see also* 16:50-17:63, Cl. 10.) If the controller determines that the “corresponding Control Action” for such a situation is to “reduce[] the vehicle speed to a selected speed range, using a vehicle ‘governor’ or some other suitable approach,” then it will send

such a command to the vehicle interface module, which in turn will cooperate with the appropriate “vehicle component[s]” to reduce the vehicle’s speed accordingly. (*Id.*; *see also* 13:66-14:17, 15:9-54, Figs. 6-7.) If it determines the driver is not operating the vehicle within her “operating profile,” then “vehicle operation is temporarily disabled, or a coded alarm signal is transmitted, or other appropriate control actions are taken,” such as reducing vehicle speed. (*Id.*, Abstract, 5:29-60, Fig. 2, 13:53-14:17.) *See supra* Ground 2a, Claim 1[E].

- b) **Dependent Claim 8: *The driver authentication device of claim 1 wherein said master control unit is further configured for wirelessly receiving data indicative of a speed of said motor vehicle, a location of said motor vehicle, and a time of day from at least one of: a WIFI source; an RF source; a Bluetooth source; and a smart-road network source.***

170. Murphy anticipates and renders obvious Claim 8.

171. In Murphy, LD module includes an “LD signal antenna” for receiving “LD signals” wirelessly transmitted from “satellites or transmitting ground-based towers”—*i.e.*, “RF sources.” (Murphy, 3:48-64, 13:28-65, Fig. 6.) As I discussed above, satellites send radio frequency signals. And, a POSITA would understand that ground-transmitting towers are ground-based radio transmission towers. These “LD signals” are “data indicative of” vehicle speed and location and time of day, and are used to “determine[] the present **location**, present **speed** (optional) and observation **time** (optional).” (Murphy, 3:48-4:38.) Further, the LD module

“communicates this information to the controller” (e.g., master control unit). (*Id.*, 15:32-54.) The controller and LD module can also “coincide or both be parts of a larger module ...” (*Id.*, 14:17-22.) *See also supra* Ground 2a, Claim 1[C].

- c) **Dependent Claim 11: *The driver authentication module of claim 1 further comprising an alarm module configured to wirelessly receive data from at least one of said master controller, said slave controller, and said GPS module wherein said alarm module is further configured to present at least one of location data, speed data, and infraction data in real time.***

**Dependent Claim 12: *The driver authentication module of claim 11 wherein said alarm module comprises at least one of: a cellular telephone; a smartphone; a computer; a vehicle integrated wireless communication device; a WIFI enabled device; an RFID enabled device; and a Bluetooth enabled device.***

172. Murphy anticipates and renders obvious Claim 11-12.

173. Murphy’s system includes a remote “monitoring station” (e.g., an alarm module comprising a computer) that present “infraction data” that is received wirelessly from the in-vehicle system and controller. (Murphy, 5:13-60, 16:11-49, Fig. 6, 14:23-45, Abstract, 4:15-27, 17:30-63, Cls. 1, 12, 20, 30.) The controller is continuously determining “vehicle **present** location and velocity and **present** time” and determining if these are within “permitted ranges” in a loop. (*Id.*, Figs. 2-4, 7:12-13:10.) If the controller determines they are not, it can cause the telecommunication module to transmit an “alarm signal” over “suitable communication systems” (e.g., wireless networks) presented at the remote monitoring station. (*Id.*) That is, when

the alarm signal including the data is wirelessly sent to, and received at, the remote monitoring station, the signal and information in the signal are “presented” to a computer at the monitoring station. This computer at the remote monitoring station can read the sent, or presented, alarm signal. In response to being presented with the alarm signal, the remote station can take various actions, including “modify[ing], add[ing], or delet[ing] vehicle operation restrictions.” (*Id.*) *See also infra* Ground 2a, Claim 18.

- d) **Dependent Claim 17: *The driver authentication and monitoring system of claim 1, wherein said operating profile comprises at least one operating parameter including at least one of: a maximum allowable vehicle speed; an allowable vehicle location; allowable hours of operation; and a seatbelt usage.***

174. Murphy anticipates and renders obvious Claim 17.

175. In Murphy, driver operating profiles include “***parameters for vehicle operation***,” including restrictions on (a) “selected maximum speed” (*i.e.*, maximum allowable vehicle speed), (b) “selected geographic region” and “specific routes” (*i.e.*, allowable vehicle locations), and (c) “one or more selected time intervals during the day, or to selected days of the week” (*i.e.*, allowable hours of operation). (Murphy, 17:14-28, 14:40-45, Abstract, 5:12-54, 11:60-67, 2:46-53, 6:8-17, Fig. 2, 8:5-67, 12:16-35, 15:66-16:11.) *See supra* Ground 2a, Claim 1[B].

- e) **Dependent Claim 18: *The driver authentication and monitoring system of claim 1 wherein said slave control unit generates an alarm signal for remotely alerting said authorized user when said at least one driver violates said operating profile.***

176. Murphy anticipates and renders obvious Claim 18.

177. In Murphy, the system monitors whether a driver is operating the vehicle in accordance with her profile, and, if the driver violates her profile, takes one or more of a variety of “control actions,” including generating “alarm signals.” *See supra* Ground 2a, Claim 1[E]. If the system determines the “present time” is not within “permitted time intervals” or the “vehicle present location and/or speed” is not within the driver’s “permitted travel region or speed range,” the system can cause (1) the telecommunication module to “**transmit[] a selected alarm signal to a selected facility** that is spaced apart from the vehicle” (e.g., alert authorized personnel at the remote facility); and (2) the vehicle interface module to “activate[] an on-board alarm the [sic] is visually or audibly perceptible **to a person outside the vehicle**” (that is, alert others such as other authorized drivers who may be present, like parents). (Murphy, 5:13-60, Cl. 1, Abstract, 17:30-63, Cl. 20, 2:6-9, 4:15-27, 12:8-12, 13:60-65, 14:23-45, 15:37-50, 16:11-49, Figs. 6-7.) *See also supra* Ground 2a, Claims 1[E], 11-12.

