UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FORD MOTOR COMPANY,
Petitioner,

v.

AUTOCONNECT HOLDINGS LLC,
Patent Owner.

U.S. Patent No. 9,290,153 to Ricci

Case No.: IPR2025-01383

DECLARATION OF TODOR COOKLEV

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List of Exhibits

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1001	U.S. Patent No. 9,290,153 ("the '153 Patent")
1002	U.S. Patent No. 9,290,153 Certified File History ("the '153 Patent File History")
1003	Expert Declaration of Todor Cooklev
1004	Todor Cooklev Curriculum Vitae
1010	U.S. Patent No. 8,768,539 B1 to Clement ("Clement")
1011	U.S. Patent No. 7,388,466 B2 to Ghabra ("Ghabra")
1012	U.S. Patent Application Pub. No. 2012/0092129 A1 to Lickfelt ("Lickfelt")
1013	U.S. Patent Application Pub. No. 2011/0093153 A1 to Moinzadeh ("Moinzadeh")
1014	U.S. Patent Application Pub. No. 2012/0042005 A1 to Papakostas ("Papakostas")
1015	U.S. Patent No. 7,783,699 B2 to Rasin ("Rasin")
1050	Bosch Automotive Handbook, 6th Ed., (Robert Bosch GmbH – October 2004) ("Bosch")
1051	IEEE Dictionary, (IEEE 100 The Authoritative Dictionary of IEEE Standards Terms 2000 7th Edition) ("IEEE Dictionary")
1052	"Specification of The Bluetooth System" (June 30, 2010). Version 4.0 (Volumes 0-6) Available at https://www.bluetooth.com/specifications/specs/core-specification-4-0/ (Accessed June 27, 2025) ("Bluetooth Specification")
1053	Hossain et al., "A Comprehensive Study of Bluetooth Signal Parameters for Localization," 2007 IEEE 18th International Symposium on Person, Indoor and Mobile Radio Communications Available at https://www.ieeexplore.ieee.org/document/4394215 (Accessed June 27, 2025) ("Hossain")
1054	McCartt et al., "Driver Cellphone and Texting Bans in the United States: Evidence of Effectiveness," Engaged Driving Symposium Annals of Advances in Automotive Medicine, March 31, 2014 Available at https://pmc.ncbi.nlm.nih.gov/articles/PMC4001674/ (Accessed July 1, 2025) ("McCartt")

Exhibit No.	Description
1055	NHTSA Traffic Safety Facts Research Note "Distracted Driving 2010" published September 2012. Available at https://www.nrd.nhtsa.dot.gov/CATS/index.aspx (Accessed June 24, 2025) ("NHTSA")
1056	Peterson, Andrew, "Do not disturb, Ford Fights Distracted Driving with Limited In-Motion Sync Access," July 12, 2010. Available at https://www.motortrend.com/news/163-news100712-ford-sync-do-not-disturb (Accessed June 24, 2025) ("Motor Trend")
1057	Allen, Leslie "Ford launches parental control technologies," October 7, 2008. Available at https://www.autonews.com/article/20081007/ZZZ_SPECIAL/310079921/ford-launches-parental-control-technologies/ (Accessed June 24, 2025) ("Auto News")
1058	Ghangurde, Mujund "Ford SNYC and Microsoft Windows Embedded Automotive Make Digital Lifestyle a Reality on the Road," *SAE International*, Volume 3, Issue 2, October 19, 2010 SAE2010-01-02319 (Accessed April 25, 2025) ("Ghangurde")
1059	Austin, Michael "Ford introduces Next-Gen Connectivity Suite Called MyFord; Should be Awesome," January 6, 2010. Available at https://www.caranddriver.com/news/a15128939/ford-introduces-next-gen-connectivity-suite-called-myford-should-be-awesome-car-news/ (Accessed June 25, 2025) ("Car and Driver")
1060	TCP/IP Tutorial and Technical Overview 6th Ed. (International Business Machines Corporation – October 1998) ("IBM TCP/IP Tutorial")
1061	Ford SYNC Supplemental Guide, November 2007 ("Sync Guide 2007")
1062	Ford SYNC Supplemental Guide, January 2010 ("Sync Guide 2010")
1063	Saltzstein, William E. "Bluetooth: The Future of Wireless Medical Technology?" February 1, 2002. Available at https://www.mddionline.com/new-technologies/bluetooth-the-future-of-wireless-medical-technology- (Accessed June 30, 2025) ("MDDI")

Exhibit No.	Description
1064	MyFord Touch Ford User Guide Ford Motor Company, February 2012 ("MyFord Touch Guide")
1065	SUSE LINUX – Administration Guide. Published by SUSE LINUX AG, 2004. ("Linux")
1066	"Universal Serial Bus 3.0 Specification" (November 12, 2008). Revision 1.0. Available at https://manuais.iessanclemente.net/images/4/4b/USB30-Specification-2008.pdf (Accessed August 12, 2025) ("USB 3 Spec.")
1067	"Specification of the Bluetooth System" (December 1, 1999). Version 1.0 B Available at https://engweb.eng.wayne.edu/ad/ad57/ad5781/public_html/BluetoothWeb/BTooth_Spec1.0B_Vol1.pdf (Accessed August 12, 2025) ("Bluetooth Spec. V1.0 B")

I, Todor Cooklev, hereby declare as follows:

1. I am making this declaration at the request of Ford Motor Company in the matter of *inter partes* review of U.S. Patent No. 9,290,153 ("the '153 Patent") to Christopher Ricci. (Ex. 1001.)

2. I am being compensated at an hourly consulting rate of $700 for time spent reviewing materials and performing my analysis of the technical issues relevant to this matter. My compensation is not contingent on the outcome of this proceeding or the content of my opinions.

3. This declaration is based on the information currently available to me. If additional information becomes available, I may continue my investigation and study, which may include a review of documents and information that may be produced, as well as testimony from depositions that have not yet been taken.

4. In preparation of this declaration, I have studied the exhibits as listed in the Exhibit List shown above in my report.

5. In forming the opinions expressed below, I have considered:

   a. The documents listed above as well as additional patents and documents referenced herein;

   b. The relevant legal standards, including the standard for obviousness provided in *KSR International Co. v. Teleflex, Inc*.,

550 U.S. 398 (2007), and any additional documents cited in the body of this declaration; and

c. My knowledge and experience based upon my work and study in this area as described below.

I. Qualifications and Professional Experience

6. I have provided my full background in the curriculum vitae that is attached as Ex. 1004.

7. I am currently a Professor of Electrical and Computer Engineering at Purdue University in Fort Wayne, Indiana, where I have had several administrative positions.

8. In addition to communications systems and radios, my current research interests include hardware and software architectures of electronic devices. A significant part of my research is specifically focused on standards-related issues. I have received a number of research grants in these areas. My research has been funded by DARPA, the Air Force Research Laboratory, the Office of Naval Research, and other organizations. My teaching responsibilities have included courses in communication systems and networks, signals and systems, software-defined radio, and digital signal processing.

9. I am a named inventor on more than thirty U.S. patents, most of which relate to the hardware or software aspects of communication systems. In 2019, I

was inducted into the Purdue Inventors Hall of Fame. I have also authored and coauthored more than one hundred peer-reviewed articles. I also authored "Wireless Communication Standards: A Study of IEEE 802.11, 802.15, and 802.16," published by IEEE Press. Recently I authored the textbook "Modern Communications Systems: A First Course" published by the University of Michigan. According to the publisher, the textbook has been used at close to 200 universities in the United States and at a similar number of universities abroad.

10. I graduated from the Technical University of Sofia, Bulgaria in 1988 with a Diploma of Engineering in the field of Electrical Engineering. I graduated from Tokyo Institute of Technology in Tokyo, Japan in 1995 with a Doctor of Philosophy (Ph.D.) degree in Electrical Engineering.

11. Prior to my career in academia, I worked in the high-technology industry. I worked in research and development but also contributed to product firmware and software development. I have worked on the design of an Application Specific Integrated Circuit (ASIC).

12. I have contributed to the development of several major standards for communication systems and numerous amendments, including Bluetooth, Wi-Fi, cellular, and other standards. I have participated in many meetings of standards committees; I have chaired some committee meetings and served in other leadership roles. Since about 1999 I have been reviewing and contributing to

many standards relevant to wireless protocols, and to the hardware and software for their implementation. At present, I continue to be involved.

13. Around 1998 - 1999 I participated in the Bluetooth Special Interest Group (SIG). I was among the authors of the Bluetooth 1.0 specification, contributing to the Host Controller Interface (HCI) and the Message Sequence Charts that illustrate the interaction between the host and the Bluetooth radio. At the time it was recognized that laptop computers and personal digital assistants (PDAs, predecessors of modern smartphones) would be the main but not the only examples of Bluetooth hosts. Even then it was expected that Bluetooth would become part of many embedded systems. This proved correct; in subsequent years Bluetooth enabled many novel applications, exceeding the expectations for success that we had as authors of the 1.0 specification. In 1999 I participated in the group that established the license agreement between the Bluetooth SIG and the IEEE 802. Subsequently I joined IEEE 802.

14. Within IEEE 802, I mostly participated in 802.15 and 802.11. For example, I contributed to the early work within 802.15.1 and 802.15.2. In November 1999 I was part of the group that established 802.15.3. I was also a voting member of 802.11 during 2000-2002 and 2005-2008. Between 2005 and 2008 the 802.11 Working Group worked on, inter alia, 802.11p, an amendment supporting Intelligent Transportation Systems (ITS). Further, I chaired a Study

Group within IEEE 802.11 and for part of this work I received an award from IEEE Standards Association in 2012.

15. Around 2006-2008 I was the Principal Investigator of one National Science Foundation grant awarded to the IEEE. This grant supported many students and their faculty mentors from a number of institutions who worked on the development of innovative hardware and software that incorporated the IEEE standards. The grant was considered successful by the NSF and the IEEE. Around the same time, I served as Chairman of the IEEE Standards in Education Committee.

16. My additional involvement with IEEE includes being elected to serve on the Board of Governors of the IEEE Standards Association (SA) in 2020. The Board of Governors provides overall leadership of the IEEE Standards Association. The Board also interacts with other standards organizations and government entities in the U.S. and the world. As a Member-at-Large, together with other members of the Board, I oversaw the budget of the IEEE SA and the revision of the Intellectual Property policy, among other activities.

17. I am the Series Editor for Wireless and Radio Communications for the IEEE Communications Standards Magazine (which is the premier journal in the field of communication standards) and have held that position since 2017. As member of the Editorial Board, I coordinate the review of scholarly manuscripts. I

have handled several manuscripts that relate to, inter alia, vehicle-to-everything (V2X) communication and positioning methods.

18. I have previously prepared expert reports and testified in a number of cases concerning systems for wireless communication, communication protocols, and hardware and software of electronic devices.

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

20. Intentionally left blank.

II. Relevant Legal Standards

A. General

21. I have been asked to provide opinions on the claims of the ’153 Patent in light of the prior art.

22. It is my understanding that a claimed invention is unpatentable under 35 USC § 102 if a prior art reference teaches every element of the claim. Further, it is my understanding that a claimed invention is unpatentable under 35 U.S.C. § 103 if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the alleged invention was made to a person having ordinary skill in the art to which the subject matter pertains. I also understand that an obviousness analysis takes into factual

inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

23. It is my understanding that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of the claimed subject matter. Some of these rationales include the following: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to obtain predictable results; a predictable use of prior art elements according to their established functions; applying a known technique to a known device to yield predictable results; choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

B. Priority Dates for Claimed Subject Matter

24. I understand that in order to be considered "prior art," patents or printed publications must predate the pertinent priority dates for the subject matter claimed in the '153 Patent.

25. I have been informed that a patent is only entitled to a priority date based on an earlier filed application if the earlier filed application meets the

requirements of 35 U.S.C. §112. Specifically, I have been informed that 35 U.S.C. § 112 (a) requires that the specification of a patent or patent application must "contain a written description of the invention, and the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the [invention] . . . ." I understand that the requirements of this provision are commonly called the written description requirement and the enablement requirement.

26. I have been informed that compliance with both the written description requirement and enablement requirement must be determined as of the effective filing date of the application for which priority is sought.

27. I have been informed that to satisfy the written description requirement a patent's specification should reasonably convey to a person of skill in the art that the inventor had possession of the claimed invention as of the effective filing date of the application.

C. Claim Construction Standard

28. In order to properly evaluate these claims, I understand that the terms of the claims must first be construed.

29. I understand that in this proceeding, the claims are construed consistent with the specification and using the same construction as that used in

litigation. I have been informed that the claims, after being construed in this manner, are then to be compared to the information in the prior art, which for this proceeding is limited to patents and printed publications. I also understand that, at the same time, absent some reason to the contrary, claim terms are typically given their ordinary and accustomed meaning as would be understood by one of ordinary skill in the art.

30. I understand that an apparatus claim limitation that includes functional language without reciting the structure limitations for performing the claimed function may be construed as a "means for" or "means plus" claim, even if the claim limitation does not expressly use the term "means." Such a claim limitation is interpreted to cover the structure disclosed in the specification for performing the claimed function and equivalents thereof.

D. Anticipation

31. I understand that the following standards govern the determination of whether a patent claim is "anticipated" by the prior art.

32. I understand that, for a patent to be "anticipated" by the prior art, each and every limitation of the claim must be found, expressly, implicitly or inherently, in a single prior art reference. I further understand that the requirement of strict identity between the claim and the reference is not met if a single element or limitation required by the claim is missing from the applied reference.

33. I understand that claim limitations that are not expressly described in a prior art reference may still be there if they are implicit or inherent to the thing or process being described in the prior art. I have been informed that to establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference and that it would be so recognized by persons of ordinary skill in the art. I have been informed that inherency cannot be established just because a certain thing may result from a given set of circumstances.

34. I understand that it is acceptable to consider evidence other than the information in a particular prior art document to determine if a feature is necessarily present in or inherently described by that reference.

E. Obviousness

35. I understand that for a single reference or a combination of references to render obvious a claimed invention, a person of ordinary skill in the art must have been able to arrive at the claimed invention by altering or combining the applied references.

36. I have been informed that a patent claim can be found unpatentable as obvious where the differences between the subject matter taught 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 of ordinary skill in the relevant field.

Specifically, I understand that the obviousness question involves a consideration of: the scope and content of the prior art;

a) the differences between the prior art and the claims at issue;

b) the knowledge of a person of ordinary skill in the pertinent art; and

c) whatever objective factors indicating obviousness or non-obviousness may be present in any particular case – referred to as "secondary considerations."

37. I have been informed that such secondary considerations include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unmet need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) the taking of licenses under the patent by others and (h) the patentee proceeded contrary to the accepted wisdom of the prior art. I understand that secondary considerations are relevant where there is a connection, or nexus, between the evidence and the claimed invention.

38. In addition, I understand that the obviousness inquiry should not be done in hindsight, but must be done using the perspective of a person of ordinary skill in the relevant art as of the effective filing date of the patent claim.

39. I understand that in order for a claimed invention to be considered

obvious, there must be some rationale in the prior art, or the knowledge of a person of ordinary skill in the relevant art at the time of the invention, for combining cited references as proposed.

40. I understand that obviousness may also be shown by demonstrating that it would have been obvious to modify what is taught in a single piece of prior art to create the patented invention. I understand that obviousness may be shown by establishing that it would have been obvious at the time of the purported invention to combine the teachings of more than one item of prior art. In determining whether a piece of prior art could have been combined with other prior art or with other information within the knowledge of one of ordinary skill in the art, I have been informed the following are examples of approaches and rationales that may be considered:

a) Combining prior art elements according to known methods to yield predictable results;

b) Simple substitution of one known element for another to obtain predictable results;

c) Use of a known technique to improve similar devices (methods, or products) in the same way;

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

e) Applying a technique or approach that would have been "obvious to try" (i.e., choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success);

f) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; or

g) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. I also understand that this suggestion or motivation may come from such sources as explicit statements in the prior art, or from the knowledge or common sense of one of ordinary skill in the art.

41. I understand that an invention that might be considered an obvious variation or modification of the prior art may be considered non-obvious if one or more prior art references discourages or lead away from the line of inquiry disclosed in the reference(s). I understand a reference does not "teach away" from an invention simply because the reference suggests that another embodiment of the invention is better or preferred. My understanding of the doctrine of teaching away

requires a clear indication that the combination should not be attempted (e.g., because it would not work or explicit statement saying the combination should not be made).

42. Intentionally left blank.

III. Qualifications of One of Ordinary Skill in the Art

43. Based on my review of these materials, I believe that the relevant field for purposes of the ’153 Patent includes the control of a vehicle subsystem that communicates with a mobile communication device, including aspects of device discovery and customization. (*See* the ’153 Patent, Ex. 1001, cover (51),(52),(58), Claims, pp. 116-118.)

44. I have been asked to provide my opinion as to the level of skill of a person having ordinary skill in the art (“POSA” or “ordinary artisan”) of the ’153 Patent at the time of the claimed invention, which I have been instructed to assume is April 15, 2013. In determining the characteristics of a hypothetical person of ordinary skill in the art of the ’153 Patent at the time of the claimed invention, I was told to consider several factors, including the type of problems encountered in the art, the solutions to those problems, the rapidity with which innovations are made in the field, the sophistication of the technology, and the education level of active workers in the field. I also placed myself back in the time frame of the claimed invention and considered the colleagues with whom I had worked at that

time.

45. In my opinion, a person having ordinary skill in the art ("POSA") of the '153 Patent at the time of its filing would have been a person having, as of April 15, 2013, a Bachelor's degree in Electrical Engineering, Mechanical Engineering, or an equivalent degree with at least two years of experience in communication systems, vehicle sensor systems, electronic user interface systems, or related technologies. Additional industry experience could make up for less education and vice versa. Such a person of ordinary skill in the art would have been capable of understanding the '153 Patent and the prior art references discussed herein.

46. Based on my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a person of ordinary skill in the art at the time of the claimed invention. Additionally, I met at least these minimum qualifications to be a person having ordinary skill in the art at least as of April 15, 2013. Further, although my qualifications may exceed those of the hypothetical person having ordinary skill in the art defined above, my analysis and opinions regarding the '153 Patent have been rendered from the perspective of a person having ordinary skill in the art at the time of the invention.

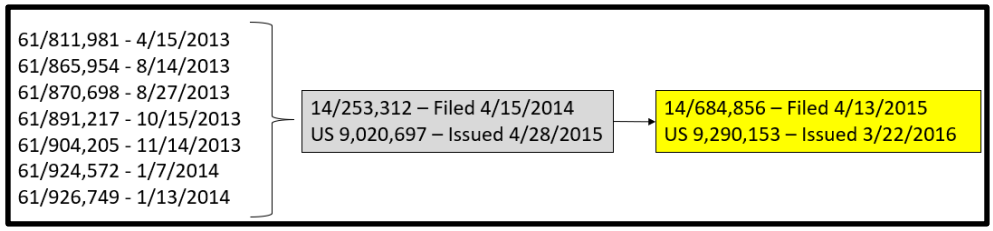
47. Intentionally left blank.

IV. U.S. Patent No. 9,290,153 to Ricci

A. Priority Claim

48. The ’153 Patent claims priority to a series of provisional patent applications: Application No. 61/811,981 filed on April 15, 2013, Application No. 61/865,954 filed on August 14, 2013, Application No. 61/870,698 filed on August 27, 2013, Application No. 61/891,217 filed on October 15, 2013, Application No. 61/904,205 filed on November 14, 2013, Application No. 61/924,572 filed on January 7, 2014, and Application No. 61/926,749 filed on January 13, 2014. (’153 Patent, Ex. 1001, Cover.)

49. U.S. Application No. 14/684,856 was filed on April 13, 2015, as a continuation of the ’697 Patent, and issued on March 22, 2016 as U.S. 9,290,153. (’the 153 Patent, Ex. 1001, Cover.) The ’153 Patent is also asserted in the Related Litigation. A graphic of the ’153 Patent Family is provided below, with the ’153 Patent highlighted in yellow and the related ’697 Patent shaded in gray:



The ’153 Patent Family

B. Overview of the ’153 Patent

50. U.S. Patent No. 9,290,153 (“the ’153 Patent”) titled “Vehicle-based multimode discovery” was filed on April 13, 2015, and issued on March 22, 2016.

('153 Patent, Ex. 1001, Cover.)

51. The '153 Patent relates to "[m]ethods and systems for a device discovery daemon that bases access of a communication device to an on board vehicle network on device location." ('153 Patent, Ex. 1001, Abstract.) The '153 Patent discloses that the device discovery daemon utilizes a desktop manager to enable customizable "desktop configuration[s]" on "the user interface of the vehicle control system 204" based on the devices information and capabilities. ('153 Patent, Ex. 1001, 57:63-58:6.) The '153 Patent explains that "[t]he overall design and functionality of the systems provide for an enhanced user experience making the automobile more useful and more efficient." ('153 Patent, Ex. 1001, 23:34-36.)

52. The '153 Patent seeks to improve vehicle comfort: "Several manufacturers have added comfort features in vehicles . . . [h]owever, because these manufacturers have added features to a conveyance, they have built comfort around a vehicle and failed to build a vehicle around comfort." ('153 Patent, Ex. 1001, 2:55-62.)

53. The '153 Patent also seeks to reduce driver distractions while enhancing passenger enjoyment:

> The present disclosure can provide a number of advantages depending on the particular aspect, embodiment, and/or configuration. . . . The

> application of accessibility technologies to the driver's screen can successfully reduce driver distractions while enabling the driver to perform permissible computational tasks. The availability of accessibility technologies in the vehicle can not only comply with prevailing legal requirements but also enhance passenger enjoyment. . . . The use of media filters and restrictions based on one or more of the identity of the vehicle occupant requesting media content, the identity of a portable computational device associated with the vehicle occupant, and the spatial location of the vehicle occupant and/or remote computational device can enable compliance with prevailing laws regarding driver distractions while providing the vehicle owner with the ability to control media access by one or more selected vehicle occupants. The use of user accounts to control passenger access to vehicle tasks, functions, and operations can prevent a non-driving passenger, for instance, from controlling a critical vehicle task, function or operation and confusing or frustrating the driver. The inactive control surface can enable a vehicle occupant to perform tasks, functions and operations without viewing his or her screen. This provides yet another convenient method for driver control of vehicle and non-vehicle tasks, functions, and operations without distraction while driving the vehicle.

('153 Patent, Ex. 1001, 14:63-15:43.)[1]

[1] Unless I indicate otherwise, all underlining and emphasis used in my declaration has been added.

54. With reference to Figure 1, the ’153 Patent discloses a vehicle environment 100 with internal and external areas associated with a vehicle 104, including a first “interior zone 108”; a second zone 112 that “is exemplary of the range of those [vehicle] sensors and what can be detected by those sensors associated with the vehicle 104”; and a third “area 116 that includes all areas beyond the sensor range 112.” (’153 Patent, Ex. 1001, 23:40-65.)

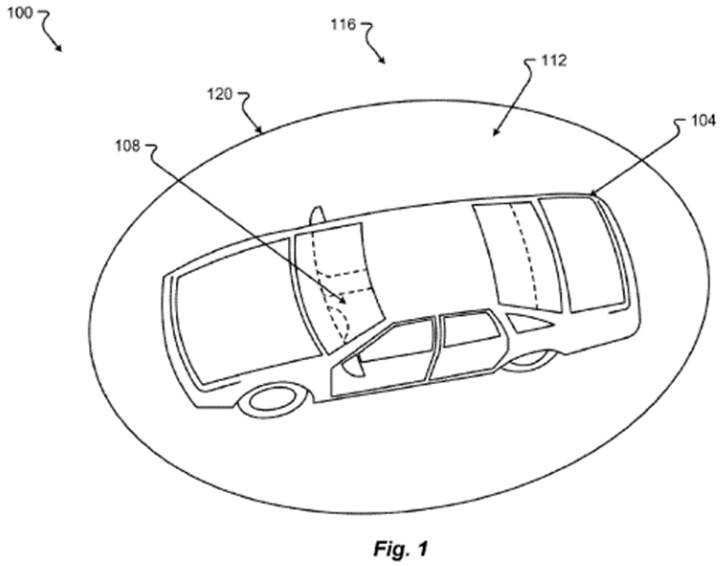
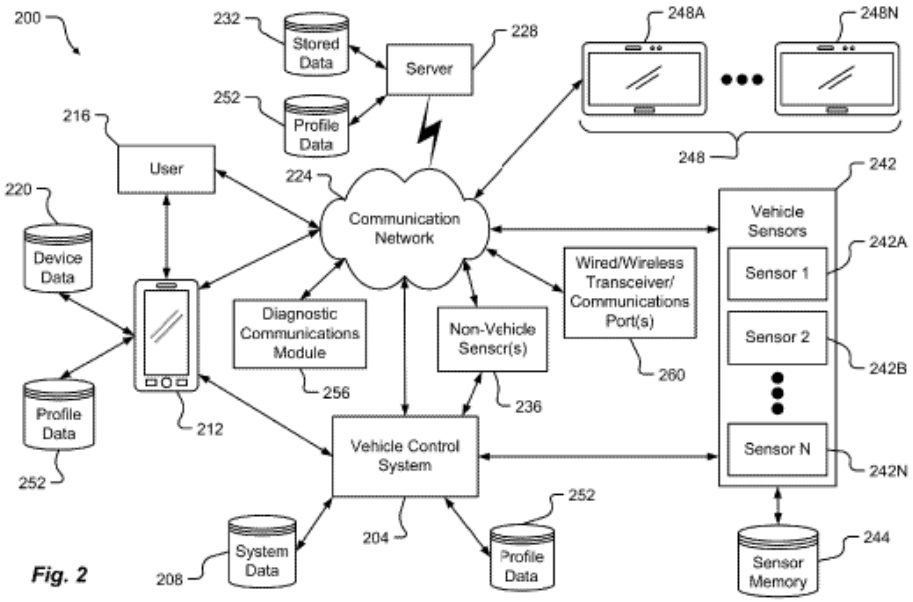


Fig. 1

’153 Patent, Ex. 1001, Fig. 1

55. Referring to Figure 2, the ’153 Patent discloses a “vehicle control system 204 [that] may communicate with a device or user interface 212, 248” that “may be operable to receive user input either through touch input, on one or more user interface buttons, via voice command, via one or more image sensors, or through a graphical user interface[.]” (’153 Patent, Ex. 1001, 24:19-24.)



'153 Patent, Ex. 1001, Fig. 2

56. "The device 212, 248 can be a mobile device . . . that is either permanently located in or temporarily associated with, . . . the vehicle 104" and "the vehicle control system 204 can interface with the device 212, 248 and leverage the device's computing capability to provide one or more of the features or functions . . . ." ('153 Patent, Ex. 1001, 24:27-35.) The '153 Patent refers to the device 212 using a plurality of interchangeable terms, such as "mobile," "portable," a "communication device," and a "computational device". ('153 Patent, Ex. 1001, 86:40-42, 17:3-17:14, 24:27-32.) The '153 Patent also uses the terms computational device and communication device interchangeably, e.g. "[t]he VNC software 2116 effectively provides the remote computational device 2120 (e.g., portable communication device) with remote access to the board 2104, ..." ('153

Patent, Ex. 1001, 100:45-48.)

57. "The vehicle control system 204 may also communicate with or through a communication network 224" that "can represent any type of wireless and/or wired communication system that may be included within the vehicle 104 or operable to communicate outside the vehicle 104." ('153 Patent, Ex. 1001, 25:52-57.) The communication network 224 within the vehicle may include "a Bluetooth® wireless system, an 802.11x (e.g., 802.11G/802.11N/802.11AC, or the like, wireless system), a CAN bus, an Ethernet network within the vehicle 104, or other types of communication networks." ('153 Patent, Ex. 1001, 25:59-64.)

58. The '153 Patent discloses accessing and controlling a vehicle system from a device located external to the vehicle with reference to Figure 5A. The '153 Patent explains that "the location of the device 212, 248 relative to the vehicle 104 may determine vehicle functionality and/or features to be provided and/or restricted to a user 216." ('153 Patent, Ex. 1001, 34:3-5.) For example, "a device 212, 248 associated with a user 216 may be located at a second outside area 520 from the vehicle 104." ('153 Patent, Ex. 1001, 34:6-7.)

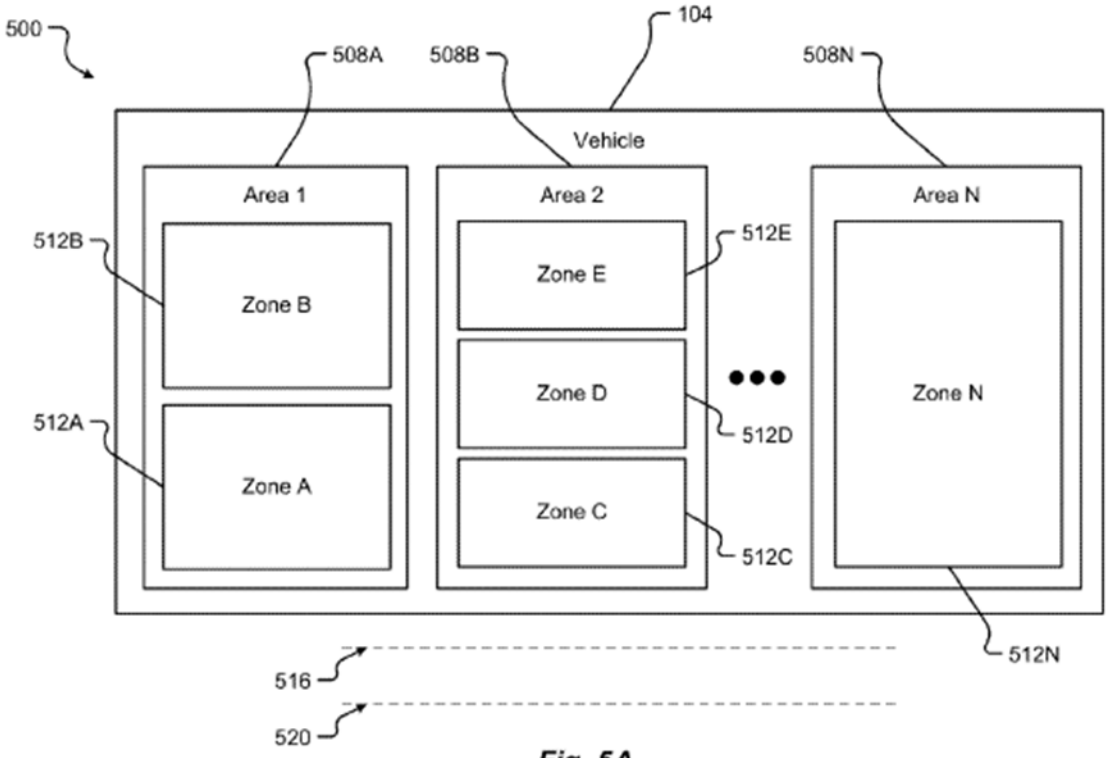


Fig. 5A

'153 Patent, Ex. 1001, Fig. 5A

59. Since the portable device 218, 248 is located far away from the vehicle "at or beyond the second outside area 520[] the vehicle 104 may lock one or more features (e.g., ignition access, vehicle access, communications ability, etc.) associated with the vehicle 104." ('153 Patent, Ex. 1001, 34:10-13.) By "lock[ing]" "vehicle access" and "ignition access", the '153 Patent is describing not permitting passive entry and passive start functionality based on the location of the device 212, 248 relative to the vehicle 104. ('153 Patent, Ex. 1001, 34:12-13.)

60. Referring to Figure 5B, the '153 Patent also discloses accessing and controlling a vehicle system from a device located within the vehicle. The '153

Patent discloses zones 512A-N associated with different locations of the vehicle and that "the zone 512 the user device is located in may have an impact on the type of communications, available bandwidth, the types of other devices or vehicle systems or subsystems the device could communicate with." ('153 Patent, Ex. 1001, 34:49-53.) For example, "[o]nly devices in [the front seat] area 1 508A may be able to access vehicle control functions such as when 'parents' are located in area 1 508A and the children are located in area 2 508B." ('153 Patent, Ex. 1001, 35:25-28.) However, devices located in the rear passenger compartment, e.g., "area 2 508B devices can be provided with full access to multimedia and infotainment available within the vehicle 104" but "may be restricted from any access to vehicle functions." ('153 Patent, Ex. 1001, 35:22-25.)

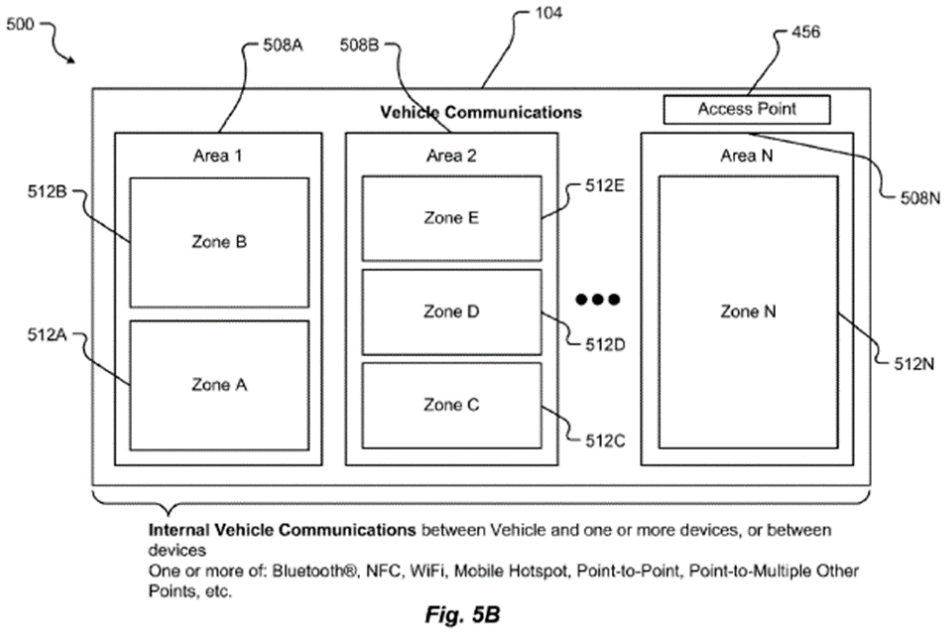


Fig. 5B

'153 Patent, Ex. 1001, Fig. 5B

61. With reference to Figure 10, the ’153 Patent discloses that “[a] device discovery daemon 1020 may be a computer program that runs as a background process that can discover new devices that connect with the network 356 or communication subsystem 1008 or devices that disconnect from the network 356 or communication subsystem 1008.” (’153 Patent, Ex. 1001, 57:32-36.) “The device discovery daemon 1020 can ping the network 356 (the local subnet) when the vehicle 104 starts, when a vehicle door opens or closes, or upon the occurrence of other events.” (’153 Patent, Ex. 1001, 57:36-39.) “[T]he device discovery daemon 1020 may force Bluetooth®, USB, and/or wireless detection. For each device that responds to the ping, the device discovery daemon 1020 can populate the system data 208 with device information and capabilities, using any of one or more protocols.” (’153 Patent, Ex. 1001, 57:40-44.)

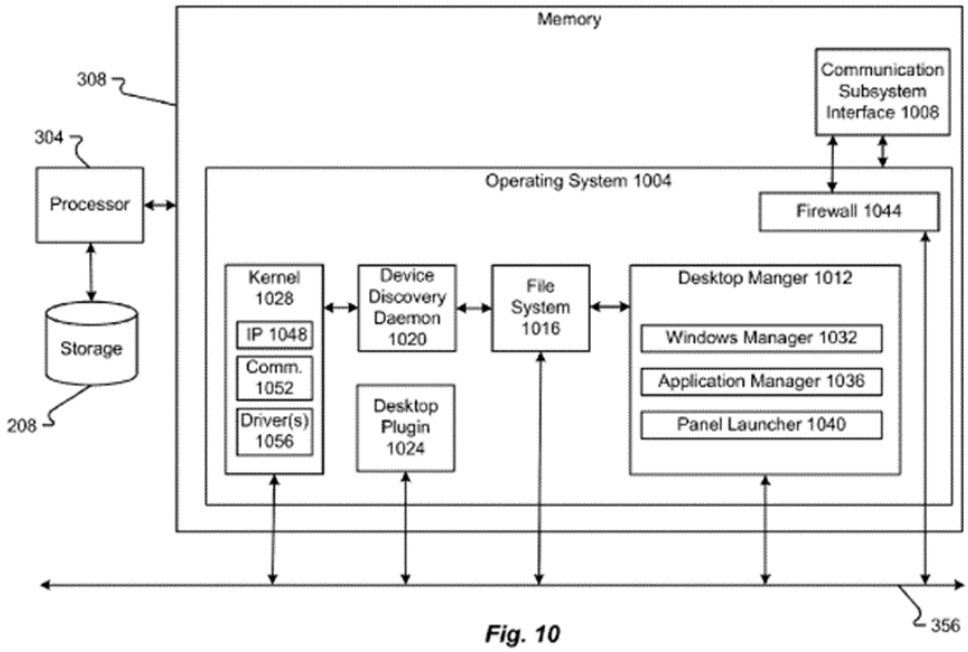


Fig. 10

'153 Patent, Ex. 1001, Fig. 10

62. The '153 Patent explains that "the device discovery daemon 1020 can determine device capabilities based on the opened ports the device exposes" e.g., "[i]f a camera exposes port 80, then the device discovery daemon 1020 can determine that the camera is using a Hypertext Transfer Protocol (HTTP)." ('153 Patent, Ex. 1001, 57:52-56.) Further, "[w]hen a scan stops, the device discovery daemon 1020 can trigger a dashboard refresh to ensure the user interface reflects the new devices on the desktop." ('153 Patent, Ex. 1001, 57:60-62.)

63. The '153 Patent further explains that device capabilities may include a communication ability (e.g., Bluetooth and 4G), associated hardware and software of the device, operating system, services running, device type, etc.:

> Examples of device capabilities may include, but are not limited to, a communications ability (e.g., via wireless network, EDGE, 3G, 4G, LTE, wired, Bluetooth®, Near Field Communications (NFC), Infrared (IR), etc.), hardware associated with the device (e.g., cameras, gyroscopes, accelerometers, touch interface, processor, memory, display, etc.), software (e.g., installed, available, revision, release date, etc.), firmware (e.g., type, revision, etc.), operating system, system status, and the like.

('153 Patent, Ex. 1001, 66:26-35.)

> In step 2004 and as noted above, the device discovery daemon 1020 accesses computational device accesses configuration and other information and capabilities of the connected computational device. This information can include device type and/or class, manufacturer name, product and/or device identifier or name, firmware identification, services running, device operating system, network address(es), capabilities, user credentials, and the like. The device discovery daemon 1020 can determine presence of the computational device on any input channel, such as Ethernet, USB, WiFi, Bluetooth, and the like.

('153 Patent, Ex. 1001, 92:63-93:6.)

64. The '153 Patent further discloses that a "desktop manager 1012 may be a computer program that manages the user interface of the vehicle control system 204." ('153 Patent, Ex. 1001, 57:63-58:6.) "[A] desktop manager 1012 can manage one or more graphical user interfaces (GUI) in a desktop environment."

('153 Patent, Ex. 1001, 56:42-44.) Further, "[t]he desktop environment may be designed to be customizable and allow the definition of the desktop configuration look-and-feel for a wide range of appliances or devices from computer desktops, mobile devices, computer tablets, etc." ('153 Patent, Ex. 1001, 57:65-58:1.)

65. The '153 Patent describes "an operation of the device discovery daemon 1020" with reference to Figure 20. ('153 Patent, Ex. 1001, 91:53-54.) "[T]he device discovery daemon 1020 detects a computational device attempting to connect to or otherwise connectable with the vehicle network 356 or communication subsystem 1008 and, applying rules, determines when it is appropriate to connect with the computational device." ('153 Patent, Ex. 1001, 91:55-60.) "In step 2000, the device discovery daemon 1020 detects a computational device connectable with the vehicle network 356 or communication subsystem 1008." ('153 Patent, Ex. 1001, 92:29-31.)