**2. Ground 2b: Murphy in View of Arshad Renders Obvious Claims 1, 4-8, 11-12, and 17-18**

178. As viewed by a POSITA, Murphy in view of Arshad renders obvious independent Claims 1, 4-8, 11-12, and 17-18.

**a) Claims 1, 4**

179. Murphy discloses Claims 1[pre]-1[F]. *See supra* Ground 2a, Claim 1. Additionally, regarding Claims 1[B] and 4, it would have been obvious to configure Murphy's token as a wireless RFID transponder. Arshad discloses an RFID transponder that, like Murphy's token, identifies the individual carrying it. *See supra* Ground 1a, Claims 1[A], 1[F], 4. And similar to Murphy's token, Arshad's RFID transponder stores driver operating limitations that are loaded from the transponder to a "master control unit." *See supra* Ground 1a, Claim 1[A]-[B], [F].

180. It would have been obvious to configure Murphy's token "presented" to its reader as an RFID transponder as in Arshad. Such a configuration would be the use of a known technology for its intended purpose—transferring information stored on a small device carried by a user to a control unit in a vehicle. A POSITA would have had a reasonable expectation of success, as this would have simply required configuring Murphy's token with the transponder circuit described in Arshad, and configuring Murphy's TRAM to include a reader circuit (such as Arshad's reader circuit 14 connected to antenna 58) which can transmit and receive

RF signals for their intended purposes. (Arshad, [0030]-[0034].) This would be one well-known method for Murphy to “present” the token to its reader.

181. Implementing Murphy’s token as an RFID transponder would have allowed Murphy to continue its normal operation. For example, Arshad discloses that an RFID transponder can store the same types of identifying and restriction information as Murphy’s token. *See supra* Ground 1a, Claims 1[A]-1[B]. Moreover, a POSITA would have been motivated to implement Murphy’s token as an RFID transponder so it can be read when the driver is near the vehicle, thereby speeding up the authentication process. (Arshad, [0035].) For example, instead of the driver having to physically present the token close to the TRAM, the transponder could transmit its identification number when the driver approaches the vehicle or immediately after the driver enters the vehicle. The authentication process could then start and be completed before the driver is ready to start and operate the vehicle. And, implementing Murphy’s token as an RFID transponder would allow vehicle operation information to be transmitted back to, and stored on, the transponder as a record that could later be read by someone monitoring Murphy’s “restricted operators.” (Arshad, [0027]; Murphy, 1:9-27.) Murphy already suggests such a modification, because driver performance data can be stored for “subsequent review and analysis” and “copied from or removed from the system for subsequent analysis or storage.” (Murphy, 15:42-16:11, Fig. 7, 5:52-54.)

- b) **Dependent Claim 5: *The driver authentication device of claim 4 wherein said wireless identification and data logging module is further configured to wirelessly load said operating profile for said at least one driver into said master control unit.***

182. Murphy in view of Arshad renders obvious Claim 5. Murphy, as modified by Arshad, includes an RFID transponder and corresponding reader circuit, renders obvious wirelessly loading a driver's operating profile to Murphy's master control unit. *See supra* Ground 1a, Claim 5; Ground 2b, Claims 1, 4.

- c) **Dependent Claim 6: *The driver authentication device of claim 4 wherein said wireless identification and data logging module is further configured to wirelessly receive driver specific vehicle performance and infraction data from said master control unit.***

**Dependent Claim 7: *The driver authentication device of claim 6 wherein said wireless identification and data logging module is further configured to present said driver specific vehicle performance and infraction data.***

183. Murphy in view of Arshad renders obvious Claims 6-7.

184. Regarding Claim 6, Murphy already includes “an ***operations log, including periodic recording of the present*** observation time, ***vehicle location and/or vehicle speed in a memory***” (Murphy, 12:1:5, Fig. 6, 13:53-15:65, 14:18-22.) *See supra* Ground 2a, Claim 1[D]. Further, it can include a recording of operating profile violations, which are infractions where the driver operated the vehicle outside allowed limits or parameters, such as when the driver operates the vehicle outside of permitted times, speed, and/or locations. (Murphy, 5:12-54

(noting control action (12) includes logging the violation “activity”).) Murphy’s logged data can be stored for “subsequent review and analysis” and “copied from or removed from the system for subsequent analysis or storage.” (Murphy, 15:42-54, Fig. 7, 5:52-54; *see also* 15:66-16:11.)

185. As discussed above, Arshad discloses that similar data regarding driver performance can be wirelessly sent from a monitoring controller (*e.g.*, master control unit) to an RFID driver identification and data logging module. *See supra* Ground 1, Claims 1[B], 6. It would have been obvious to modify Murphy to implement its token as an RFID transponder, including so that driver performance information and profile violation events can be stored on the transponder for later review outside of the vehicle and by individuals other than the driver. *See* Ground 2b, Claims 1, 4. This could include, for example, allowing a fleet manager to read the transponders of fleet drivers at the fleet manager’s computer, and check to see if the drivers violated their profiles. This would allow fleet managers to keep track of which drivers are operating within profiles, and what types of infractions drivers are incurring and the severity of those infractions.