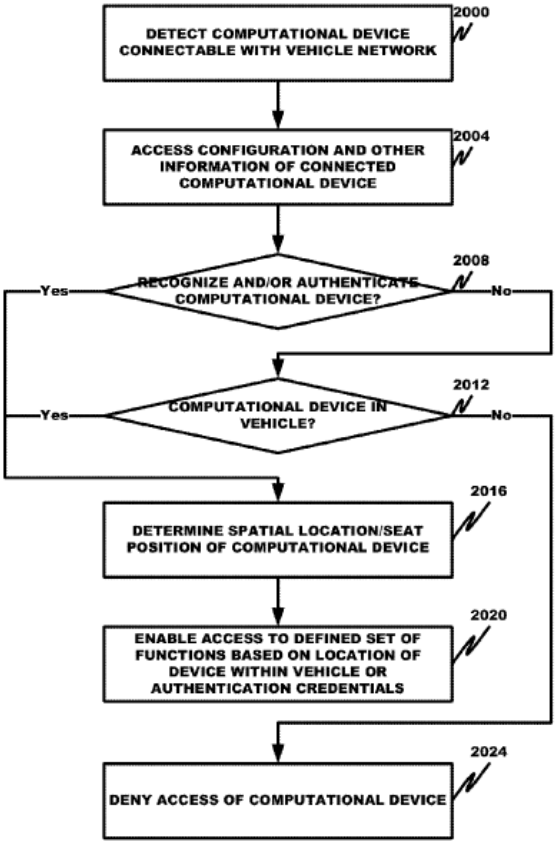


Fig. 20

'153 Patent, Ex. 1001, Fig. 20

66. As illustrated in step 2020 of Figure 20 above, the device discovery daemon "ENABLE[s] ACCESS TO [a] DEFINED SET OF FUNCTIONS BASED ON [the] LOCATION OF [the] DEVICE." ('153 Patent, Ex. 1001, 96:17-25.) The '153 Patent clarifies that location means permitting the computational device to connect with the vehicle network 356 or communication subsystem 1008 to perform a "set of tasks, functions, and/or operations" based on the location of the computational device:

> In step 2020, the device discovery daemon 1020 permits or enables connection of the computational device with the vehicle network 356 or communication subsystem 1008 and optionally stipulates or defines what set of tasks, functions, and/or operations the user of the computational device can perform using the computational device, such as based on the location of the computational device within the vehicle and/or based on the authentication credentials (e.g., the identity of the computational device user).

('153 Patent, Ex. 1001, 96:17-25.)

67. At step 2024, the device discovery daemon 1020 denies access to the defined set of functions if the device is outside a defined area or zone:

> When the computational device is determined to be outside of a defined area and/or zone of the vehicle (e.g., outside the passenger compartment or cabin) and the device discovery daemon 1020 does not recognize and/or authenticate the computational device successfully, the device discovery daemon 1020, in step 2024, denies access of the computational device to connect to or access the vehicle network 356 or communication subsystem 1008.

('153 Patent, Ex. 1001, 96:26-33.)

68. The '153 Patent uses the terms "step", "operation", and "function" interchangeably for describing the steps of the method, for example:

> The present disclosure can include a method, vehicle, and/or tangible and non-transient computer readable medium comprising the steps, operations, and/or functions of:

> (a) determining, by a microprocessor executable device discovery daemon, that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle;

('153 Patent, Ex. 1001, 4:47-53.)

69. The '153 Patent explains that "'Connectable' can refer to the computational device being physically within the vehicle, the computational device having a threshold signal strength or connection quality with the vehicle network, the computational device being configured properly to connect with the vehicle network, and the like." ('153 Patent, Ex. 1001, 92:31-36.) The '153 Patent does not quantify the threshold signal strength or connection quality, beyond referencing ranges defined by certain standards or protocols, e.g., "some wireless protocols, particularly WiFi™, use an access point (or hotspot) having a defined range, which can be commensurate with the area of the vehicle passenger cabin." ('153 Patent, Ex. 1001, 93:22-25.)

70. Further, the '153 Patent discloses that "[a] level of confidence can be assigned by the device discovery daemon 1020 to the computational device indicating a likelihood or probability that the computational device is located within the passenger compartment." ('153 Patent, Ex. 1001, 93:47-50.) The '153 Patent does not quantify the level of confidence, instead it states that "[t]his level of confidence can be based on consideration and analysis of multiple of the

factors" and "[w]hen multiple factors indicate that the user is within the passenger compartment, a higher likelihood is assigned to that determination; likewise, when multiple factors indicate that the user is outside of the passenger compartment, a lower likelihood is assigned to the determination." ('153 Patent, Ex. 1001, 93:50-57.)

71. The '153 Patent also discloses that "device detection can be receipt of information from one or more on board sensors that a new occupant has entered the vehicle." ('153 Patent, Ex. 1001, 92:55-57.) The '153 Patent further explains that the information includes "a door opening or closing, a successful authentication of an occupant or computational device, a sensed load in a seat, detection of movement within the vehicle, and detection of initiation of a vehicle task, function or operation," for example, "a key inserted in an ignition, engine start up, and the like." ('153 Patent, Ex. 1001, 92:58-62.)

72. Independent claims 1 and 12 are directed to a vehicle system and method for discovering wireless communication devices connecting to a vehicle network, collecting the devices' information and capabilities, and updating the vehicle's graphical user interface to reflect the connected devices. Independent claim 1 is representative of claim 12 and is reproduced below:

1[pre]. A method, comprising:

> [1a] discovering, by a microprocessor executing a microprocessor executable device discovery daemon, one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle;
>
> [1b] for each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery daemon, system data with device information and capabilities; and
>
> [1c] refreshing, by the microprocessor executing a microprocessor executable desktop manager, graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

('153 Patent, Ex. 1001, claim 1.)

73. In my opinion, the technology of the challenged independent claims of the '153 Patent was old and well-known in the art by April 15, 2013. (*See* ¶¶ 91-133.)

74. The dependent claims add common features, e.g., limiting access to certain vehicle system functionality based on the location of a device (claims 4, 8, 15, 19), the communication device determining its own location (claims 5, 16), device discovery (claims 2-3, 6, 13-14, 17), and localization, or device positioning, strategies (claims 7, 9-10, 18, 20-21).

C. The '153 Patent File History

75. Flextronics AP, LLC filed U.S. Patent Application No. 14/684,856

was on April 13, 2015, with a preliminary amendment canceling claims 1-21 and adding claims 22-42. The application was filed with twenty claims, including independent claims 22 and 33. (’153 Patent File History, Ex. 1002, 2-9.)

76. The Patentee filed an information disclosure statement (IDS) on July 21, 2015, listing over 200 references. (’153 Patent File History, Ex. 1002, 284-291.)

77. The Examiner issued a notice of publication on August 20, 2015, and subsequently, a notice of allowance on October 21, 2015, in which all twenty claims were allowed, without rejection or objection. (Ex. 1002, ’153 Patent File History, 499-507.)

78. The Examiner provided the following reasons for allowance:

> The prior art of record fails to teach - populating, by the device discovery daemon, system data with device information and capabilities; and refreshing, by a microprocessor executable desktop manager, graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

(’153 Patent File History, Ex. 1002, 506.)

79. On January 20, 2016, Patentee filed an Amendment after Notice of Allowance, amending independent claims 22 and 33 to clarify any potential ambiguity in the claims. (’153 Patent File History, Ex. 1002, 537-546.) Along with the Amendment, Patentee also filed a Power of Attorney to change the applicant to

AutoConnect Holdings LLC. (’153 Patent File History, Ex. 1002, 530-531.)

80. The application issued as the ’153 Patent on March 22, 2016. (Ex. 1002, ’153 Patent File History, 1.)

81. Moinzadeh (Ex. 1013), Clement (Ex. 1010), Ghabra (Ex. 1011), Rasin (Ex. 1015), and Bosch (Ex. 1050) were not considered during examination and are not cited on the ’153 Patent (’153 Patent, Ex. 1001, 1-3.)

D. Claim Construction

82. In order to properly evaluate these claims, I understand that the terms of the claims must first be construed. I also understand that, at the same time, absent some reason to the contrary, claim terms are typically given their ordinary and accustomed meaning as would be understood by one of ordinary skill in the art.

1. “daemon”

83. For the purpose of this declaration, I have been asked to apply the following claim construction for my analysis regarding unpatentability:

- **“*daemon*” as a “computer program”**

84. The independent claims require that the device discovery “daemon” is executed by a microprocessor. For example, independent claims 1 and 12 require “a microprocessor executable device discovery daemon.” A POSA would have understood that a microprocessor executes a computer program, i.e., software.

85. This interpretation is consistent with the '153 Patent specification, which discloses that "[a] device discovery daemon 1020 may be a computer program that runs as a background process that can discover new devices that connect with the network 356 or communication subsystem 1008 or devices that disconnect from the network 356 or communication subsystem 1008." ('153 Patent, Ex. 1001, 57:32-36.)

2. "*access or attempt to access the vehicle network and/or communication subsystem*"

86. For the purpose of this declaration, I have been asked to apply the following claim construction for my analysis regarding unpatentability:

- **"*access or attempt to access the vehicle network and/or communication subsystem*" as "*access or attempt to access* <u>[functionality of]</u> *the network and/or communication subsystem*"**

87. Claims [4c] and [15c] require *"(C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permit[ting] the computational device to access or attempt to access the vehicle network and/or communication subsystem*." Claims 4 and 15 each include three steps: (a), (b), and (c). Step (c) includes sub-steps (C1) and (C2). The "permitting" sub-step C1 follows the "*determin[ation]*" in claims [4a] and [15a] "*that a computational device is connected to or attempting to connect to a network and/or*

communication subsystem of a vehicle." Accordingly, a POSA would have understood that the term "*access*" in step (C1) must indicate more than mere connection to the network and/or communication subsystem, e.g., access to functions available through the vehicle network and/or communication system.

88. For example, the '153 Patent describes passive entry and passive start functionality with reference to Figure 5A and explains that "the location of the device 212, 248 relative to the vehicle 104 may determine vehicle functionality and/or features to be provided and/or restricted to a user 216." ('153 Patent, Ex. 1001, 34:3-5.) For example, "a device 212, 248 associated with a user 216 may be located at a second outside area 520 from the vehicle 104." ('153 Patent, Ex. 1001, 34:6-7.) Since the portable device 218, 248 is located far away from the vehicle "at or beyond the second outside area 520[] the vehicle 104 may lock one or more features (e.g., ignition access, vehicle access, communications ability, etc.) associated with the vehicle 104." ('153 Patent, Ex. 1001, 34:10-13.) By "lock[ing]" "vehicle access" and "ignition access", the '153 Patent is describing not permitting passive entry and passive start functionality based on the location of the device 212, 248 relative to the vehicle 104. ('153 Patent, Ex. 1001, 34:12-13.)

89. Accordingly, Ford is pursuing a construction of "*access or attempt to access*" as "access or attempt to access functionality of" such that the phrase "*access or attempt to access the vehicle network and/or communication*

subsystem" be construed as "*access or attempt to access* [functionality of] *the vehicle network and/or communication subsystem*" and not merely "accessing" or connecting to a network or subsystem, as the remote device is already connected as required by step (a).

90. Intentionally left blank.

V. State of the Art

91. As mentioned above, the '153 Patent relates to "[m]ethods and systems for a device discovery daemon that bases access of a communication device to an on board vehicle network on device location." ('153 Patent, Ex. 1001, Abstract.) The '153 Patent explains that such "communications systems and/or devices . . . provide for an enhanced user experience making the automobile more useful and more efficient." ('153 Patent, Ex. 1001, 23:30-36.) As such the '153 Patent relates to vehicle systems, including infotainment systems and their communication with other devices and systems.

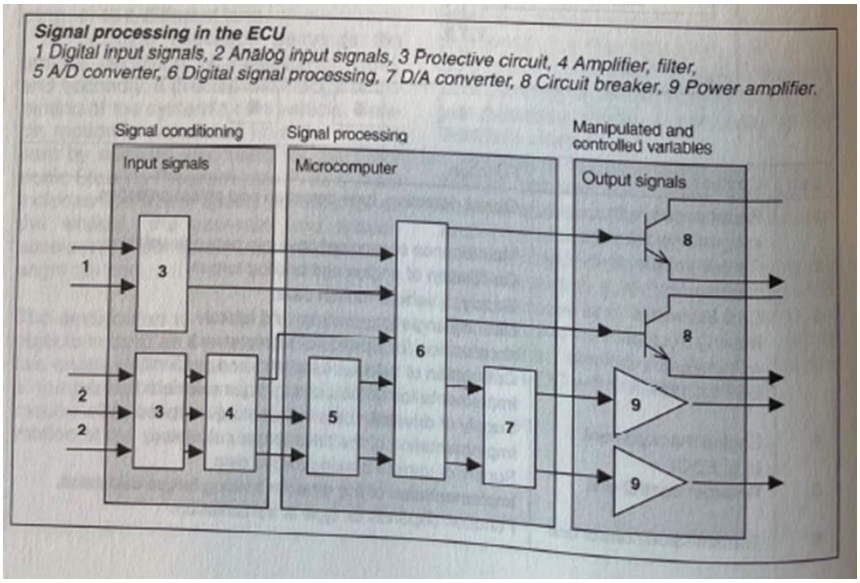
A. Automotive Electronic Control Units (ECUs)

92. At the time of the '153 Patent, automotive electronic control units (ECUs) for controlling vehicle functions were ubiquitous. For example, as of 2004, "[m]odern vehicles [were] equipped with 20 to 60 electronic control units."

(Bosch, Ex. 1050, p. 1064[2].) Further, "[w]ith modern semiconductor technology [in 2004], powerful microcomputers can be integrated on relatively few chips together with their accompanying program and data memories, and special peripheral circuits designed specifically for real-time applications." (Bosch, Ex. 1050, p. 1064.)

93. An ECU receives signals from vehicle sensors and "then converts to the signals required to adjust the final-control elements/actuators." (Bosch, Ex. 1050, p. 1064.) As illustrated in the figure below, "ECUs developed for use in motor vehicles all have a similar design. Their structure can be subdivided in the conditioning of input signals, the logic processing of these signals in the microcomputer, and the output of logic and power levels as regulation or control signals." (Bosch, Ex. 1050, p. 1065.)

[2] Bosch, Ex. 1050 is a true and accurate copy of a book that I understand was published by Robert Bosch GmbH in October 2004.



Bosch, Ex. 1050, p. 1064

94. A microcomputer includes: a microprocessor, input and output units (I/O), and memory. (Bosch, Ex. 1050, p. 94.) "The microprocessor represents the integration of a computers central processing unit on a single chip" and "can be programmed to meet the varied requirements associated with specific operating conditions." (Bosch, Ex. 1050, p. 94.) A "microprocessor," is a specific type of processor that "contains the logic elements for manipulating data and for making decisions.". (IEEE Dictionary, Ex. 1051, pp. 872, 693[3].) A POSA would have understood that the terms controller, microcomputer, processor, microprocessor, and ECU are often used interchangeably.

[3] IEEE Dictionary, Ex. 1051 is a true and accurate copy of a dictionary that I understand was published by IEEE in December 2000.

95. The ECU also includes software code that is stored in the memory and executed by the microprocessor to perform a series of operations. Semiconductor memories are divided into two main categories: volatile (short-term) memory (e.g., (RAM)) and non-volatile (long-term) memory (e.g., (ROM). (Bosch, Ex. 1050, pp. 94-95; IEEE Dictionary, Ex. 1051, p. 152.) A POSA would have understood that a transitory medium is temporary, such as a signal, whereas a non-transitory medium is a physical object where data can be stored, like a hard drive, Random Access Memory (RAM), Read-Only Memory (ROM), CD-ROM storage, or memory card.

96. Input and output units (I/O) are associated with physical and software (which are logical or virtual) ports. A port is "an interface point connecting a communications channel and a device." (IEEE Dictionary, Ex. 1051, p. 844.) For example, Universal Serial Bus (USB) ports are standardized physical connectors used to transfer data and connect peripherals (e.g., flash drives, keyboards, diagnostic tools, mobile devices). It was well known to connect an infotainment system to a peripheral device, e.g., a mobile phone, using a USB connection. (*See e.g.*, Moinzadeh, Ex. 1013, [0069]; Rasin, Ex. 1015, 3:4-13.)

97. A logical or virtual port is a software-defined endpoint or "abstraction of an access point to network communications." (IEEE Dictionary, Ex. 1051, p. 844.) A POSA would have understood that the term "port," would encompass both physical and software points of connection through which information may be

transferred. A POSA would have known that every port is associated with a port number, and these numbers correspond to specific services or applications.

98. Transmission Control Protocol/Internet Protocol (TCP/IP) is the protocol suite that was developed for the Internet. (IBM, Ex. 1060, p. 3[4].) In the TCP/IP protocols there are two components: a host address and a port number. There are 65535 port numbers, numbered from 1 to 65535. (IBM, Ex. 1060, pp. 73-74.) Logical ports are used by the TCP/IP protocols to direct network traffic to the correct application or service on a device. Port 80 is known to correspond to HTTP traffic. (IBM, Ex. 1060, p. 437.) For example, the default port used by web browsers to request web pages from web servers using HTTP, is port 80. The concept of ports allows different applications to share a single network connection. Logical ports do not correspond to physical ports. Multiple logical ports can use the same physical port. A port can be open, closed, or blocked. If a port is closed, the host issues a response that connection attempts to the port will be denied. If a port is blocked, the host does not send a response. A port scanner is an application designed to identify open ports. Port scanning has been known for as long as computer networking has been in existence. For example, Nmap (Network

[4] IBM, Ex. 1060 is a true and accurate copy of a guide that I understand was published by International Business Machines Corporation in October 1998.

Mapper) is a popular tool for port scanning. "An excellent program for this job is nmap, which not only checks out the ports of your machine, but also draws some conclusions as to which services are waiting behind them." (Linux, Ex. 1065, p. 506, *see also* 454[5].) Nmap was first released in 1997. At the time of the invention, the concept of ports and scanning for open ports had been known for decades. It was also known to use a mobile device to interact with a proxy server through a uniquely assigned port, which serves a similar purpose as a virtual port in terms of identifying and routing data. (*See* Papakostas, Ex. 1014, [0025]-[0027].)

B. Vehicle Communication Systems

99. Vehicle systems may communicate with portable devices located within the vehicle, and external to the vehicle, through wired and wireless communication. A remote keyless entry system is able to may communicate with a portable device (e.g., key fob) that may be located outside of the vehicle and a vehicle infotainment system may communicate with a portable device (e.g., a smart phone or tablet) located inside of the vehicle.

1. Multimedia Systems

100. Multimedia systems combine different media, e.g., "radio, cassette

[5] Linux, Ex. 1065 is a true and accurate copy of an administration guide that I understand was published by Suse Linux AG in 2004.

player, CD player, phone, navigation and traffic telematics equipment, and even computer, video player, and TV." (Bosch, Ex. 1050, p. 1118.) Infotainment refers to the combination of information and entertainment. Vehicle infotainment systems at the time of the alleged invention were integrated multimedia interfaces that provide drivers and passengers with access to navigation, music, communication, and vehicle controls through touchscreen displays, voice commands, and/or manual buttons. These systems were becoming increasingly connected to smartphones and/or portable media players via technologies like USB and Bluetooth, Apple CarPlay, and Android Auto, enabling users to access apps, make calls, send texts, and stream media directly through the vehicle's interface. Such infotainment systems include microprocessors that execute software or computer programs to facilitate such communication.

101. By the mid-2000s, as mobile phones became more advanced, vehicle infotainment systems that interacted with mobile devices became widely available. Multiple automotive manufacturers, including Ford and Fiat, had commercialized infotainment systems that interacted with mobile devices by that time. For example, Ford released its Sync Infotainment system in the 2007 and Fiat released its Blue&Me in-vehicle infotainment system in 2006. (Ghangurde, Ex. 1058, pp. 100, 102-103.)

a. Ford SYNC Technology

102. Partnering with Microsoft in 2006, Ford sought to develop a vehicle infotainment system that focused on affordability and accessibility, while "[p]romoting hands-free use of cell phones and media devices[.]" (Ghangurde[6], Ex. 1058, p. 101.) Ford's SYNC Gen1 system was first released in 2007, which enabled drivers to use voice activated commands for phone conversations and music control, automatically connected devices with the in-vehicle microphone and sound system, Bluetooth media streaming, voice-activated navigation, advanced voice recognition software, contact data transferring, and text-to-voice online messaging control. (Ghangurde, Ex. 1058, pp. 102-103.)

103. The SYNC Gen1 system enabled drivers to connect both a digital media player and a mobile phone to the vehicle—media players via a USB cable, and phones via Bluetooth. The USB connection not only played media through the car's system but also charged the device. To connect a mobile phone, users first completed a one-time pairing process by entering a 6-digit PIN provided by the SYNC system. After that, the phone could automatically connect by selecting the "connect" option on the vehicle interface. (SYNC Supplemental Guide 2007, Ex.

[6] Ghangurde, Ex. 1058. Ghangurde is a true and accurate copy of a paper that I understand was published by *SAE International* on October 19, 2010.

1061[7], pp. 2-5, 34, 38-39, 43-44.) Additionally, SYNC Gen1 introduced a voice-activated navigation system that included a feature called "Traffic, Directions and Information Services." This feature used GPS to give drivers voice-guided traffic updates, turn-by-turn directions, and local business information, along with real-time updates like sports scores. Drivers could use voice commands to customize or adjust the navigation system. (SYNC Supplemental Guide 2010, Ex. 1062[8], pp. 2, 30-32.)

104. In 2010, Ford released an updated version of its original SYNC Gen1 system, SYNC 2, also known as MyFord Touch. The addition of MyFord Touch created several improvements to the SYNC system, including: an inventive touch screen infotainment display, a four-section main display that allowed for control/display of phone, navigational, entertainment and climate information simultaneously, traffic monitoring, emergency contact information, and voice-

[7] SYNC Guide 2007, Ex. 1061. The SYNC Guide 2007 is a true and accurate copy of a guide that I understand was published by Ford Motor Company in November 2007.

[8] SYNC Guide 2010, Ex. 1062. The SYNC Guide 2010 is a true and accurate copy of a guide that I understand was published by Ford Motor Company in January 2010.

activated climate control. (My Ford Touch Guide, Ex. 1064[9], pp. 2-9; *see also* Car and Driver, Ex. 1059[10], pp. 1-2.) These enhancements were implemented to improve the user experience and enhance overall customer satisfaction.

2. Passive Entry and Passive Start (PEPS) Systems

105. A remote keyless entry system includes a door module that communicates wirelessly, typically using radio frequency (RF) communication, with a remote key fob to control a door lock to lock and unlock. Key fobs include buttons that a user manually actuates to send a lock/unlock signal to a door module. (*See* Ghabra, Ex. 1011, 1:20-2:10.)

106. Passive systems were developed in which a key fob and vehicle system communicated with each other without manual activation by the user to

[9] MyFord Touch Guide, Ex. 1064. The MyFord Touch Guide is a true and accurate copy of a guide that I understand was published by Ford Motor Company in February 2012.

[10] Car and Driver, Ex. 1059. The Car and Driver is a true and accurate copy of an article that I understand was published by Car and Driver in January 2010. Car and Driver is available at https://www.caranddriver.com/news/a15128939/ford-introduces-next-gen-connectivity-suite-called-myford-should-be-awesome-car-news/, accessed on June 25, 2025.

provide passive entry to a vehicle and also passive starting of the vehicle. (*See* Ghabra, Ex. 1011, 4:57-63.)

107. PEPS systems initiate communication with the key fob by being either "triggered" (where the user initiates the process by touching something on the car, e.g., a door handle or engine start button) or through "polling" (where the system continuously or periodically scans for the key fob within range). (Ghabra, Ex. 1011, 4:57-63.)

C. User Convenience

108. Mobile phones may be connected to infotainment systems by wired (e.g., USB) communications or wireless connections. Bluetooth is a wireless technology that enables short-range communication between devices. Bluetooth 1.0 was released in 1999 (*see* Bluetooth Specification, Ex. 1052, Vol. 0, p. 62[11]) and became a ubiquitously available protocol that vehicle infotainment systems have been using to connect and exchange data with other devices (i.e. mobile

[11] Bluetooth Specification, Ex. 1052 is a true and accurate copy of a specification that I understand was published by Bluetooth Special Interest Group (SIG), Inc. in 2010. Bluetooth Specification, Ex. 1052 is available at https://www.bluetooth.com/specifications/specs/core-specification-4-0/, accessed on June 27, 2025.

phones) due to its low power consumption, cost, and ease of use.

1. Device Discovery

109. Bluetooth is a short-range wireless protocol operating in the unlicensed 2.4 GHz band, located within the ultra-High-Frequency (UHF) band between 300 MHz and 3 GHz. A Bluetooth device can be in one of three main states (Standby, Connection, Park); and within those states there are various substates. The Standby State "is the default state in the device. In this state, the device may be in a low-power mode." (Bluetooth Specification, Ex. 1052[12], Vol. 2, p. 151.) For the specific purpose of device discovery, the two critical substates are the Inquiry Substate and the Inquiry Scan Substate. (Bluetooth Specification, Ex. 1052, Vol. 2, pp. 160-163.)

[12] In this Declaration I am citing the Bluetooth 4.0 specification. However, as I state above, Bluetooth 1.0 was published in 1999.

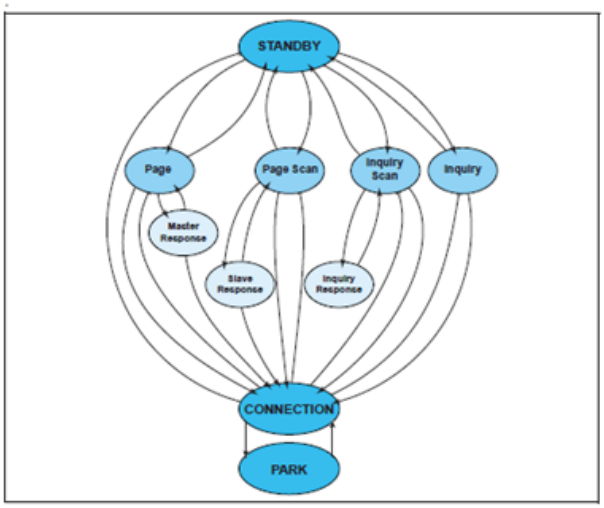


Figure 8.1: State diagram of link controller.

Bluetooth Specification, Ex. 1052, Vol. 2, p. 150, Figure 8.1

110. Bluetooth is far more than a radio. At the time of the invention, it was known that certain protocols that are part of Bluetooth can run in the background. Generally, an application that "runs in the background" has the following characteristics:

- operates continuously even when the vehicle is parked;
- not started and terminated by user commands but may be configured for background operation.

111. At the time of the invention, background operation was well known. Further, it was known that certain protocols that are part of the Bluetooth specification can run in the background. Bluetooth depends on "[a]t least two background daemons . . . hcid (*host controller interface*), which serves as an interface for the Bluetooth device and controls it, and sdpd (*service discovery*

protocol).” (Linux, Ex. 1065[13], p. 207.) Common protocols like SDP enabled this functionality by allowing “for automatic recognition and configuration between two devices of different types and from different manufacturers.” (MDDI, Ex. 1063[14], p. 7.) I note that a POSA would have known that Bluetooth includes both device discovery and service discovery protocols. Device discovery involves scanning for nearby Bluetooth devices, while service discovery involves identifying specific capabilities or functionalities offered by these devices.

112. Such background apps in vehicles play a crucial role in providing seamless connectivity between the vehicle and a user device, without requiring manual setup each time a user enters the vehicle. For example, Bluetooth devices can remember previously connected devices and automatically re-establish the connection when the devices are in range, eliminating the need for repeated pairing. In essence, a vehicle’s "device discovery" must run in the background to facilitate seamless integration and functionality between the car's infotainment

13

[14] MDDI, Ex. 1063 is a true and accurate copy of an article that I understand was published by Medical Device and Diagnostic Industry on February 1, 2002. MDDI, Ex. 1063 is available at https://www.mddionline.com/new-technologies/bluetooth-the-future-of-wireless-medical-technology-, accessed on June 30, 2025.

system and various other devices, enhancing the overall driving and connectivity experience.

113. An infotainment system may include a program that runs in the background. For example, Clement discloses an infotainment system with receivers 610 that take signal strength measurements continuously to detect the location of a portable device within a vehicle, enabling the location system 330 to run in the background, without being turned on by a user. (Clement, Ex. 1010, 7:23-32.)

114. Passive entry systems may also include programs that run in the background to detect a user approaching a vehicle. Such systems include transmitters and receivers that communicate with each other to detect and authenticate an approaching user. (*See e.g.*, Lickfelt, Ex. 1012, [0005]; Ghabra, Ex. 1011, 2:21-41.)

115. However, even with Bluetooth's automatic connectivity, the ability for a device to enter the standby state allows for a reduction in power consumption. A device/controller may leave the standby state and enter into a substate in response to a trigger event:

> To move from one state or substate to another, either commands from the link manager are used, or internal signals in the link controller are used (such as the trigger signal from the correlator and the timeout signals).

(Bluetooth Specification, Ex. 1052, Vol. 2, p. 150.)

116. To discover other devices, the device enters the Inquiry Substate:

> In [the inquiry] substate, it shall repeatedly transmit the inquiry message (ID packet . . .) at different hop frequencies. The inquiry hop sequence is derived from the LAP [Lower Address Part] of the GIAC [General Inquiry Access Code]. . . . A device that allows itself to be discovered, shall regularly enter the inquiry scan substate to respond to inquiry messages.

(Bluetooth Specification, Ex. 1052, Vol. 2, p. 160.)

117. During the Inquiry Substate, "the discovering device collects the Bluetooth device addresses and clocks of all devices that respond to the inquiry message. . . . It can then, if desired, make a connection to any one of the discovered devices . . . ." (Bluetooth Specification, Ex. 1052, Vol. 2, p. 160.)

118. Bluetooth devices assume the roles of master and slave depending on their behavior in the inquiry procedure. The master transmits inquiry messages, and the slave responds with an inquiry response packet:

> Although master and slave roles are not defined prior to a connection, the term *master* is used for the inquiring device and slave is used for the inquiry scanning device. . . . During the inquiry procedure, the master shall transmit inquiry messages with the general or dedicated inquiry access code. . . . An inquiry response packet is transmitted from the slave to the master after the slave has received an inquiry message (see Table 8.5 on page 165).

(Bluetooth Specification, Ex. 1052, Vol. 2, p. 81.)

119. Once the proper inquiry access code is received, the device will enter the Connection State, where a "connection has been established and packets can be sent back and forth." (Bluetooth Specification, Ex. 1052, Vol. 2, p. 165.) "The first information packets [in this state] contain control messages that characterize the link and give more details regarding the devices." (Bluetooth Specification, Ex. 1052, Vol. 2, p. 165.) Once the proper response packets are retrieved, the device enters an active mode where the Bluetooth pairing is finalized, at which point the controller and devices can enter and/or complete differing functions based upon a given device need or request.

120. Further, Papakostas discloses a system that monitors and determines a mobile device's identity and information ("*capabilities*") based on its open ports, e.g., model of mobile device, phone number associated with the mobile device, and/or unique identifier of the panelist or mobile device. (Papakostas, Ex. 1014, [0013], [0022].) Papakostas discloses that its "client devices 110, 130 are mobile devices and communicate via the first and second wireless communication links 120, 140," which could be "cellular communication links" or "a Bluetooth connection." (Papakostas, Ex. 1014, [0016]-[0017].)

121. A port is defined as "[a]n interface point connecting a communications channel and a device," and also as "[a]n abstraction of an access

point to network communications." (IEEE Dictionary, Ex. 1051, p. 844.) A POSA would have understood that the term "port," as used in Papakostas, would encompass both physical and virtual points of connection through which information may be transferred. Given that the communication between the system and the communication device can occur wirelessly and that the system uses software processes (e.g., a daemon) to facilitate monitoring, a POSA would have recognized that the referenced "open port" describes a virtual port used by software to facilitate communication.

2. Customization

122. Infotainment system customization allows drivers to personalize their in-car experience by adjusting various settings, apps, and visual elements. This can include rearranging home screen icons, setting up user profiles, adjusting navigation preferences, and customizing visual appearance like color schemes. (Auto News, Ex. 1057[15],1-6; Moinzadeh, Ex. 1013; Rasin, Ex. 1015.) Many systems also allow for smartphone integration, application downloads, and

[15] Auto News, Ex. 1057 is a true and accurate copy of an article that I understand was published by Automotive News on October 7, 2008, and is available at https://www.autonews.com/article/20081007/ZZZ_SPECIAL/310079921/ford-launches-parental-control-technologies/ accessed on June 24, 2025.

personalized shortcuts. For example, the Ford Sync system allows users to customize voice-command shortcuts for frequently accessed features such as climate control or selecting radio stations. (Ex. 1062, p.2, 30-32; Ex. 1064, pp. 9, 11.)

123. Ford's MyKey system also adds an additional layer of vehicle personalization but focuses on safe driving habits. For example, vehicle owners can program specific restrictions for designated keys, including setting maximum speed limits, disabling the ability to deactivate traction control, limiting audio system volume, early low-fuel warnings, etc. (Auto News, Ex. 1057, pp. 1-6.)

D. Safety Concerns

124. While advancements in vehicle technology and infotainment have brought many valuable benefits to drivers, they have also introduced new considerations and potential challenges that warranted thoughtful attention.

1. Driver Distraction

125. A key concern that came with the advancements in mobile phones and use in vehicles was the increase in distracted driving. In 2001, New York was the first state to enact a law banning handheld cell phone use while driving. (McCartt,

Ex. 1054[16], 1.) Many states followed with bans on texting while driving, with Washington being the first to enact such a law in 2008. (McCarrtt, Ex. 1054, 1.) Between 2006 and 2010, the National Highway Traffic Security Administration ("NHTSA") reported a four percent (14,000 people) increase in vehicle crashes related to distracted driving. (*See* NHTSA, Ex. 1055[17], p. 4 (table 5).) As access to music, navigation, and phone features through vehicle systems became more seamless and user-friendly, it also highlighted the importance of developing solutions to help minimize potential driver distraction.

126. One of the primary approaches to address driver distraction was to limit access to certain features within the vehicle interface. Ford took a proactive approach to reducing driver distraction by introducing a "Do Not Disturb" feature

[16] McCartt, Ex. 1054. The McCartt is a true and accurate copy of a paper that I understand was published by Annals of Advances in Automotive Medicine for the Engaged Driving Symposium on March 31, 2014. McCartt, Ex. 1054 is available at https://pmc.ncbi.nlm.nih.gov/articles/PMC4001674/, accessed on July 1, 2025.

[17] NHTSA, Ex. 1055 is a true and accurate copy of a research note that I understand was published by the National Highway Traffic Safety Administration in September, 2012. NHTSA, Ex. 1055 is available at https://www.nrd.nhtsa.dot.gov/CATS/index.aspx, accessed on June 24, 2025.

within its SYNC connectivity system, that limits access to certain functions when a vehicle is in motion. (Motor Trend, Ex. 1056[18], pp. 1-2.) When activated, this feature automatically blocks incoming text messages and phone calls from a connected Bluetooth device, while still allowing voice-activated outgoing calls and access to emergency services through the enhanced 911 Assist feature. (Motor Trend, Ex. 1056, p. 3.)

127. Ford also implemented automatic restrictions on certain SYNC features when a vehicle is in motion. These restrictions include disabling access to screens that display non-driving related information, as well as preventing actions that involve typing on a keyboard, manually adding contacts, pairing a Bluetooth phone, or playing video on the navigation display. However, many of these features remain accessible through SYNC's voice-command system, which allows drivers to stay connected while maintaining focus on the road. (Motor Trend, Ex. 1056, p. 4.)

[18] Motor Trend, Ex. 1056 is a true and accurate copy of an article that I understand was published by Motor Trend in July 2010. Motor Trend, Ex. 1056 is available at https://www.motortrend.com/news/163-news100712-ford-sync-do-not-disturb, accessed on June 24, 2025.

2. Security

128. Another area of concern that evolved from the advancements in vehicle technology and infotainment was the risk of improper access. This concern led to the development of several security enhancement strategies such as user authentication technology and vehicle disablement upon theft.

129. One of the ways this device discovery process has helped with security concerns is using it to authenticate and authorize a device. Authentication is a "procedure [] based on a challenge-response mechanism . . . ." (Bluetooth Specification, Ex. 1052, Vol. 3, p. 393.) "The verifier sends . . . a random number (the challenge) to the claimant. The claimant calculates a response, that is a function of this challenge, the claimant's BD_ADDR and a secret key. The response is sent back to the verifier, that checks if the response was correct or not." (Bluetooth Specification, Ex. 1052, Vol. 2, p. 247.) Authorization is "[a] procedure where a user of a Bluetooth device grants a specific (remote) Bluetooth device access to a specific service. Authorization implies that the identity of the remote device can be verified through authentication." (Bluetooth Specification, Ex. 1052, Vol. 3, p. 393.)

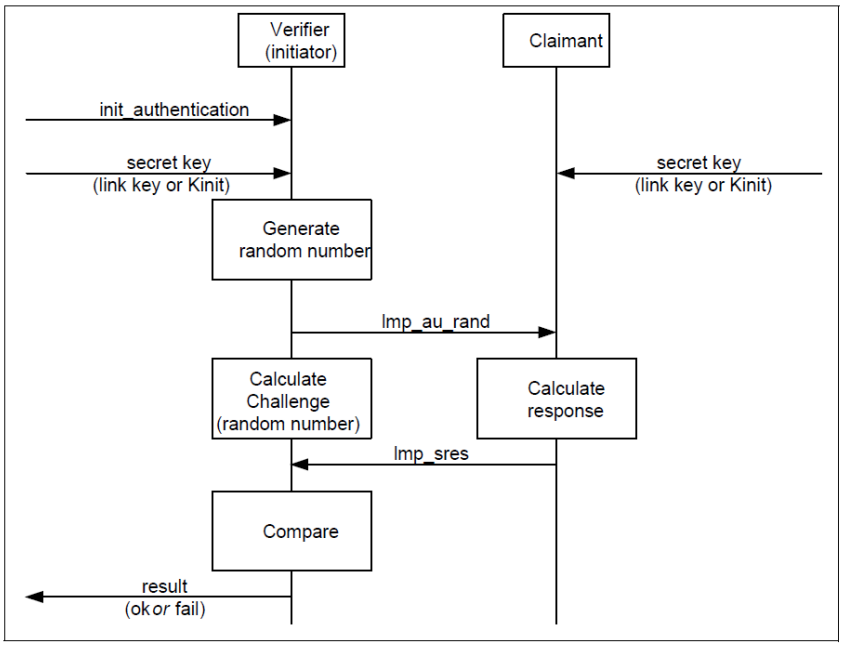


Figure 17.1: LMP-authentication as defined by [2].

Bluetooth Specification, Ex. 1052, Vol. 3, p. 398, Figure 17.1

130. Similarly, passive entry systems may authenticate a fob before allowing it to access the vehicle network by using unique identifier numbers or security codes. (*See* Ghabra, Ex, 1011, 3:57-67, 4:8-40.)

E. Positioning Methods

131. At the time of the invention, wireless positioning techniques, both outdoor and indoor, had become very popular. For example, just Bluetooth provides multiple signal parameters that may be used for determining the location of a mobile device, including: Link Quality, Received Signal Strength (RSSI),

Transmit Power Level (TPL), and Inquiry Result with RSSI. (Hossain, Ex. 1053[19] at 1-2.) RSSI was a well-known technique at the time. Because generally signal strength decreases as distance increases, signal strength is an indication of distance. However, just a single signal strength value does not lead to a very accurate position determination. (Hossain, Ex. 1053 at 4.) More accurate methods such as based on multiple signal strength values or triangulation were also known.

132. Vehicle systems utilized wireless position techniques to limit driver distraction and to restrict access to certain functions to the driver. Systems were developed to limit access to certain vehicle systems from a mobile device based on the location of the mobile device within the vehicle. For example, U.S. Patent No. 8,768,539 (Clement, Ex. 1010) describes restricting manual control of safety-critical systems to the driver's seat. (Clement, Ex. 1010, 10:14-26.) U.S. Publication No. 2011/0093153 (Moinzadeh, Ex. 1013) discloses disabling certain non-essential functions like video game playback on the driver display. (Moinzadeh, Ex. 1013, [0026].)

133. Vehicle systems also utilized wireless position techniques to enhance security. One such innovation is the Passive Entry Passive Start (PEPS) system,

[19] Hossain, Ex. 1053 is a true and accurate copy of an article that I understand was published by IEEE in 2007.

which allows users to access and control vehicle functions without physically interacting with the vehicle. For example, U.S. Patent No. 7,388,466 (Ghabra, Ex. 1011) describes a passive entry and passive start (PEPS) system that allows a vehicle to communicate wirelessly with a key fob for hands-free access and ignition. (Ghabra, Ex. 1011, 2:13-54, 2:63-65.)