186. With regard to Claim 7, Murphy’s system as modified by Arshad includes an RFID transponder having stored driver performance and infraction data. *See* Ground 2b, Claim 6. Such a transponder is configured to present, or send, the performance and infraction data to any RFID reader device, including for later

review and analysis outside of the vehicle. Again, this could include the transponder presenting the driver performance and infraction data stored thereon to a reader connected to a fleet manager's computer, so that the fleet manager can track the performance and violations of the fleet drivers. The fleet manager could take into account such information when assigning drivers tasks, and in evaluating employee (fleet driver) performance. *See also supra* Ground 1a, Claim 7.

**d) Dependent Claims 8, 11-12, and 17-18**

187. Murphy in view of Arshad renders obvious Claims 8, 11-12, 17-18. *See* Ground 2a, Claims 8, 11-12, 17-18.

**3. Ground 2c: Murphy (Alone or with Arshad) in View of Karsten Renders Obvious Claim 3**

**a) Dependent Claim 3: *The driver authentication and monitoring system of claim 1 further comprising: an impairment sensor wherein said slave control unit receives signals from impairment sensor and prevents said motor vehicle from starting when said transducer senses driver a driver impairment above a prescribed limit.***

188. Murphy (alone or with Arshad) in view of Karsten renders obvious Claim 3.

189. In the same field of vehicle monitoring, Karsten discloses using a driver impairment and identification device that “prevents operation of a vehicle when an operator’s breath alcohol concentration is above a predetermined threshold limit or when the operator’s identity is not verified.” (Karsten, Abstract, [0011], [0043]-

[0045], [0027]-[0029], [0017], Figs. 1-2.)

190. Karsten discloses a “breath alcohol detection device” that senses “breath alcohol content (BrAC)” for use with a vehicle and provides this information to an “interlock microprocessor 610.” (*Id.*, [0006], [0012]-[0014], [0042]-[0043].) The “interlock microprocessor” is part of an “ignition interlock apparatus 150” which can “generat[e] an enable signal” or a “disable signal” to the vehicle’s ignition via a “relay.” (*Id.*, [0017], [0028], [0043]-[0044], Figs. 1-2.) If the BrAC reading exceeds a prescribed limit or “pre-programmed BrAC threshold,” “the vehicle is not permitted to start.” (*Id.*, [0042]-[0043].) Likewise, if the driver’s identity is not verified, such as by analyzing sensed skin characteristics, the vehicle is prevented from being started. (*Id.*, [0026]-[0030], [0037]-[0043].)

191. It would have been obvious to a POSITA to include the breath alcohol impairment detection device of Karsten in the Murphy system, because this would improve the safety and monitoring features in the system. This would have been the simple addition of a known component (*e.g.*, a breathalyzer) into a similar driver authentication and monitoring system for the achieving its intended purpose – enhancing driver safety by preventing intoxicated drivers from starting a vehicle.

192. Furthermore, Murphy was ready for modification in this regard, and a POSITA would have had a reasonable expectation of success in implementing Karsten’s breath alcohol detection sensor in the Murphy system. For example,

Murphy's vehicle interface module (*e.g.*, slave control unit) is already connected to various vehicle components via its "input" and "output" terminals and can take actions based on information from sensors indicating activity. (Murphy, 13:65-14:17.) For example, if the vehicle interface module detects use of "vehicle components (doors, ignition, alarm system, vehicle cargo, accessories, etc.) whose activation may indicate that someone is preparing to drive the vehicle," it can "activate a driver interrogation sequence." (*Id.*) Similarly, the vehicle interface module can send signals to components, including vehicle "engine" and "power supply" for "controlling or restricting operation of the vehicle." (*Id.*) A POSITA would have been motivated to connect the breathalyzer of Karsten to Murphy's vehicle interface module, or "slave control unit," allowing it to prevent the "driver interrogation sequence" (and thus vehicle) from being activated or to "disable" the engine, in each case if the driver's impairment was above the prescribed limit, as taught by Karsten.

193. For example, a POSITA would have understood that dispatchers would be concerned with drivers operating fleet vehicles while intoxicated. To prevent this, a POSITA would have understood that, as taught by Karsten, a simple solution is to provide an alcohol detection device in the vehicle and require the driver to prove their blood alcohol is below a certain limit before allowing the vehicle to start. This would help to ensure drivers are in an appropriate condition to operate their vehicles,

and that the driver is not cheating by having someone else take the breath test for them. This fits with Murphy's teachings of identifying the operator before allowing vehicle operation, as Karsten similarly teaches that the driver must both verify their identify and pass the breath test before the vehicle can be started. (Murphy, 2:19-53.)

**4. Ground 2d: Murphy (Alone or with Arshad) in View of Petrik Renders Obvious Claims 9-10**

194. Murphy (alone or as modified by Arshad) renders obvious Claims 9-10.

- a) ***Dependent Claim 9: The driver authentication device of claim 8 wherein said master control is configured for wirelessly receiving data indicative of a speed limit associated with a road said motor vehicle is currently traveling on from at least one of: a WIFI source; an RF source; a Bluetooth source; and a smart-road network source.***

195. With regard to Claim 9, Murphy discloses driver restrictions including different permitted "travel corridor(s) and speeds for travel," "maximum speed," "geographic region[s]," and filed routes. *See supra* Ground 2a, Claim 1[B]. Thus, Murphy already considers having both permitted speeds and permitted travel corridors, routes, or regions where the driver is allowed to operate.