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VI. Overview of the Key Prior Art References Relied Upon

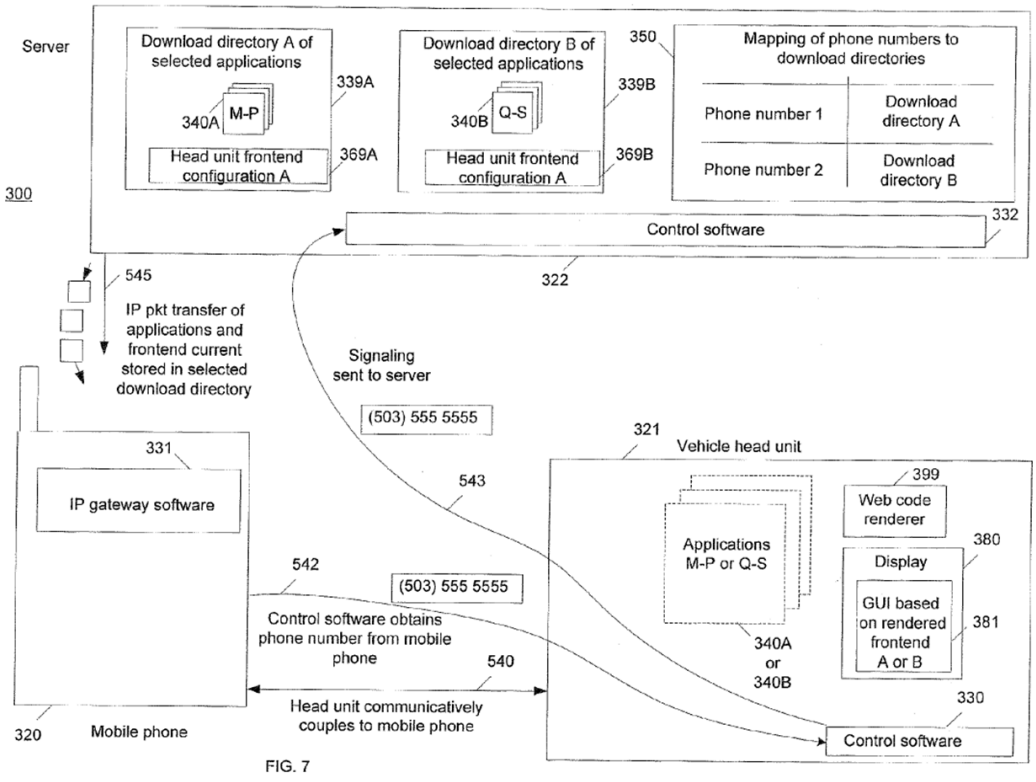
A. U.S. 2011/0093153 ("Moinzadeh" Ex. 1013)

137. Moinzadeh is a U.S. Publication that was filed March 22, 2010, and published April 21, 2011. (Moinzadeh, Ex. 1013, Cover.) I understand that Moinzadeh is prior art to all claims of the '153 Patent under 35 U.S.C. § 102(a)(1) because it was filed and published before the earliest claimed priority date of the '153 Patent.

138. Moinzadeh is directed to a vehicle system that is configured "to select and distribute applications to a vehicle in a safe and intelligent manner according to user preferences." (Moinzadeh, Ex. 1013, [0016], [0065].) Moinzadeh seeks to improve the control and operation of a smart vehicle, explaining that "[i]t is desirable to provide a mechanism to control, manage, and arbitrate the extension of

mobile phone applications operating on the head unit . . . .” (Moinzadeh, Ex. 1013, [0005].)

139. Moinzadeh discloses a system 300 that includes a mobile phone 320, a vehicle head unit 321, and a server 322 with software 330-332 distributed amongst all three that “enables a provider to select which applications can be installed on the head unit 321 and control distribution of the selected applications to the vehicle.” (Moinzadeh, Ex. 1013, [0066].)



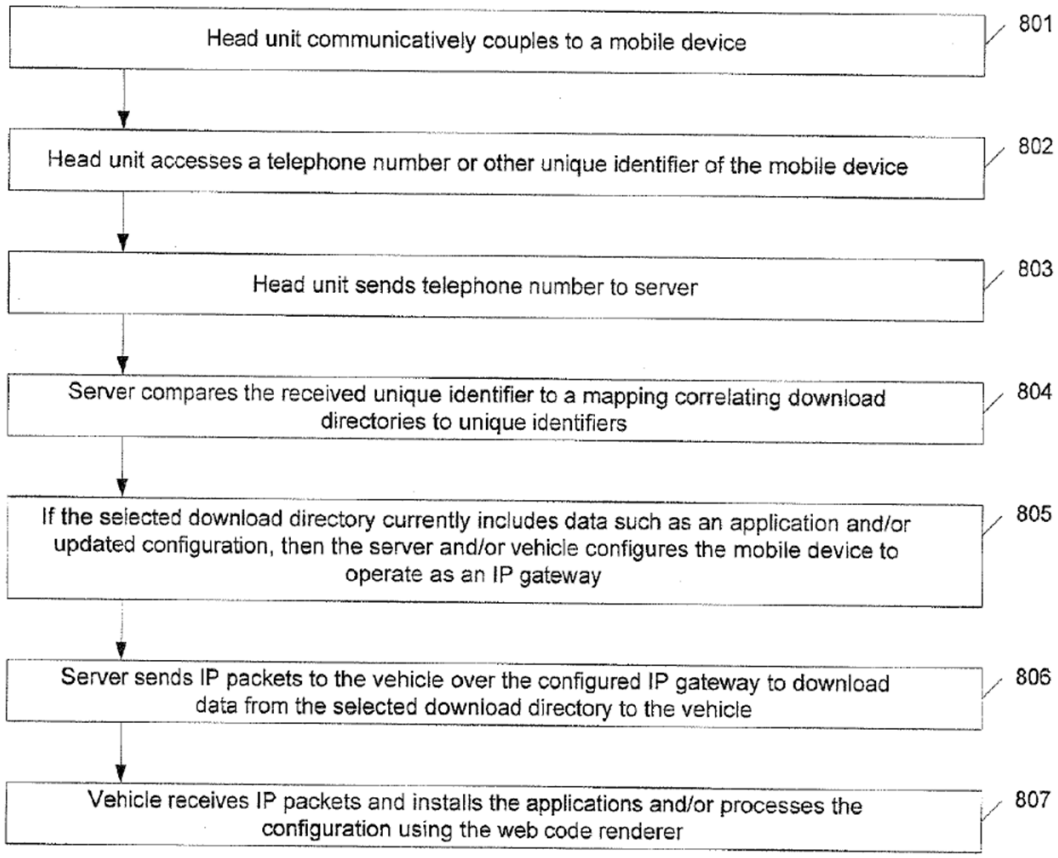
Moinzadeh, Ex. 1013, Fig. 7

140. Moinzadeh notes that “a single system could include some applications installed on a mobile phone using an interface of a vehicle as an

extended interface and some applications installed on a component of the vehicle." (Moinzadeh, Ex. 1013, [0067].)

141. Moinzadeh discloses that its vehicle system (e.g. system 300) includes hardware and associated software, e.g., "one or more processors and software executable on those processors to carry out the operations described." (Moinzadeh, Ex. 1013, [0092].) Moinzadeh further discloses memory associated with a processor, or microprocessor, that "may be stored in the same physical device as the processor ('on-board') memory; for example, RAM or FLASH memory disposed within an integrated circuit microprocessor or the like." (Moinzadeh, Ex. 1013, [0093].)

142. With reference to Figure 8, Moinzadeh discloses that a "communicative connection can be established by a user connecting the mobile phone 320 to the head unit 321 using a USB connection." (Moinzadeh, Ex. 1013, [0069].) Alternatively, Moinzadeh discloses that "connection 540 is established via Bluetooth pairing of the head unit 321 and the mobile phone 320." (Moinzadeh, Ex. 1013, [0069].) Moinzadeh explained that "[t]he Bluetooth pairing can be in response to the vehicle being powered up (causing the head unit to power up and search for a Bluetooth device) . . . ." (Moinzadeh, Ex. 1013, [0069].)



Moinzadeh, Ex. 1013, Fig. 8

143. Moinzadeh discloses that after establishing a connection between the head unit 321 and the mobile phone 320 in block 801, "the control software 330 accesses a telephone number of the mobile phone 320" in block 802. (Moinzadeh, Ex. 1013, [0070], Fig. 8.) Then in "block 803, the control software 330 [of the head unit 321] sends signaling 543 to [a] server 322" that includes "the obtained phone number." (Moinzadeh, Ex. 1013, [0071], Fig. 8.)

144. Moinzadeh further discloses that the server 322 includes a directory for each user associated with the head unit 321, and "[i]n block 804, the control

software 332 [of the server] compares the phone number" to a mapping 350 of phone numbers to directories, and selects the directory associated with the phone number. For example, "in the mapping a first phone number is correlated with the download directory A and a second phone number is correlated with the download directory B. The control software 332 selects one of the download directories A-B based on the comparison of the received telephone number to the mapping 350." (Moinzadeh, Ex. 1013, [0072].) "The software 332 then checks the selected one of the download directories A-B to determine if there are any applications currently stored in the selected directory," for example, "applications 340A (M-P) and 340B (Q-S)." (Moinzadeh, Ex. 1013, [0073].)

145. Moinzadeh further discloses that "the download directories A-B [also] include head unit frontend configurations A-B." (Moinzadeh, Ex. 1013, [0074].) "The configurations A-B can be stored as HTML code or other web code processable by [a] web code renderer of the 399." (Moinzadeh, Ex. 1013, [0074].) Based on the chosen configuration downloaded to the head unit 321, "a display 380 of the head unit 321 will display a different graphical user interface." (Moinzadeh, Ex. 1013, [0074].)

146. Moinzadeh explains that "[i]n block 806, the software 332 generates and sends IP packets 545 to download the data from the selected one of the directories onto the vehicle." (Moinzadeh, Ex. 1013, [0076].) Subsequently, "[t]he

IP packets 545 are received by the mobile phone 320 and forwarded by operation of the software 331 to the head unit 321." (Moinzadeh, Ex. 1013, [0076].)

147. Then, Moinzadeh discloses that "[i]n block 807, the software 330 receives the IP packets 545 and installs the applications included therein on the. . . . head unit 321. . . . The software 330 also processes the configuration from the IP packets 545 using the web code renderer 399 to generate a particular graphical user interface based on the detected phone number." (Moinzadeh, Ex. 1013, [0077].) "For example, each graphical user interface could have its own user customized settings such as a particular wallpaper selected by a user." (Moinzadeh, Ex. 1013, [0074].) Moinzadeh explains that "customizations can include customized graphical interface buttons, customized graphical user interface layout, custom images, etc." (Moinzadeh, Ex. 1013, [0087].)

148. Moinzadeh clarifies that this "invention may be modified in arrangement and detail without departing from such principles." (Moinzadeh, Ex. 1013, [0095].) For example, Moinzadeh explains that any function "performed by the software [330-332] of the head unit 321 . . . can alternatively be performed by the software of the mobile phone" 320 or the server 322. (Moinzadeh, Ex. 1013, [0090].) Additionally, "the functions described above can be distributed in any manner between the mobile phone 320, the head unit 321, and the server 322 by changing the configuration of the software distributed over the system 300."

(Moinzadeh, Ex. 1013, [0090].)

B. U.S. 8,768,539 B1 ("Clement" Ex. 1010)

149. Clement is a U.S. Patent that was filed September 28, 2012, and issued July 1, 2014. (Clement, Ex. 1010, Cover.) I understand that Clement is prior art to all claims of the '153 Patent under 35 U.S.C. § 102(a)(1) because it was filed before the earliest claimed priority date of the '153 Patent.

150. Clement is directed to a vehicle permission management system "that is configured to receive user input for controlling the vehicle . . . [by] a portable communication device." (Clement, Ex. 1010, 4:42-45.) Clement seeks to improve the control and operation of a smart vehicle, explaining that "[u]sing [a] portable computing device to provide user input to the vehicle may increase the ease at which users interact with their vehicles." (Clement, Ex. 1010, 1:31-33.)

151. Clement discloses a vehicle 101 that includes a passenger compartment 210. "Inside the passenger compartment 210 may be a control device 230 used by the vehicle's driver and/or passengers to control the vehicle." (Clement, Ex. 1010, 5:47-51.) "The control device 230 may be a tablet, a smart phone, a laptop, or another type of portable computing device." (Clement, Ex. 1010, 6:9-10.) Clement discloses that "[t]he operational capabilities of the control device 230 may vary with the control's device location . . . ." (Clement, Ex. 1010, 5:59-61.)

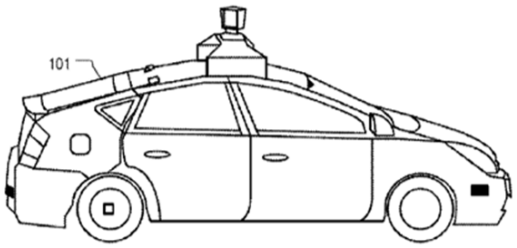


Fig. 1

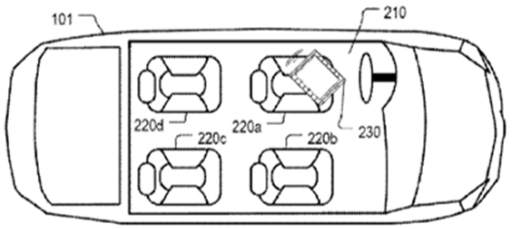


Fig. 2

Clement, Ex. 1010, Figs. 1 and 2

152. Clement discloses that the vehicle 101 includes a vehicle control unit 320 and a portable device location system 330. (Clement, Ex. 1010, 6:28-30.) Clement discloses that "the vehicle control unit 320 may include a processor 410 and memory 420" that "may store information accessible by processor 410, including executable code 440 that may be executed by the processor 410." (Clement, Ex. 1010, 7:53-57, Fig. 4.) The executable code 440 "may include a location-based permission module 442 that is configured to enforce location-based restriction policies." (Clement, Ex. 1010, 8:13-17, Fig. 8.)

153. Clement discloses that the "[v]ehicle control unit 320 may . . . be operatively connected to one or more of the vehicle systems 310*a-f* and it may be operable to change the state of any one of these systems." (Clement, Ex. 1010, 6:63-66.) Clement further discloses that "[t]he vehicle control unit 320 may be coupled to the control device 230 . . . to receive instructions from the control device 230 to change the state of one or more of the vehicle systems 310*a-f*."

(Clement, Ex. 1010, 7:8-11.)

154. Clement discloses that the location system 330 can be either its own component or combined with the vehicle control unit 320. (Clement, Ex. 1010, 7:32-36.) Clement discloses that the location system 330 may include receivers 610*a-d* "located in different parts of the [] passenger compartment 210." (Clement, Ex. 1010, 7:25-28.) The receivers 610*a-d* "may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230." (Clement, Ex. 1010, 7:25-32.) Additionally, Clement discloses that "[t]he vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230." (Clement, Ex. 1010, 7:40-42.)

155. Alternatively, Clement discloses that the passenger compartment 210 may be separated into regions that can "be presented as a single coordinate and a radius . . . [or] may be represented by 4-tupples of signal strength ranges . . . ." (Clement, Ex. 1010, 8:49-55.) Clement explains that "the indications of regions . . . may include any type of information capable of being used to distinguish from one another different portions of the passenger compartment 210." (Clement, Ex. 1010, 8:55-58.)

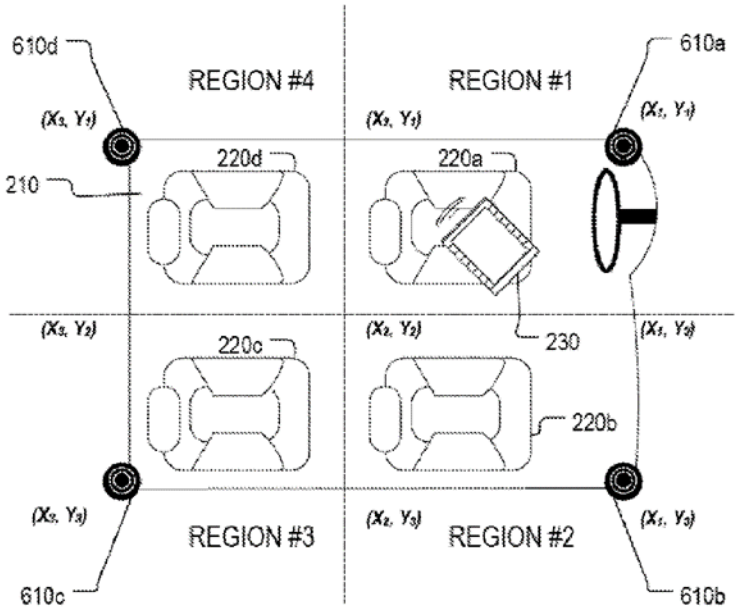


Fig. 6

Clement, Ex. 1010, Fig. 6

156. Clement discloses, with reference to Figure 8, "a process 800 associated with the operation of the vehicle 101." (Clement, Ex. 1010, 9:26-28.) Clement discloses that "[a]t task 820, a connection between the control device 230 and the vehicle control unit 320 is established." (Clement, Ex. 1010, 9:45-46.) "At task 870, the vehicle control unit 320 determines the current location of the control device 230." (Clement, Ex. 1010, 10:37-38.) Clement also discloses that "[i]n other examples, the control device 230 may determine its location and communicate it to the vehicle control unit 230 [*sic* 320]." (Clement, Ex. 1010, 10:48-49.)

157. Clement further discloses that "the vehicle control unit 320 determines whether [an] instruction is permitted to be invoked [based on] the

current location of the control device 230." (Clement, Ex. 1010, 10:55-57.)

158. Clement explains that if the vehicle control unit 320 determines that the control device 230 is within a proper location/region of the vehicle, "task 885 is executed" and the instruction is executed. (Clement, Ex. 1010, 10:62-65.) "Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed" and the vehicle control unit refuses to execute the instruction. (Clement, Ex. 1010, 10:65-67, Fig. 8.)

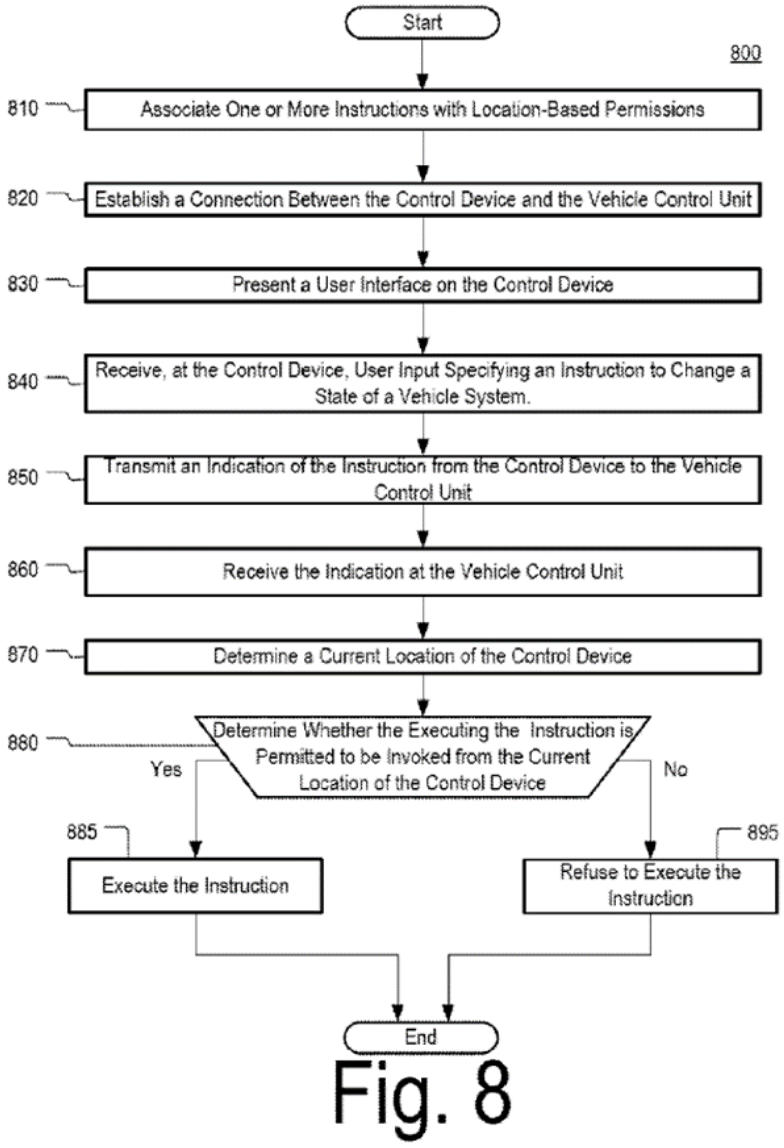


Fig. 8

Clement, Ex. 1010, Fig. 8

159. Clement clarifies that its disclosure may be modified and combined with other features, e.g., other prior art, "these and other variations and combinations of the features discussed above can be utilized without departing from the subject matter as defined by the claims" and that "the foregoing description of exemplary aspects should be taken by way of illustration rather than

by way of limitation of the subject matter as defined by the claims." (Clement, Ex. 1010, 13:19-24.)

C. U.S. 7,388,466 B2 ("Ghabra" Ex. 1011)

160. Ghabra is a U.S. Patent that was filed November 20, 2004, and issued June 17, 2008. (Ghabra, Ex. 1011, Cover.) I understand that Ghabra is prior art to all claims of the '153 Patent under 35 U.S.C. § 102(a)(2) because it was filed and issued before the earliest claimed priority date of the '153 Patent.

161. Ghabra is directed to passive entry and passive start systems that involve a two-way wireless communication model. (Ghabra, Ex. 1011, 1:16-20.) Ghabra seeks to improve the operation of passive communication between a vehicle and a fob, explaining that a "hands-free" system "has [the] advantages of added convenience [and] faster response times." (Ghabra, Ex. 1011, 2:13-16.)

162. Ghabra discloses a vehicle 10 that includes "a base station or vehicle communication module 11 for communicating with a remote portable fob 12." (Ghabra, Ex. 1011, 2:63-65.) Ghabra discloses that "[b]ase station 11 includes a microcontroller 13 coupled to an LF transmitter 14, an RF receiver 15, and an RF transmitter 16." (Ghabra, Ex. 1011, 2:65-67.) Ghabra further discloses that the vehicle 10 may include a "[d]oor module 22 [] coupled to microcontroller 13 and may preferably include a sensing switch for detecting the lifting of a door handle . . . ." (Ghabra, Ex. 1011, 3:10-13.)

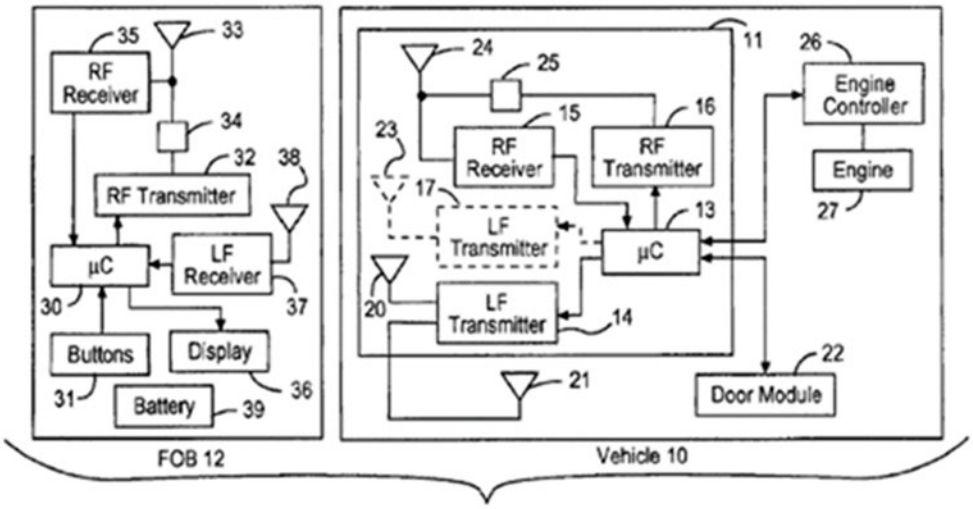
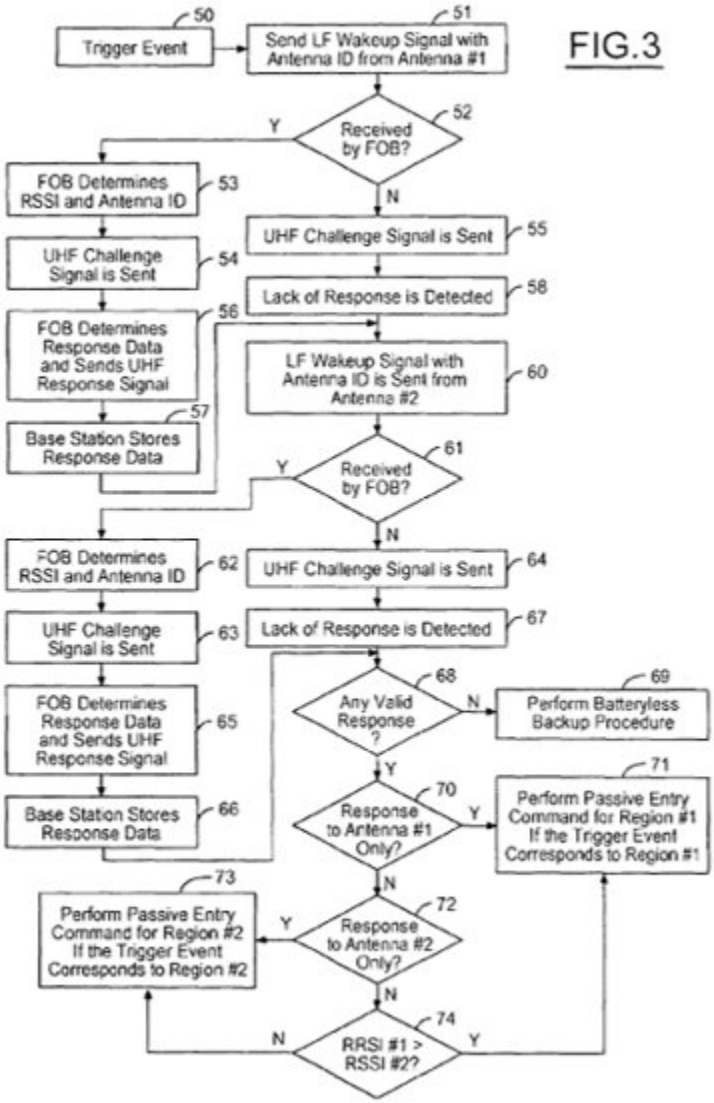


FIG.1

Ghabra, Ex. 1011, Fig. 1

163. Ghabra explains that "[i]n operation, a typical passive entry sequence begins when a door handle switch in door module 22 generates a trigger pulse provided to microcontroller 13 resulting in executing a trigger generation function within microcontroller 13." (Ghabra, Ex. 1011, 3:48-51.) With reference to Figure 3, Ghabra discloses that the trigger generation function or trigger event could occur when the fob is inside or outside of vehicle 10. Ghabra explains that "[i]n step 50, a trigger event is generated indicating a request for a passive entry function (e.g., lifting a door handle or pressing a start button inside the vehicle)." (Ghabra, Ex. 1011, 5:22-25.) Ghabra further explains that "[i]n response to the trigger generation, LF transmitter 14 is activated in order to generate an LF wakeup signal to activate LF receiver 37 in fob 12 . . . ." (Ghabra, Ex. 1011, 3:51-54.)



Ghabra, Ex. 1011, Fig. 3

164. Ghabra further discloses that "[l]ocalization of the fob is necessary to ensure that a person carrying an authorized fob is properly located in the area where the passive function is being requested . . . ." (Ghabra, Ex. 1011, 3:61-67.) Ghabra discloses that the location could be "outside the door with the triggering door handle for a passive entry function and located in the passenger compartment for a passive engine start function." (Ghabra, Ex. 1011, 3:64-67.)

165. Ghabra discloses that determining whether a fob is authorized or not is based on unique identifier numbers or security codes. Ghabra explains that after the LF wakeup signal is sent "RF transmitter 16 in base station 11 is used to broadcast a UHF challenge signal including [a] random number [to fob 12]." (Ghabra, Ex. 1011, 4:8-13, *see also* 4:13-29.) Ghabra further explains that the fob 12 "passe[d] the random number through [a] known mathematical transformation. The resulting transformed number is included in [the] response data" sent back to the vehicle. (Ghabra, Ex. 1011, 4:13-17.) Then, the "microcontroller 13 checks the transformed number as received from the fob 12 with its own results of the transformation and determines the UHF response signal to be valid if the transformed numbers match." (Ghabra, Ex. 1011, 4:25-29.)

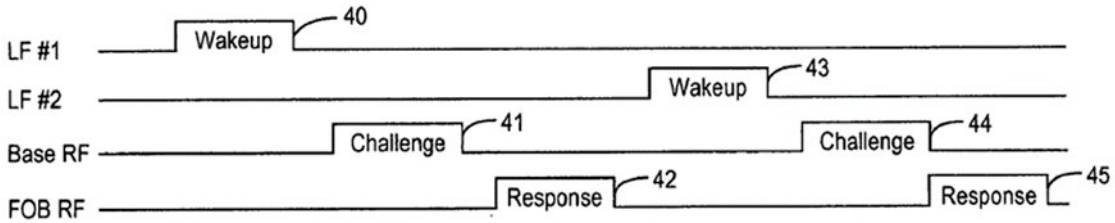


FIG.2

Ghabra, Ex. 1011, Fig. 2

D. U.S. 7,783,699 B2 ("Rasin" Ex. 1015)

166. Rasin is a U.S. Patent that was filed June 19, 2006, and issued August 24, 2010. (Rasin, Ex. 1015, Cover.) I understand that Rasin is prior art to all claims of the '153 Patent under 35 U.S.C. § 102(a)(1) because it was filed and issued

before the earliest claimed priority date of the '153 Patent.

167. Rasin is directed to a vehicle user interface system that is "configured to communicate and enable access to electronic devices including services and/or applications . . . available via the electronic devices." (Rasin, Ex. 1015, 2:27-30.) Rasin seeks to improve a vehicle user interface system's "dynamic programming or synchronization to enable access to services through electronic devices." (Rasin, Ex. 1015, 1:23-25.)

168. Rasin discloses a vehicle 10 that is configured to communicate with electronic devices. (Rasin, Ex. 1015, 2:27-30.) Rasin discloses that the vehicle 10 includes a user interface system 16 that "provides vehicle occupants information/data pertaining to vehicle 10, its systems, and devices, including services available through an electronic device 12." (Rasin, Ex. 1015, 2:40-42.)

169. Rasin discloses that the "electronic device 12 may be a PDA, a handheld computer, a cellular telephone, a smart phone, a laptop and the like that is capable of providing services and applications for use by vehicle occupants." (Rasin, 2:62-65.) Rasin further discloses that the "user interface system 16 has a display unit 18, a user interface module 19 and multiple selection devices 20." (Rasin, Ex. 1015, 2:42-44.) Rasin further explains that "[d]isplay unit 18 is adapted to display information . . . that [is] accessible through the use of electronic device 12." (Rasin, Ex. 1015, 2:45-48.)

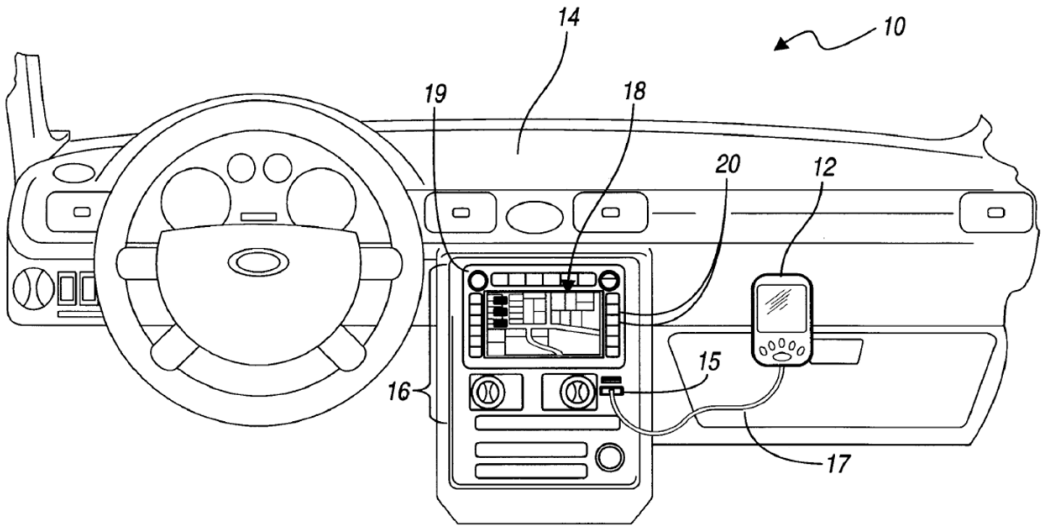
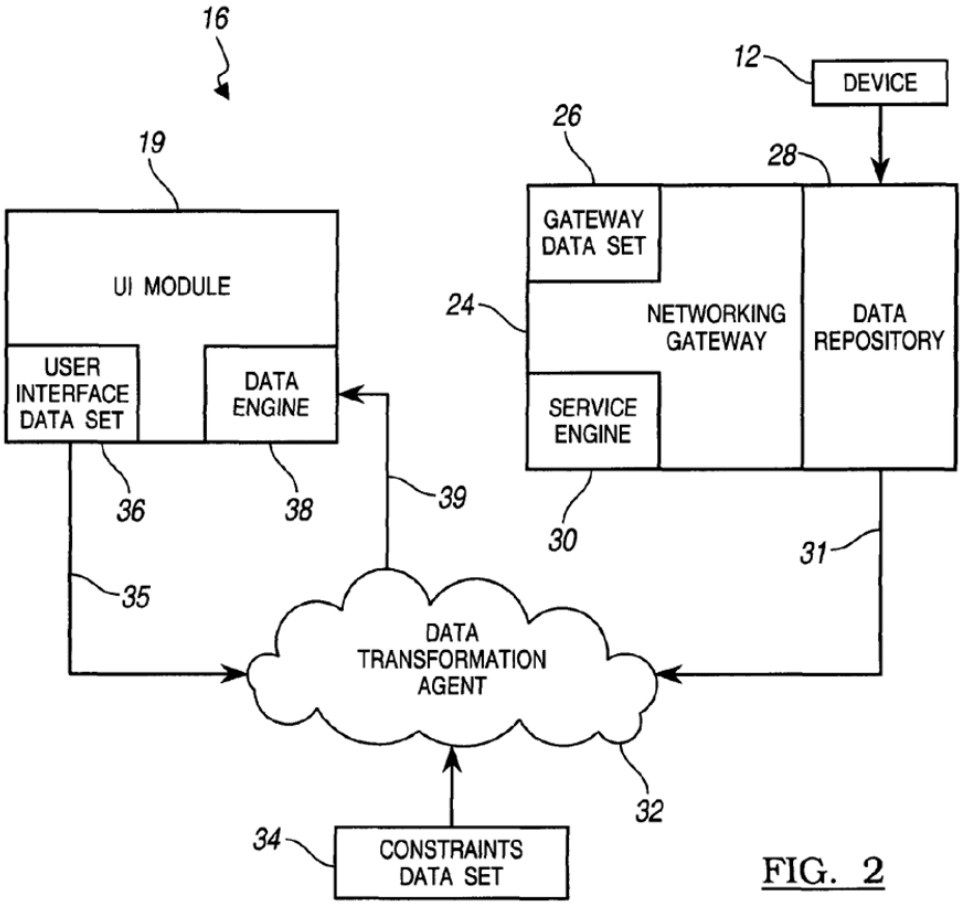


FIG. 1

Rasin, Ex. 1015, Fig. 1

170. Rasin discloses that "electronic device 12 may be connected to user interface system 16 through the use of port 15, which includes universal serial bus (USB) ports and the like." (Rasin, Ex. 1015, 3:4-6.) Alternatively, "electronic device 12 may communicate with user interface system 16 via a wireless protocol including, but not limited to bluetooth, wi-fi, and the like." (Rasin, Ex. 1015, 3:9-13.)

171. Rasin discloses with reference to Figure 2, "a block diagram of user interface system 16 in communication with electronic device 12 . . . ." (Rasin, Ex. 1015, 3:18-20.)



Rasin, Ex. 1015, Fig. 2

172. Rasin discloses the "upon connection of device 12 to the vehicle . . . device 12 transmits a data set to user interface system 16," which is initially received by a networking gateway 24 within the user interface system 16. (Rasin, Ex. 1015, 3:33-35, 3:39.) Rasin further discloses that the networking gateway 24 "includes a data repository 28, a gateway data set 26, and a service engine 30." (Rasin, Ex. 1015, 3:40-41.) The "[d]ata repository 28 provides a plurality of default software constructs that describes communication parameters, features of device 12, and services that may be available via device 12." (Rasin, Ex. 1015,

3:52-55.) Rasin further discloses that the service engine 30 "generate[s] a corresponding data set in a desired format that describes the available services" "[b]ased on the data available from gateway data set 26 and data repository 28." (Rasin, Ex. 1015, 3:39-44; 3:60-62.)

173. Rasin further discloses that the user interface system 16 also includes a data transformation agent 32 that contains a constraint data set 34. The data transformation agent 32 and constraints 34 "may be used to control the appearance of information displayed by the user interface system display unit (FIG. 1) and ensure that proper functionality and service behavior by user interface system 16 occurs." (Rasin, Ex. 1015, 3:65-4:8.) Rasin discloses that "[t]he data of constraints data set 34 may include static and dynamic data, which may be loaded into the vehicle at any time." (Rasin, Ex. 1015, 4:12-14.) Rasin further discloses that along with the data transformation agent 32 and the constraints data set 34, the "[d]ata engine 38 is responsible for generic interaction with the user and may contain a specification in electronic form that also controls the appearance and/or function of the user interface module display." (Rasin, Ex. 1015, 4:39-42.)

174. With reference to Figure 3, Rasin discloses "a method for accessing services available through the electronic device." (Rasin, Ex. 1015, 4:50-51.) First, at "[b]lock 42 . . . the electronic device is introduced or acknowledged." (Rasin, Ex. 1015, 4:52:53.) Then, at block 44, "the user interface system, through the use

of the networking gateway determines whether the electronic device offers any services (also referred to as service discovery)." (Rasin, Ex. 1015, 4:53-57.) If no services are found, the method ends at block 43. (Rasin, Ex. 1015, 4:57-58.) However, if services are available, block 46 involves retrieving service data using the data repository (block 48). (Rasin, Ex. 1015, 4:58-64.)

175. Rasin further explains that at block 50, the "user interface system . . . receives constraints [from the data transformation agent] that provide a set of rules by which the data is processed." (Rasin, Ex. 1015, 4:65-67.) The constraints are stored in a data set, shown at block 52. Rasin discloses that "[in] block 54, user interface data is received via the data transformation agent" and defined in block 56. (Rasin, Ex. 1015, 5:6-9.) At block 58, the data transformation agent transforms data from the user interface data set, constraints data set, and networking gateway into a compatible format. (Rasin, Ex. 1015, 5:9-16.) The transformed data is then loaded into the user interface module (block 60). (Rasin, Ex. 1015, 5:16-18.)

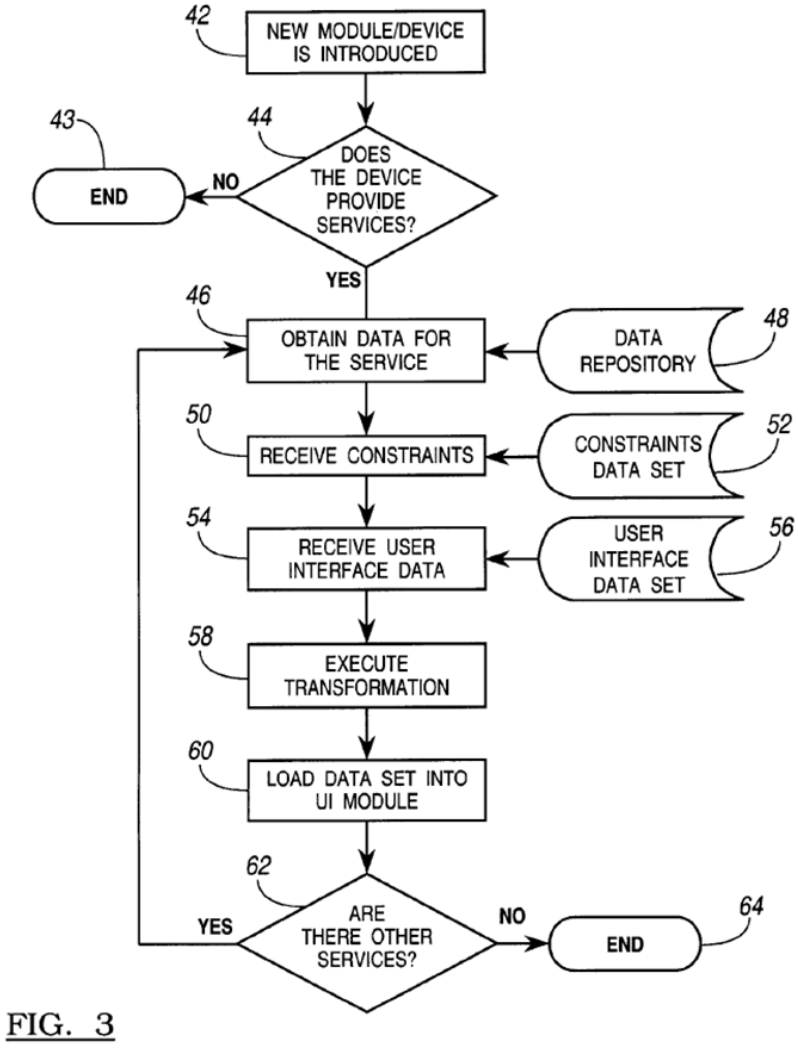


FIG. 3

Rasin, Ex. 1015, Fig. 3

176. Rasin clarifies that "the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms." (Rasin, Ex. 1015, 2:16-26, *see also* 5:24-28.)