196. In a similar field, Petrik discloses a remote facility (*e.g.*, Command Centre) maintaining a database including "a geographical speed zone locations table of every speed zone as displayed by road speed signs throughout the country." *See*

*supra* Ground 1a, Claim 9. That is, the table includes information on the speed limit of roads in a country, reflecting the speed limit that is displayed on speed limit signs along the roadside. Petrik further discloses that this road speed limit information can be “remotely” sent to in-vehicle control units via a wireless RF or Bluetooth communication link. *Id.*

197. It would have been obvious to modify Murphy so its controller wirelessly receives such road speed limit information from a remote facility wirelessly, such as over an RF or Bluetooth link, as taught by Petrik. A POSITA would have understood that having road speed limit information would assist in Murphy’s setting of permitted or maximum speeds for certain geographic areas or routes, as the speeds could be set to be within nationally set speed limits. A POSITA would have understood this would help ensure drivers did not incur speeding violations and would have further helped the controller set maximum speed and allowed speed ranges specific to particular restricted operators in view of a general safe speed limit for a particular road. For example, by having the speed limit information, the system could warn the driver when a legal speed limit for a road changes from one section to another, and could give the driver warnings so the driver knows to slow down. This would help drivers to avoid receiving speeding tickets. A POSITA would have had a reasonable expectation of success in modifying Murphy for its controller to wirelessly receive road speed limit information from a source at

a remote facility, as its controller is already connected to a “telecommunication module 185” that includes an “antenna 187 and associated receiver/transmitter” that exchanges information with a remote facility, such as Petrik’s facility maintaining the speed limit database, using cellular or radio communications. (Murphy, 14:23-45.)

**b) Dependent Claim 10: *The driver authentication device of claim 9 wherein said master control is configured to define a maximum speed limit and a geo-fence limit for said at least one driver according to said time of day.***

198. Regarding Claim 10, Murphy discloses its controller defines maximum speed and a geofence for a driver based on time of day. Murphy’s controller determines “whether the vehicle present location and/or speed are within permitted ranges corresponding to the permitted time interval.” (Murphy, Abstract, 2:46-53, 5:13-28, 12:16-27, 15:8-31.) It determines if “the vehicle present location and/or speed, as determined by [Murphy’s system], is within a permitted travel region and speed range ***corresponding to a permitted time interval that includes the present time.***” (*Id.*) For example, a teen may only be allowed to drive from home to school and at a maximum speed of no more than 35 mph in the morning, and separately allowed to drive outside of this region and at speeds up to 55 mph in the evenings to go to work.

5. Ground 2e: Murphy (Alone or with Arshad) in View of Siwinski Renders Obvious Claims 13 and 14

- a) **Dependent Claim 13:** *The driver authentication device of claim 1 further comprising a phone governor module configured to receive at least one instruction from said master control unit said instructions comprising at least one of: restricting calls on said at least one driver's cellular telephone; powering off said at least one driver's cellular telephone; and disabling text messaging on said at least one driver's cellular telephone.*

**Dependent Claim 14:** *The driver authentication device of claim 1 further comprising an Internet governor module configured to disables all integrated in-vehicle Internet related applications when said vehicle is in operation.*

199. Murphy (alone or as modified with Arshad) in view of Siwinski renders obvious Claims 13-14.

200. Siwinski, in the same field as Murphy (and Arshad), discloses a vehicle system to “reduce or eliminate distractions” caused by “electronic devices,” like “**cell phones**” and “hand-held computers,” that are “portable” or “installed in the vehicle” and “**connected to the Internet.**” (Siwinski, Abstract, [0001]-[0002], [0004], [0008], [0014], [0021], Cl. 9.) *See supra* Ground 1d, Claims 13-14.

201. Again, in Siwinski, “main processor 30” receives data from “sensor 20” regarding whether the vehicle is “in motion,” and if it is, can communicate this to “processor 60” in the electronic device. (*Id.*, [0006], [0013]-[0016], [0020], Figs. 1-3.) “Processor 60” can then (a) “**disable**” the “audio output,” “voice input,” and

“data network” connection, and limit information provided on a visual display, preventing the device from making calls or text messages, and (b) “prohibit **operation of the Internet connection**,” preventing the device from accessing “Internet-related information.” (*Id.*, [0016]-[0020], Cls. 1-8.) By preventing the electronic device from having connection to the cellular network, it can no longer make telephone calls or transmit or receive texts to disturb the driver while the vehicle is in motion, similar to the “do not disturb” or airplane mode on mobile phones. Likewise, by preventing operation of the Internet connection, the electronic device can also no longer use any Internet-related applications. This disablement of cellular or Internet access minimizes driver distraction, thereby promoting safer vehicle operation. Thus, Siwinski’s teaching also supports Murphy’s (and Arshad’s) goal of enhancing driving safety by reducing the risk of accidents caused by driver inattention. (Murphy, 1:09-27; Arshad, [0008]-[0009].)

202. It would have been obvious to apply these teachings to Murphy and include in its system such a “governor module” disabling telephone calls, text messages, and in-vehicle Internet-related activities when the vehicle is in motion, as taught by Siwinski. (*Id.*, [0016]-[0020], Cls. 1-8.) *See supra* Ground 1d, Claims 13-14. All three references are analogous art and in the same field of endeavor, as each are directed to monitoring and controlling vehicle operation and improving driver safety. (Siwinski, [0008]; Murphy, 1:09-27, 3:20-47; Arshad, [0008]-[0009],

[0026]-[0027].) Adding such a “governor module” to disable such activities to Murphy would have been the mere inclusion of a well-known component in a vehicle safety system for their intended purpose. (Siwinski, [0008], [0016]-[0020], Cls. 1-8.)

203. Murphy also suggests the modification, because its system can indicate whether the driver is authorized to operate specific “vehicle components” including “accessories” via “vehicle interface module” and can already include a vehicle “governor.” (Murphy, 5:29-60, 13:65-14:22.) A POSITA would understand that “cell phones,” “hand-held computers,” and portable or permanently installed electronic devices with Internet connections are simply additional examples of such “accessories.” Furthermore, controlling these accessories, as taught in Siwinski, would merely supplement the safety features of the Murphy system and not impact its functioning.

204. Moreover, Murphy would continue to control vehicle operation as before, with, for example, its “controller” (*e.g.*, master control unit) still monitoring the driver for compliance with her profile and controlling vehicle access and operations based on the operating profile. The only addition would be that the “controller” would now further control cellular phone and Internet usage, *e.g.*, additional “accessories.” These would be controlled in the same manner as other accessories and as taught by Siwinski. Murphy’s controller can determine if vehicle

is in operation using its speed data with its vehicle interface module and then send a signal to the device to disable any activities, just like is taught in Siwinski. (Murphy, 2:46-53, 5:29-60, 13:66-14:17; Siwinski, [0008], [0016]-[0020], Cls. 1-8.) A POSITA would have been motivated to control such accessories in Murphy, as it would further reduce driver distraction and keep fleet drivers on task, to better achieve regulate high risk drivers and improve safety.

**6. Ground 2f: Murphy (Alone or with Arshad) in View of Wu Renders Obvious Claim 16**

- a) ***Dependent Claims 16: The driver authentication and monitoring system of claim 1, wherein said slave control unit further comprises a power regulator module; a starter relay module; a definable relay module; a slave microcontroller; and an alarm synthesizer.***

205. Murphy (alone or with Arshad) in view of Wu renders obvious Claim 16.

206. Murphy discloses, and it would have been obvious for, its slave control unit to include a “slave microcontroller.” For example, Murphy’s “vehicle interface module” is “connected to at least one vehicle component... for use in controlling or restricting operation of the vehicle.” (Murphy, 13:53-14:17, Fig. 6, 15:32-54, Fig. 7.) When controlling these other components such as the “vehicle engine, vehicle transmission system, vehicle fuel supply, vehicle power supply and accessories,” the vehicle interface module will communicate instructions to them “according to serial data communications standards between *microcomputers in a vehicle*, as set forth

in S.A.E. Documents J1708 and J1587.” (Murphy, 13:66-14:17.) The vehicle interface module includes a “**microcomputer**” and “output terminals” connecting to the “microcomputers” of the components it controls. (Murphy, Fig. 6, 13:53-14:17, Fig. 7, 15:32-16:49.) Because these “microcomputers” are part or connected to and take the actions instructed by the vehicle interface module, they are “slave microcontrollers.”

207. Murphy discloses, and it would have been obvious for, its vehicle interface module to include, an “alarm synthesizer.” For example, Murphy’s system can include a “screen or monitor 181” and a “**loudspeaker** 182.” (Murphy, Fig. 6, 12:8-12, Fig. 7, 15:37-50.) When the system (*e.g.*, interface module) determines that a driver has violated or will soon violate an operating restriction in her profile, then it causes the display system (including the speaker) to synthesize, or electronically generate, an alarm. Murphy teaches that in this situation, the display system synthesizes an “audibly perceptible presentation to the driver,” such as “**audibl[e]... announcement** that a violation has occurred and/or that the vehicle will become disabled...” (*Id.*, 15:47-50, 5:13-60; *see also* Claim 1, 17:30-63, 13:60-65.) Moreover, a POSITA would have understood the “output terminals” of the vehicle interface module, which are used to control myriad components, could likewise be connected to the “alarm synthesizer,” because they can be connected to “different group of vehicle components.” (*Id.*, 13:66-14:17.) Likewise, Wu discloses that this

same type of audible alert or announcement can be done with a synthesizer, including an “operational amplifier” and “resistor,” and a POSITA would have readily understood this to be a common and simple way to implement the audible alerts in Murphy for its intended purpose. (Wu, [0030].)

208. Murphy in view of Wu discloses, and it would have been obvious for its “slave control unit” to include a “power regulator module.” Murphy’s system includes a “power supply 197” that regulates power, as it “supplies power to operate one or more of the components of the apparatus 170” in the in-vehicle system. (Murphy, 13:66-14:4, 14:66-15:8.) Furthermore, Wu discloses it was “standard” to include a power (or voltage) regulating device in modules, like Murphy’s, to “regulate the voltage level to 5V” or to voltage levels the system “requires.” (Wu, [0020], [0022], [0027]-[0028].) It would have been obvious to a POSITA to include a voltage regulator for the system in Murphy to perform its intended purpose, as taught by Wu, including to ensure that the vehicle interface module receives the appropriate voltage that it “requires” to operate. (Wu, [0020], [0028].)

209. Further, voltage fluctuations in vehicle systems may lead to erratic behavior or potential damage to electronic components if they were directly connected to, for example, the battery or alternator, and Wu’s disclosures teach that regulating power was a well-established practice in such systems. A POSITA would have understood this would merely require the use of a well-known, standard,

component to perform its intended function. A POSITA would have been motivated to use a voltage regulator in order to ensure the voltage level required for the electronic controller in Murphy, and its associated modules, was delivered, such as 5V as is standard in automotive electronic components and systems. Again, a POSITA would have understood this to be simply the routine inclusion of a known, common vehicle component (a power or voltage regulator) for its intended purpose, and in fact would have expected Murphy's in-vehicle systems to include such a standard component to apply the appropriate voltage to the controller and associated modules and to protect against voltage surges. (Wu, [0020], [0022], [0027]-[0028].)