E. Bosch Automotive Handbook 6th Edition ("Bosch" Ex. 1050)

177. Bosch is a reference handbook that is "all about automotive engineering in a pocketbook." (Bosch, Ex. 1050, Back Cover.) Bosch describes the

common structure of an automotive electronic control unit (ECU) as of 2004, including a "[m]icroprocessor" and "memory." (Bosch, Ex. 1050, pp. 94, 96.) Bosch explains that:

> The microprocessor represents the integration of a computers central processing unit on a single chip. Microprocessor design seeks to avoid individualization in the face of large-scale integration, and the units can be programmed to meet the varied requirements associated with specific operation conditions.

(Bosch, Ex. 1050, p. 94.)

178. Intentionally left blank.

VII. Grounds for Challenge

A. Ground 1 – Moinzadeh Teaches all of the Limitations of Claims 1-3 and 11-14

1. Independent Claim 1

179. I have given each of the limitations of claim 1 a unique numerical identifier, as shown in the chart below:

U.S. Patent No. 9,290,153
1[pre]. A method, comprising:
1[a] discovering, by a microprocessor executing a microprocessor executable device discovery daemon, one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle;

1[b] for each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery daemon, system data with device information and capabilities; and
1[c] refreshing, by the microprocessor executing a microprocessor executable desktop manager, graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

1[pre]. A method, comprising:

180. Moinzadeh discloses, with reference to Figure 7, "a system [300] to select and distribute applications to a vehicle in a safe and intelligent manner according to user preferences." (Moinzadeh, Ex. 1013, [0016], [0065].) The system 300 includes a mobile phone 320, a vehicle head unit 321, and a server 322 with software 330-332 distributed amongst all three that "enables a provider to select which applications can be installed on the head unit 321 and control distribution of the selected applications to the vehicle." (Moinzadeh, Ex. 1013, [0066].) Moinzadeh notes that "a single system could include some applications installed on a mobile phone using an interface of a vehicle as an extended interface and some applications installed on a component of the vehicle." (Moinzadeh, Ex. 1013, [0067].)

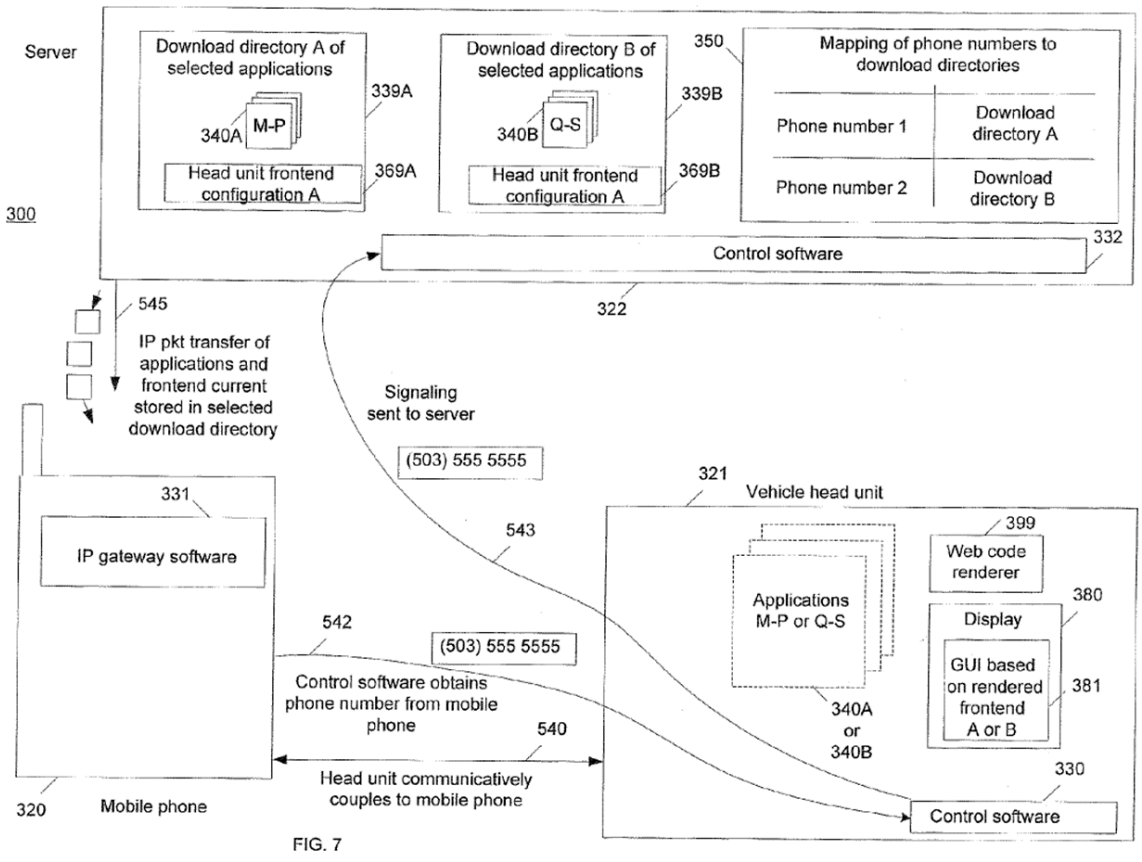
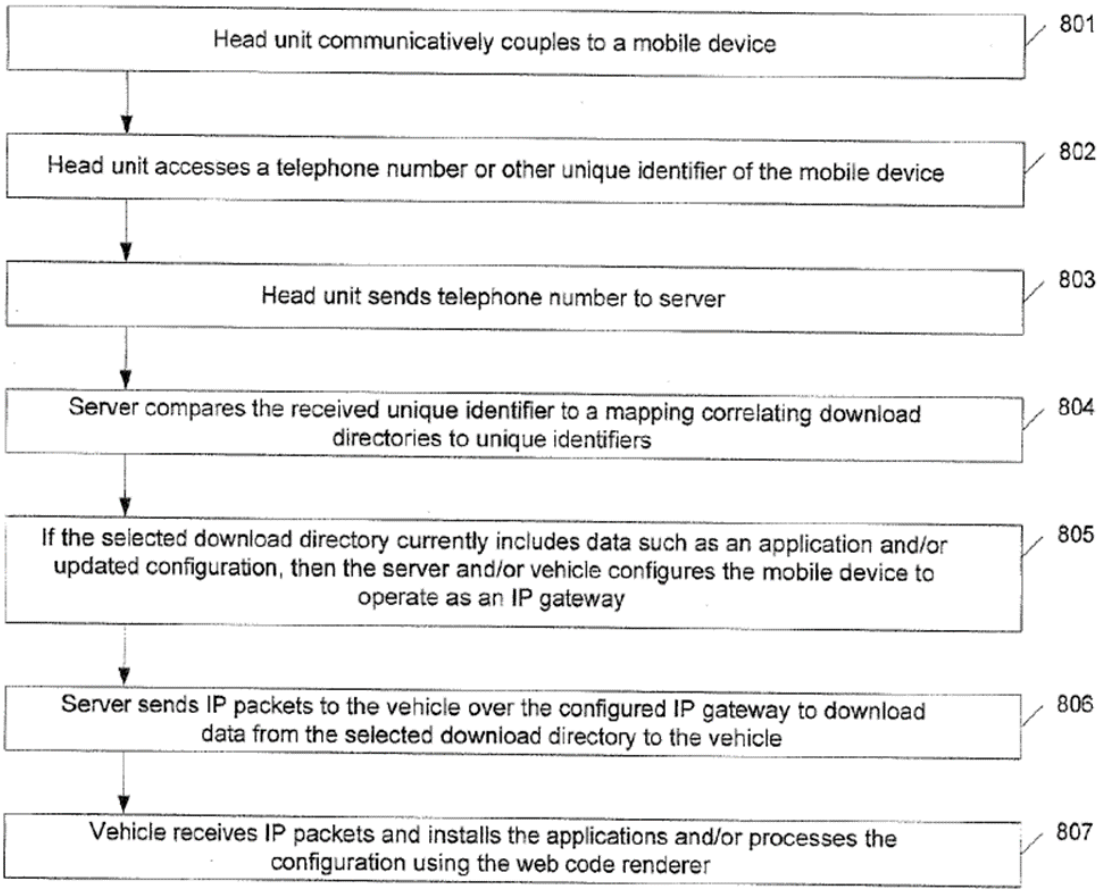


FIG. 7

Moinzadeh, Ex. 1013, Fig. 7

181. Moinzadeh discloses that "FIG. 8 illustrates a flow chart showing operation of the software of FIG. 7." (Moinzadeh, Ex. 1013, [0068].)



Moinzadeh, Ex. 1013, Fig. 8

182. Moinzadeh also describes the process of Figure 8 as a method. (Moinzadeh, Ex. 1013, p. 8, claims 15-25.) For example, claim 19 requires:

> 19. The method of claim 15, further comprising:
>
> in response to the vehicle interface communicatively coupling to a mobile device that is powered independently of the vehicle, sending a phone number of the mobile device to the vehicle interface;
>
> selecting one of a plurality of download directories for the vehicle stored on a server based on a value of the telephone number; and

> if the selected download directory contains data, then generating and sending packets to download the data of the selected download directory from the server to the vehicle.

(Moinzadeh, Ex. 1013, p. 8.)

183. Thus, Moinzadeh discloses a "*Method*."

[1a] discovering, by a microprocessor executing a microprocessor executable device discovery daemon, one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle;

184. In my analysis I apply the proposed construction of the term "*daemon*" as a computer program. (*See* ¶¶ 83-85.) I understand that the term "and/or" is interpreted as "one or more".

185. It is therefore my understanding that claim [1a] should be interpreted as "*discovering, by a microprocessor executing a microprocessor executable device discovery* [computer program]*, one or more communication devices connected wirelessly to* [one or more of] *a network and*[] *communication subsystem of a vehicle*."

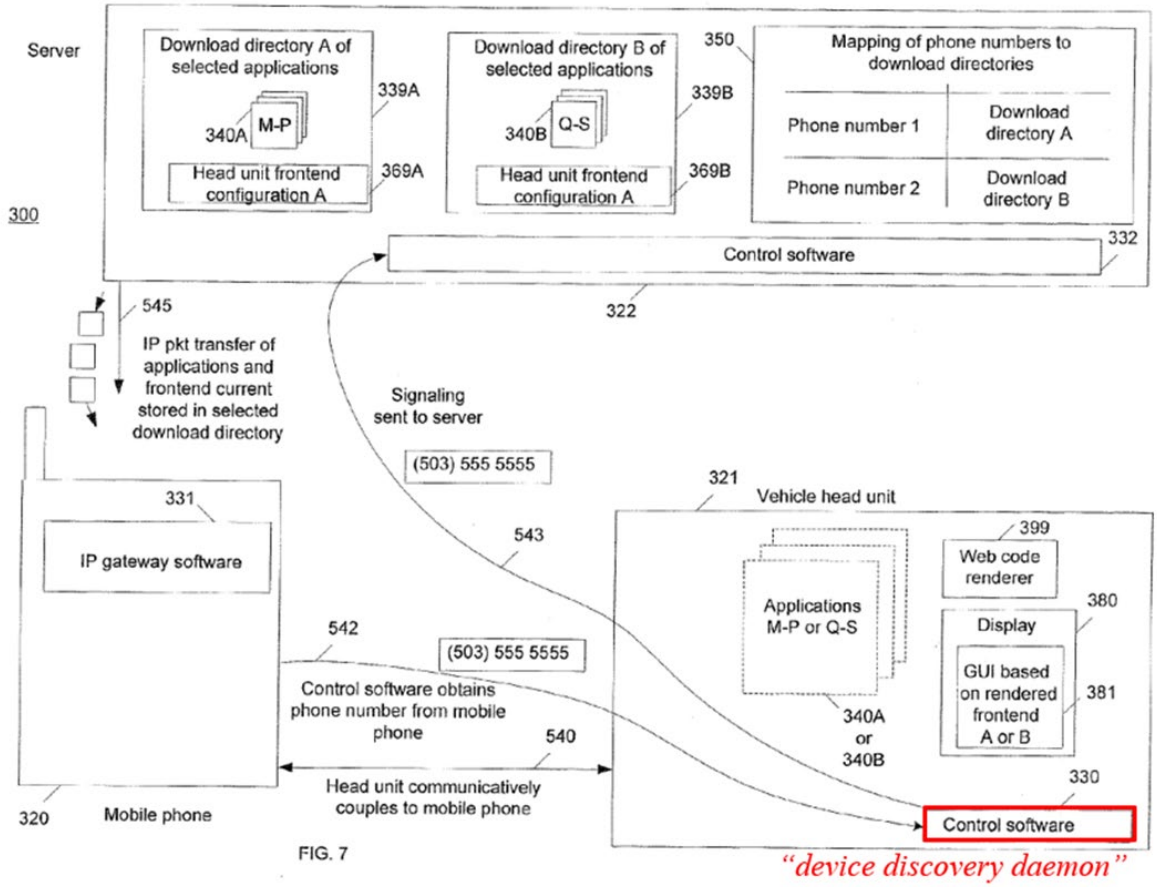
186. Moinzadeh discloses a system 300, with respect to Figures 7-8, "to select and distribute applications to a vehicle in a safe and intelligent manner according to user preferences." (Moinzadeh, Ex. 1013, [0016]-[0017], [0065], [0068].) Moinzadeh explains that the system 300 can be combined into a single

system with "the structures and functions of system 100 and 200 described in FIGS. 1-6." (Moindazeh, Ex. 1013, [0067].)

187. Moinzadeh discloses that the system 300 includes control software 330-332, including control software 330 ("*device discovery* [computer program]") to control installation of applications on the head unit 321 of the vehicle:

> [T]he applications M-P/Q-S in the system 300 of FIG. 7 are installed on the head unit 321 or other component powered by the vehicle. In system 300 of FIG. 7, the software 330-332 enables a provider to select which applications can be installed on the head unit 321 and control distribution of the selected applications to the vehicle.

(Moinzadeh, Ex. 1013, [0066].)



Moinzadeh, Ex. 1013, Fig. 7 (Annotated)

188. Moinzadeh discloses that its system(s) (e.g. system 300), include hardware and associated software, including various processors:

> Most of the equipment discussed above comprises hardware and associated software. For example, the typical navigation device is likely to include one or more processors and software executable on those processors to carry out the operations described. We use the term software herein in its commonly understood sense to refer to programs or routines (subroutines, objects, plug-ins, etc.), as well as data, usable by a machine or processor. As is well known, computer programs generally comprise instructions that are stored in machine-

> readable or computer-readable storage media. Some embodiments of the present invention may include executable programs or instructions that are stored in machine-readable or computer-readable storage media, such as a digital memory. We do not imply that a "computer" in the conventional sense is required in any particular embodiment. For example, various processors, embedded or otherwise, may be used in equipment such as the components described herein.

(Moinzadeh, Ex. 1013, [0092].)

189. Moinzadeh further discloses memory associated with a processor, or microprocessor, for storing software:

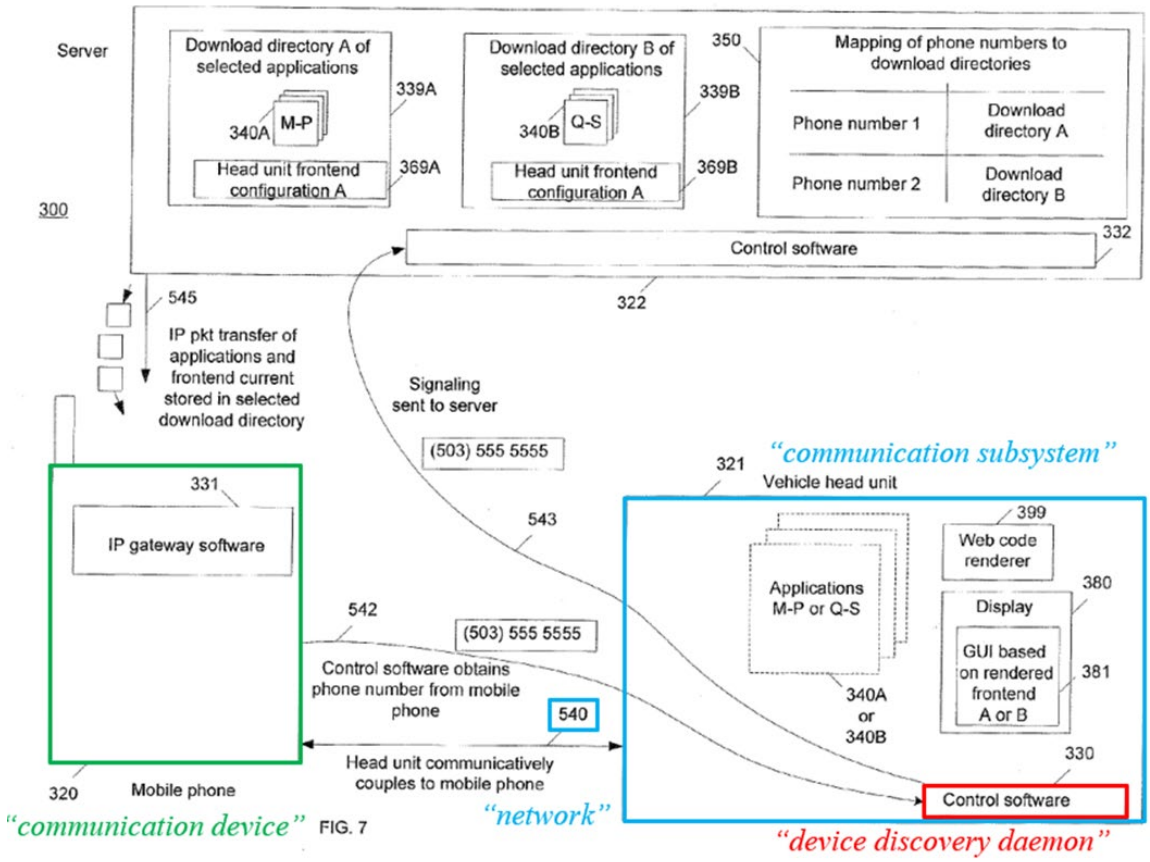
> In some embodiments, memory associated with a given processor may be stored in the same physical device as the processor ("on-board" memory); for example, RAM or FLASH memory disposed within an integrated circuit microprocessor or the like.

(Moinzadeh, Ex. 1013, [0093].)

190. Therefore, a POSA would have understood that Moinzadeh teaches that the vehicle head unit 321 includes various processors, e.g., a microprocessor, for executing the control software 330. As I explained in the state-of-the-art section, it was well-known at the time of the '153 Patent, that vehicle systems included electronic control units (ECUs) for controlling vehicle functions by processing input signals and generating appropriate output signals. Such ECUs included a microprocessor, input and output units (I/O), and memory. (Bosch, Ex.

1050, pp. 94, 96.)

191. Moinzadeh discloses a mobile phone 320 ("*communication device*") that connects to the vehicle head unit 321 ("*communication subsystem*"). (Moinzadeh, Ex. 1013, [0069].)



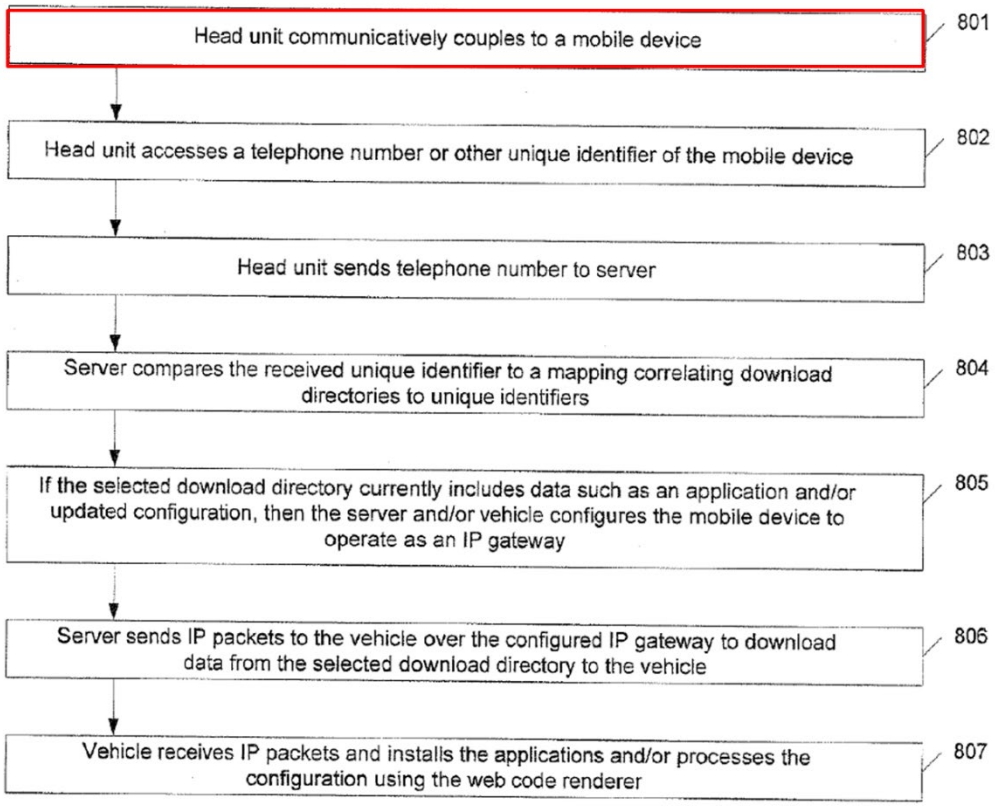
Moinzadeh, Ex. 1013, Fig. 7 (Annotated)

192. With reference to Figure 8, Moinzadeh discloses "a flow chart showing operation of the software of FIG. 7[,]" including connectivity between the mobile phone 320 and the head unit 321. (Moindazeh, Ex. 1013, [0068].) Moinzadeh further discloses that "the connection 540 . . . of the head unit 321 and

the mobile phone 320" "is established via Bluetooth pairing" which involves the head unit "search[ing] for a Bluetooth device":

> In block 801, the head unit 321 communicatively couples to a mobile device such as mobile phone 320. In one example, the connection 540 is established via Bluetooth pairing of the head unit 321 and the mobile phone 320. The Bluetooth pairing can be in response to the vehicle being powered up (causing the head unit to power up and search for a Bluetooth device), although it should be apparent that Bluetooth pairing could result from other circumstances such as the mobile phone 320 powering up, the mobile phone 320 being brought within range of the head unit 321, re-pairing after another Bluetooth device is disconnected from the head unit 321, etc. In other examples, the communicative connection can be established by a user connecting the mobile phone 320 to the head unit 321 using a USB connection.