210. Moreover, the vehicle interface module of Murphy is connected via its "output terminals" to a "vehicle power supply." (Murphy, 5:29-60, *see also* 13:66-14:17, Fig. 6, 15:32-54, Fig. 7.) These "output terminals" also connect to various vehicle components, which the vehicle interface controls, including vehicle accessories. (*Id.*) It would be obvious to include the "power regulator" within the vehicle interface module ("slave control unit"), because when the vehicle interface module controls components via its output terminals it must send them power at appropriate voltages. Given that Murphy discloses the power regulator is in its system, and that Wu further discloses to implement a power regulator for devices such as Murphy's vehicle interface, it would have been obvious to a POSITA to place the power regulator in the vehicle interface module. Such a modification would

be applying well-known methods and would achieve a predictable result, namely, providing appropriate power supply to different components of the vehicle.

211. Murphy in view of Wu discloses, and it would have been obvious for its slave control unit to include, a “starter relay module.” Murphy’s system includes an “ignition circuit,” and if a driver is authenticated after inserting and presenting “ident indicium” and is in compliance with her operating profile, then the system can “enabl[e]” (*e.g.*, activate) this “ignition circuit,” which then allows the engine to be started. (Murphy, Abstract, 6:55-59, 8:10-14.) Additionally, Wu discloses that a “starter relay” is controlled by a processor 22 in a controller 20 to start the engine of a vehicle. (Wu, [0020]-[0021], [0025]-[0026], [0030]-[0031], [0039], Figs. 1-2.) When the controller receives a command or notification to start the vehicle, its processor can send a signal to initiate a starter relay which will engage a starter motor, which causes the engine to start. (*Id.*, [0025], [0027], [0031].) A POSITA would have been motivated to include such a “starter relay” as taught by Wu in Murphy’s system, because it would provide a well-known and commonly-used mechanism for starting the engine. A POSITA would have understood such a “starter relay” could be included in the vehicle interface module of Murphy as part of Murphy’s circuitry that allows the engine to be started. (*Id.*) For example, Murphy discloses that the vehicle interface module (*e.g.*, “slave control unit”) includes “terminals” which connect to the “ignition” of the vehicle. (*Id.*, 13:66-14:11.) And,

a POSITA would have had a reasonable expectation of success in using such a starter relay within the vehicle interface module, as Wu discloses that this is a standard component that would be used for its well-known purpose of engaging a “starter motor” to start the vehicle. (Wu, [0025], [0027], [0031].) Thus, such a modification into the slave control unit could easily receive a response back if the driver is authenticated and enable the activation of the engine. This would have, in fact, been simply the routine implementation of a standard starter relay that a POSITA would expect to be used in any vehicle system at the time of the invention to start the engine.

212. Murphy in view of Wu discloses, and it would have been obvious for its slave control unit to include, a “definable relay module.” Murphy discloses the vehicle (or control action) interface module includes “interface output terminals” connected to other vehicle components, and the vehicle interface module can use these to cause the activation of specific circuitry or functionality such as “turn[ing] on at least one of the lights, exterior flashers or horn” for defined periods of time. (Murphy, 5:29-60, *see also* 13:66-14:17, Fig. 6, 15:32-54, Fig. 7.) Similarly, the vehicle interface module includes “interface input terminals” that are connected to certain “vehicle components (doors, ignition, alarm system, vehicle cargo, accessories, etc.) whose activation may indicate that someone is preparing to drive the vehicle.” (*Id.*) If this occurs, then it can “activate” certain system components and functionalities, such triggering the display system to turn on and provide a

“driver interrogation sequence” to the driver. (*Id.*) Furthermore, Wu discloses that components such as the ignition system, lights, and accessories can be controlled by a processor sending a signal to a “defined relay” for such components. (Wu, [0020]-[0021], [0025]-[0026], [0030]-[0031], [0039], Figs. 1-2.) For example, Wu notes that the timing for different relays can be based on voltage “pulses.” (*Id.*) A POSITA would have been motivated to use such definable “relays” for these and other components in Murphy, as taught by Wu. A POSITA would have understood using such “relays” would have merely been the implementation of known components for their intended purpose and would have allowed the processor in Murphy’s slave control unit to selectively activate and deactivate the ignition, lights, fuel injector, and other accessories. As an example, Wu discloses that using a fuel injection relay and an ignition relay allows the engine to be enabled and disabled when desired. (Wu, [0025], [0031], [0039].) A POSITA would have understood using such relays from Wu would be one way to achieve Murphy’s enabling and disabling of the vehicle engine, and the activation and deactivation of vehicle accessories. (Wu, [0025], [0031], [0039]; Murphy, 5:13-54; *see also* 17:30-63, 6:1-18.)

**7. Ground 2g: Murphy (Alone or in View of Arshad) in View of Kudo Renders Obvious Claims 2 and 15**

- a) ***Dependent Claim 2: The driver authentication and monitoring system of claim 1 further comprising: a plurality of transducers comprising at least one of proximity sensors, head movement sensors, and eye movement sensors wherein said transducers send signals to said slave control unit and said slave control unit determines if said signals are indicative of a driving condition requiring a warning and in turn signals said master control unit to alert said driver.***

213. Murphy (alone or with Arshad) in view of Kudo renders obvious Claim 2.

214. In the same field of vehicle monitoring, Kudo discloses a vehicle with a plurality of transducers in a vehicle, including proximity sensors like left and right CCD cameras, and using data from them to generate alerts. *See supra* Ground 1f, Claim 2.

215. It would have been obvious for a POSITA to modify Murphy to include a plurality of transducers, including proximity sensors such as the left and right CCD cameras and use the data from them to generate alerts, as taught by Kudo. A POSITA would have been motivated to include such sensors in Murphy's system in order to be able to determine the distance to other vehicles and objects and to automatically adjust vehicle speed and steering by the vehicle monitoring system. Murphy's vehicle interface module (*e.g.*, slave control unit) is already connected to various "vehicle components" regarding operation of the vehicle, and can analyze received

information to determine if any actions are required. (Murphy, 5:12-67, 13:53-14:17.) It would be obvious for the vehicle interface module to further monitor the data from the proximity sensors as taught in Kudo, and to signal the master control unit if actions may be required. (*Id.*)

216. Thus, a POSITA would have understood that adding Kudo's CCD stereo cameras to Murphy's system would have simply been using a known component for its intended purpose, allowing Murphy to also consider the proximity with other vehicles and/or objects when alerting the driver and controlling speed. A POSITA would understand that such an addition, as taught by Kudo, would help to increase overall safety, as the system would monitor the driving to lower the chances of potential accidents. Moreover, a POSITA would have recognized that implementing Kudo's proximity sensors in Murphy's would allow the vehicle to follow other vehicles at a safe distance. A POSITA would have had a reasonable expectation of success, as Murphy was ready for such improvement.

217. Additionally, Murphy's interface module is already configured to receive information from components regarding vehicle operation and can analyze received information to determine if actions are required. (Murphy, 5:12-67, 13:53-15:54.) Thus, it would have been obvious to a POSITA to include Kudo's proximity sensors in Murphy and have them provide signals to the vehicle interface module to determine if the signals are indicative of a driving condition requiring a warning,

and to signal the controller module (*e.g.*, master control unit) to alert the driver. This would have simply been providing additional information (*e.g.*, distance to other vehicles and objects) that is similar to information already provided from other sensors in Murphy (*e.g.*, vehicle operation information from other vehicle components) in the same manner. (*Id.*) Proximity to another vehicle or potential collisions are the type of data Murphy teaches controller module would already consider, as Murphy discloses controller constantly monitors data to determine whether to apply a control action, such as issuing an alert and/or controlling the vehicle. (*Id.*, 5:28-60.) This modification as taught by Kudo would be the use of known components for their intended purpose to increase driver safety and monitor driving behaviors. (*Id.*)

218. Furthermore, just as Murphy warns the driver when a violation has occurred, it could also warn the driver or control operation of the vehicle based on sensor data related to proximity determination. (*Id.*; Kudo, [0019]-[0023].) By monitoring the proximity to other vehicles as taught by Kudo, Murphy's control actions could be adjusted accordingly to make driving safer. (Murphy, 5:28-60; Kudo, [0019]-[0023].)

219. A POSITA would have been motivated to have the vehicle interface module send data related to proximity to other vehicles to Murphy's controller module, so the controller can receive and process this data and consider all vehicle

operation information when issuing commands and deciding whether and how to alert the driver. A POSITA would have had a reasonable expectation of success, as Murphy was ready for such improvement. As noted, Murphy has an interface module, similar to Kudo's controller 5, that is used to control speed. Thus, Murphy's interface module could continue functioning in the same way, sensing information relevant to operations, determining a driving condition may require a warning (*e.g.*, the vehicle is getting too close to a preceding vehicle or an obstacle), alerting the controller of this, and receiving commands from the controller to control the engine or other components in a manner that would maintain safe distances, such as by slowing down the vehicle. (Murphy, 5:28-60, 13:65-14:17; Kudo, [0024]-[0030].) Moreover, Murphy's controller could determine, as taught by Kudo, to additionally instruct its display module to produce audible/visual alarms to the driver regarding obstacles in the vehicle path, in the same way it displays messages regarding operational limitation violations. (*Id.*)

- b) ***Dependent Claim 15: The driver authentication device of claim 2 further comprising a steering control module, a braking control module, and an acceleration control module configured to receive at least one instruction from said master control unit said instructions comprising at least one of: reducing said vehicles speed; increasing said vehicles speed; and altering said vehicles direction.***

220. Murphy (alone or with Arshad) in view of Kudo in view of Kudo renders obvious Claim 15.

221. Kudo discloses a steering control module, braking control module, and an acceleration control module. *See supra* Ground 1f, Claim 15. For the reasons stated above, it would have been obvious for a POSITA to modify Murphy's system to include a steering control module, braking control module, and acceleration control module, as taught by Kudo, and to have them receive commands from Murphy's controller module (*e.g.*, master control unit), to provide for automatic cruise control of the vehicle in a manner that maintains a safe distance when following a preceding vehicle. *See also supra* Ground 1f, Claim 15.

222. A POSITA would have understood such commands could be sent from the controller module (directly or through the interface module) to a throttle, braking system, and steering control system, as taught by Kudo, to decrease or increase vehicle speed or alter vehicle direction based on monitored driving conditions. A POSITA would have had a reasonable expectation of success, as the controller module already receives information from various vehicle components related to vehicle operation and issues commands to controllers to operate vehicle subsystems. (Murphy, 5:28-60, 13:65-14:17.) Adding commands to steering control, acceleration control, and braking control systems would have merely been additional control of known vehicle components in a known manner and would have provided greater overall vehicle control within the driver's operational limits. (*Id.*)

**8. Ground 2h: Murphy (Alone or with Arshad) in View of Victor Renders Obvious Claim 2**

- a) ***Dependent Claim 2: The driver authentication and monitoring system of claim 1 further comprising: a plurality of transducers comprising at least one of proximity sensors, head movement sensors, and eye movement sensors wherein said transducers send signals to said slave control unit and said slave control unit determines if said signals are indicative of a driving condition requiring a warning and in turn signals said master control unit to alert said driver.***

223. Murphy (alone or as modified by Arshad) in view of Victor renders obvious Claim 2.

224. In the same field of vehicle monitoring, Victor includes a plurality of transducers—including sensors for (a) measuring a driver’s “eye movement,” “eye-gaze direction,” “eye-closure” and blinking amounts, “head movement,” and head position and orientation and (b) to detect the “traffic environment” around the vehicle—and issues alerts based on information from the sensors, like “displayed icons,” audible warnings, and driver-stimulation warnings like seat vibrations. See *supra* Ground 1g, Claim 2.

225. It would have been obvious to a POSITA to include Victor’s eye movement, head movement, and proximity sensors in Murphy and have them provide signals to the vehicle interface module (*e.g.*, slave control unit) to determine if the signals are indicative of a driving condition that may require a warning, and to signal the controller module (*e.g.*, master control unit) to

potentially alert the driver, because this would improve the safety and monitoring features in the Murphy system. The vehicle interface module is already configured to receive information from various “vehicle components” regarding operation of the vehicle and can analyze received information to determine if any actions are required. (Murphy, 13:53-14:17.) It would have been obvious for the vehicle interface module to monitor the data from the sensors as taught in Victor, and to signal the controller if actions may be required. (*Id.*)

226. This would have simply been providing additional information (sensor data related to driver attentiveness or potential collisions) that is similar to information already provided (e.g., vehicle operation information from other vehicle components) in the same manner. (*Id.*) Driver attentiveness or potential collisions are the type of data Murphy teaches controller module would already consider, as Murphy discloses controller constantly monitors data to determine whether to apply a control action, including whether a “violation has occurred and/or that the vehicle will become disabled. (*Id.*, 5:28-60.) This modification as taught by Victor would be the use of known components for their intended purpose to increase driver safety and monitor driving behaviors. (*Id.*)

227. Furthermore, just as Murphy warns the driver when a violation has occurred, it could also warn the driver or control operation of the vehicle, as taught by Victor, based on sensor data related to driver behaviors and proximity

determinations. (*Id.*; Victor, Abstract, [0026]-[0029], [0048], [0060], Fig. 2, Cls. 1-2, 4.) By monitoring driver attentiveness and proximity to other vehicles as taught by Victor, Murphy's driver operation limitations could be adjusted accordingly to make driving safer. (Murphy, 5:28-60; Victor, [0044], [0060]-[0063].) For example, where Murphy's interface module determines the driver is inattentive or is in close proximity to another vehicle, Murphy could reduce operational limits like maximum speed or instruct the engine controller to slow or disable the vehicle or reduce engine speed. (Murphy, 5:28-60.)

228. A POSITA would have been motivated to have the vehicle interface module send data related to driver attentiveness and proximity to other vehicles to the controller module, because in this way the controller can process this data and consider all vehicle operation information when issuing commands and control actions. For example, where the driver is determined to be fatigued or not looking at the road, or where a collision with a preceding vehicle is becomes more imminent, vehicle interface module 182 can alert Murphy's controller module of this occurrence and then wait for a command on what action to take. (Murphy, 5:28-60, 13:65-14:17.) Additionally, sending these signals from sensors to the vehicle interface module for initial determinations would have been at least obvious to a POSITA to try, as it has "input terminals," "output terminals," and processing capabilities, and can send information back to controller for overall

consideration. (*Id.*) Having vehicle interface module send such a signal to controller module would also be consistent with Murphy's approach of keeping them on "information bus" "connected to" each other (*id.*, 13:65-14:17), and allowing controller module to determine what appropriate control actions to take. (*Id.*, 5:28-60.)

**9. Ground 2i: Murphy (Alone or with Arshad) in View of Victor and Kudo Renders Obvious Claim 15**

229. Murphy (alone or with Arshad) in view of Victor and Kudo renders obvious Claim 15. For the same reasons stated above, it would have been obvious to modify Murphy to include steering, braking, and acceleration control modules, as taught by Kudo. *See* Ground 2g, Claim 15.

## **VI. CONCLUSION**

230. For the reasons stated above, I believe that Claims 1-18 of the '149 Patent are unpatentable in view of the prior art.

## VII. CERTIFICATION

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 willful false statements and the like are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the U.S. Code.



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Mark Ehsani, Ph.D., P.E., LF IEEE, F. SAE

Dated: May 9, 2025

## **APPENDIX A**

### **Materials Considered**

| <b>Exhibit</b> | <b>Description</b>                                                            |
|----------------|-------------------------------------------------------------------------------|
| 1001           | U.S. Patent No. 9,493,149 (“ <b>149 Patent</b> ”)                             |
| 1002           | File History for the ‘149 Patent                                              |
| 1004           | Declaration of Dr. Mark Ehsani                                                |
| 1005           | Curriculum Vitae of Dr. Mark Ehsani                                           |
| 1006           | U.S. Patent No. 6,225,890 (“ <b>Murphy</b> ”)                                 |
| 1007           | U.S. Patent Application Publication No. 2003/0189482 A1 (“ <b>Arshad</b> ”)   |
| 1008           | U.S. Patent Application Publication No. 2007/0168125 A1 (“ <b>Petrik</b> ”)   |
| 1009           | U.S. Patent Application Publication No. 2004/0239510 A1 (“ <b>Karsten</b> ”)  |
| 1010           | U.S. Patent Application Publication No. 2002/0141600 A1 (“ <b>Siwinski</b> ”) |
| 1011           | U.S. Patent Application Publication No. 2008/0114501 A1 (“ <b>Wu</b> ”)       |
| 1012           | U.S. Patent Application Publication No. 2007/0069873 A1 (“ <b>Kudo</b> ”)     |
| 1013           | U.S. Patent Application Publication No. 2003/0181822 A1 (“ <b>Victor</b> ”)   |

| Exhibit | Description                                     |
|---------|-------------------------------------------------|
| 1014    | U.S. Patent No. 5,222,152 (“ <b>Fishbine</b> ”) |