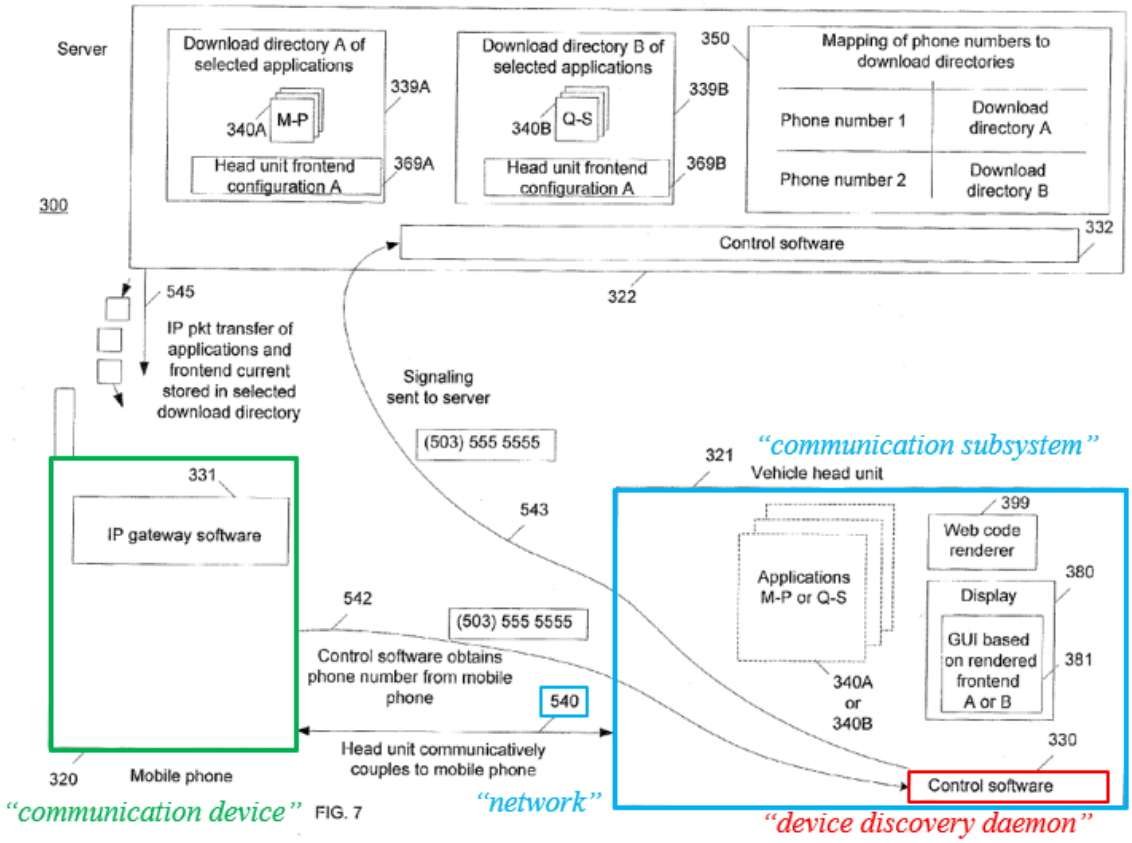
(Moinzadeh, Ex. 1013, [0069].)



Moinzadeh, Ex. 1013, Fig. 8 (Annotated)

193. As I explained in the state-of-the art section, a POSA would have known that Bluetooth was a very popular protocol used by most if not all vehicle systems for transmitting wireless signals to/from wireless devices. (*See* ¶¶ 108-110.) As also discussed above, Bluetooth includes aspects of device discovery in which a computer program runs in the background to discover such wireless devices. (*See* ¶¶ 109-121.) Accordingly, a POSA would have understood that Moinzadeh's disclosure of the head unit 321 establishing a connection 540 "via Bluetooth pairing" and searching for a Bluetooth device upon powering up the head unit (Moinzadeh, Ex. 1013, [0069]) indicates that the head unit control

software 330 ("device discovery [computer program]") is discovering and connecting the mobile phone 320 ("*communication device*") to the vehicle head unit 321 ("*communication subsystem*") over a wireless connection 540.



Moinzadeh, Ex. 1013, Fig. 7 (Annotated)

194. Accordingly, Moinzadeh discloses "*discovering, by a microprocessor executing a microprocessor executable* [computer program] [software 330 of head unit 321 searching for a Bluetooth device], *one or more communication devices* [mobile phone 320] *connected wirelessly to a network* [connection 540] *and/or communication subsystem of a vehicle* [e.g., head unit 321]."

[1b] for each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery daemon, system data with device information and capabilities; and

195. As explained above, Moinzadeh discloses that "the communicative connection" between the head unit 321 and the mobile phone 320 can be "established via Bluetooth pairing" or by "using a USB connection." (Moinzadeh, Ex. 1013, [0069].) A POSA would have understood that by connecting to the head unit 321 with a Bluetooth or USB connection, the mobile phone 320 ("*communication device*") is exposing its connectivity "*capabilities*" to the vehicle head unit.

196. Moinzadeh discloses that after establishing a connection at block 801, "the control software 330 accesses a telephone number ["*device information*"] of the mobile phone 320" e.g., using "Bluetooth signaling":

> In block 802, the control software 330 accesses a telephone number of the mobile phone 320. It should be understood that mobile phones are activated with a particular phone number in conjunction with subscribing to a call plan, which is the phone number the control software 330 reads from the mobile phone 320. In one example, the signaling 542 to obtain the phone number is performed using Bluetooth signaling.

(Moinzadeh, Ex. 1013, [0070].)

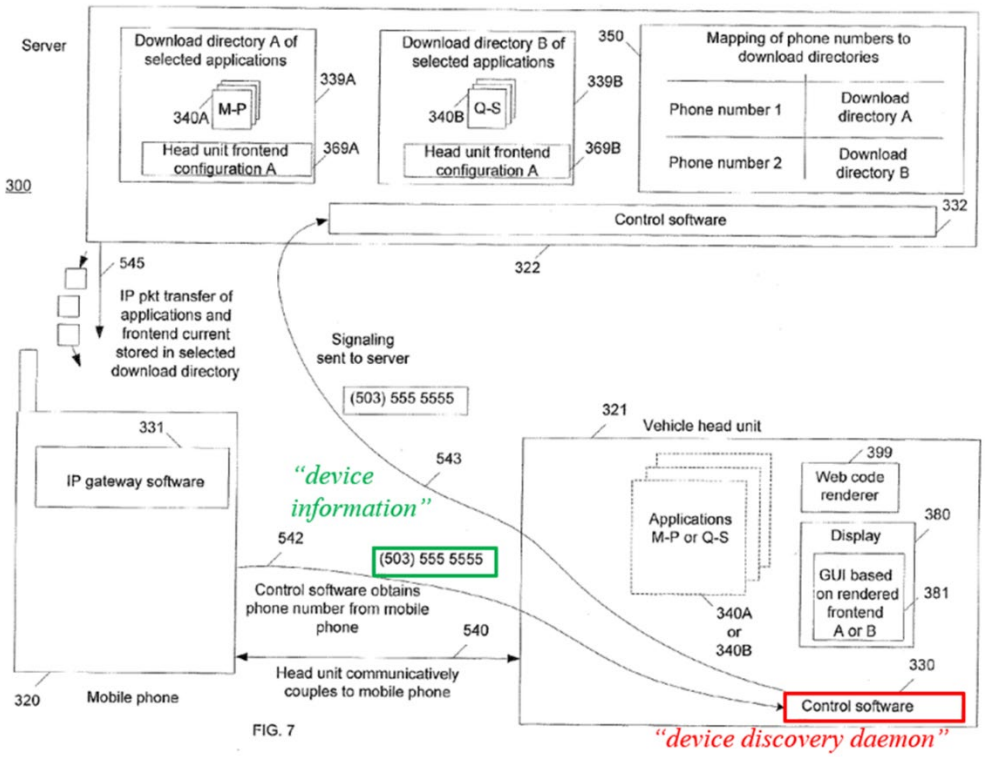
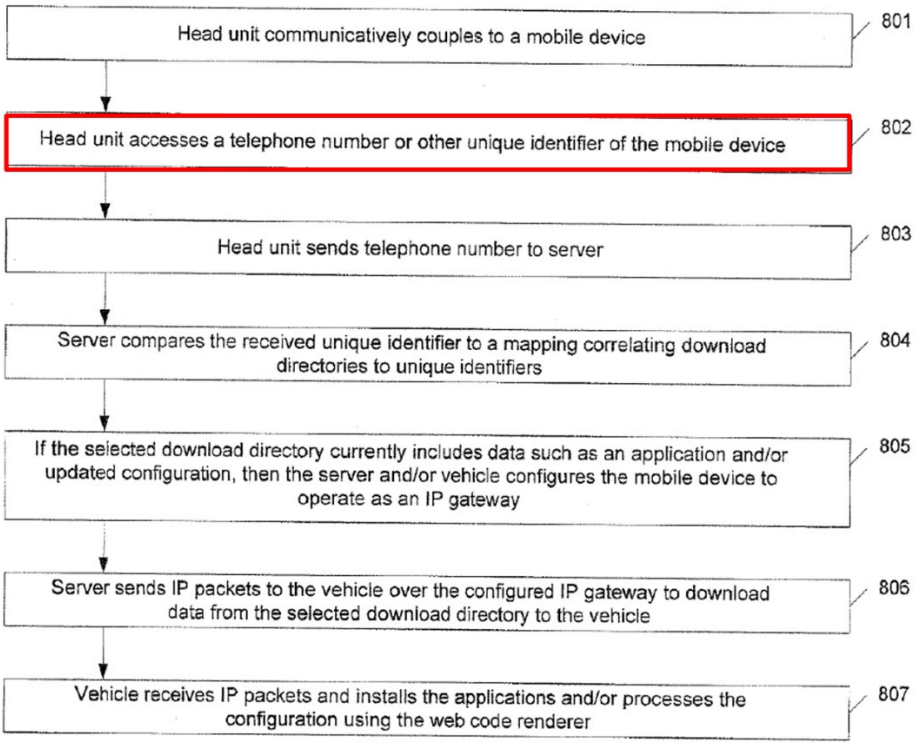


FIG. 7



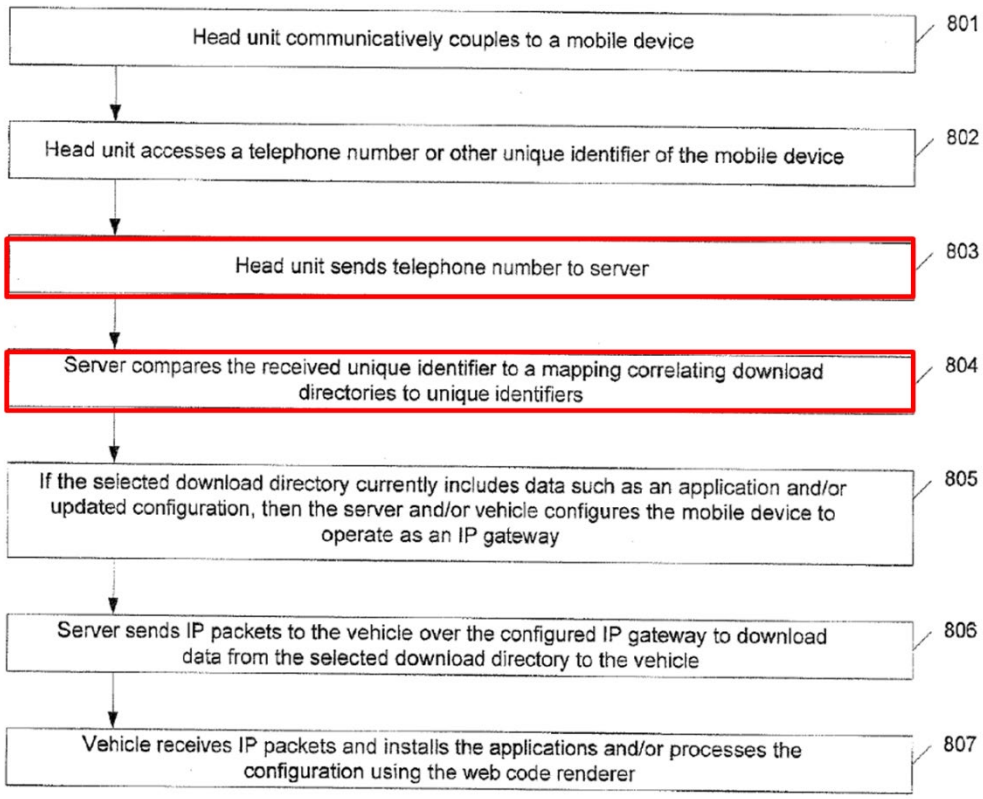
Moinzadeh, Ex. 1013, Figs. 7-8 (Annotated)

197. Moinzadeh further discloses that the mobile phone 320 "operate[s] as an IP gateway for forwarding applications to the head unit 321" in response to "signaling" "from the control software 330 on the head unit 321 after the connection 540 is established. (Moinzadeh, Ex. 1013, [0075].) A POSA would have understood that communication ability e.g., wired communication using USB, and wireless communication using Bluetooth and cellular network technologies (e.g., 3G, 4G, and LTE) that are available through the mobile phone acting as an IP Gateway, and information regarding the installed software applications are examples of the "*capabilities*" of the mobile phone 320. Then in "block 803, the control software 330 [of the head unit 321] sends signaling to the server 322" that includes "the obtained phone number." (Moinzadeh, Ex. 1013, [0071].) The server 322 includes a directory for each user associated with the head unit 321, and "[i]n block 804, the control software 332 [of the server] compares the phone number" to a mapping 350 of phone numbers to directories, and selects the directory associated with the phone number:

> In block 804, the control software 332 compares the phone number included in the signaling 543 to the mapping 350. The mapping correlates each of a plurality of download directories A-B accessible via this particular head unit 321 to a particular phone number. For example, in the mapping a first phone number is correlated with the download directory A and a second phone number is correlated with

the download directory B. The control software 332 selects one of the download directories A-B based on the comparison of the received telephone number to the mapping 350.

(Moinzadeh, Ex. 1013, [0072].)



Moinzadeh, Ex. 1013, Fig. 8 (Annotated)

198. Each directory includes applications and head unit front end configurations associated with the phone number:

The software 332 then checks the selected one of the download directories A-B to determine if there are any applications currently stored in the selected directory. A scheme for intelligently selecting applications that are present in the download directories A-B will be

> discussed in detail later with reference to FIG. 9. For now, let it be assumed for the purposes of illustration that the download directories 339A and 339B currently include applications 340A (M-P) and 340B (Q-S), respectively, in addition to the head unit frontend configurations 369A and 369B.

(Moinzadeh, Ex. 1013, [0073].)

199. The frontend configurations include user customized settings for a graphical user interface to be displayed on the head unit 321:

> As noted briefly in the previous paragraph, the download directories A-B include head unit frontend configurations A-B, respectively, in addition to the applications 340A and 340B. The configurations A-B can be stored as HTML code or other web code processable by the web code renderer of the 399. **Depending on which one of the head unit frontend configurations A-B is downloaded to the head unit 321, a display 380 of the head unit 321 will display a different graphical user interface**. Each of the different web code files 369A and 369B will produce a different graphical user interface when displayed using the display 380 and the renderer 399. For example, **each graphical user interface could have its own user customized settings such as a particular wallpaper selected by a user**. A scheme for generating the different head unit frontend configurations A-B will be discussed in detail later with reference to FIG. 9.

(Moinzadeh, Ex. 1013, [0074].)

200. Moinzadeh discloses, with reference to its Figure 1 embodiment, that

the server software 32 authenticates the application 40 by comparing an application identifier including a version number to a whitelist of applications:

> Otherwise, if the user is authenticated, then in block 204B the software 32 authenticates the application 40 by comparing the application identifier to a list 12 of applications (also referred to as a whitelist). This list 12 can be compared by version number such that one particular version of an application 40 can be identified on the list while a different version is excluded. If the particular application 40 (or particular version) is not on the list 12 in diamond 205, then in block 204A the software 32 signals the software 30A-B to block access by the application 40 to the head unit 21.

(Moinzadeh, Ex. 1013, [0025].)

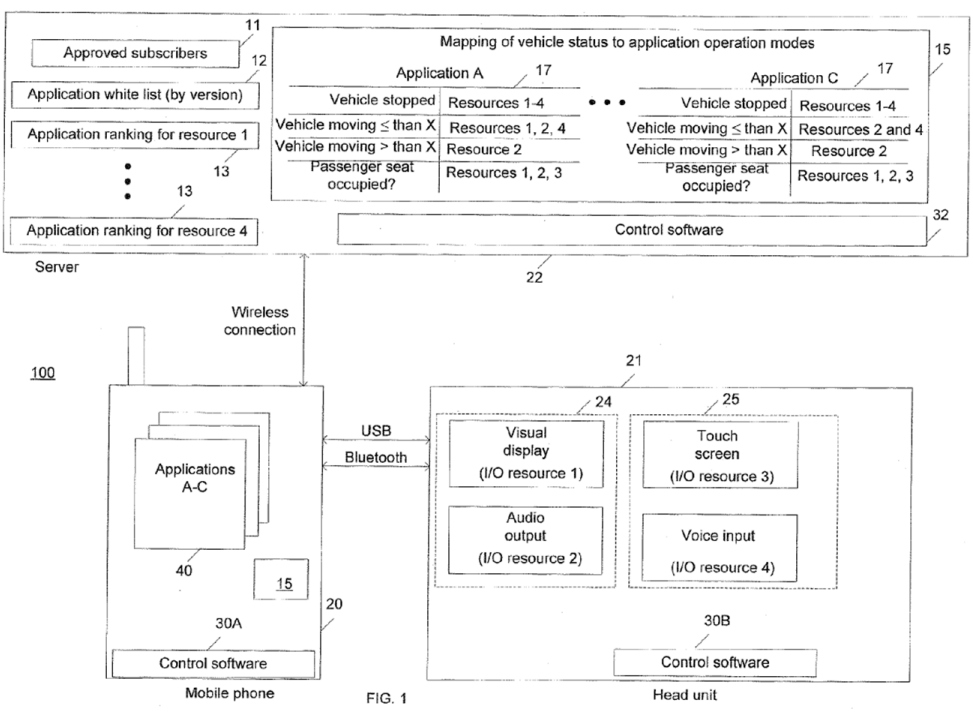


FIG. 1

Moinzadeh, Ex. 1013, Fig. 1

201. A POSA would have understood that the process of comparing application identifier, which includes the version number of the application, to a whitelist would take into account the "*capabilities*" of the mobile device as well as the head unit. Although this disclosure relates to Moinzadeh's Figure 1 embodiment, Moinzadeh explains that this teaching can be combined with its Figure 7 embodiment:

> Before discussing the details of system 300 in detail in the following paragraphs, it should be apparent that the structures and functions of systems 100 and 200 described in FIGS. 1-6 can be combined with the structures and functions of system 300 (FIGS. 7-8) into a single system.

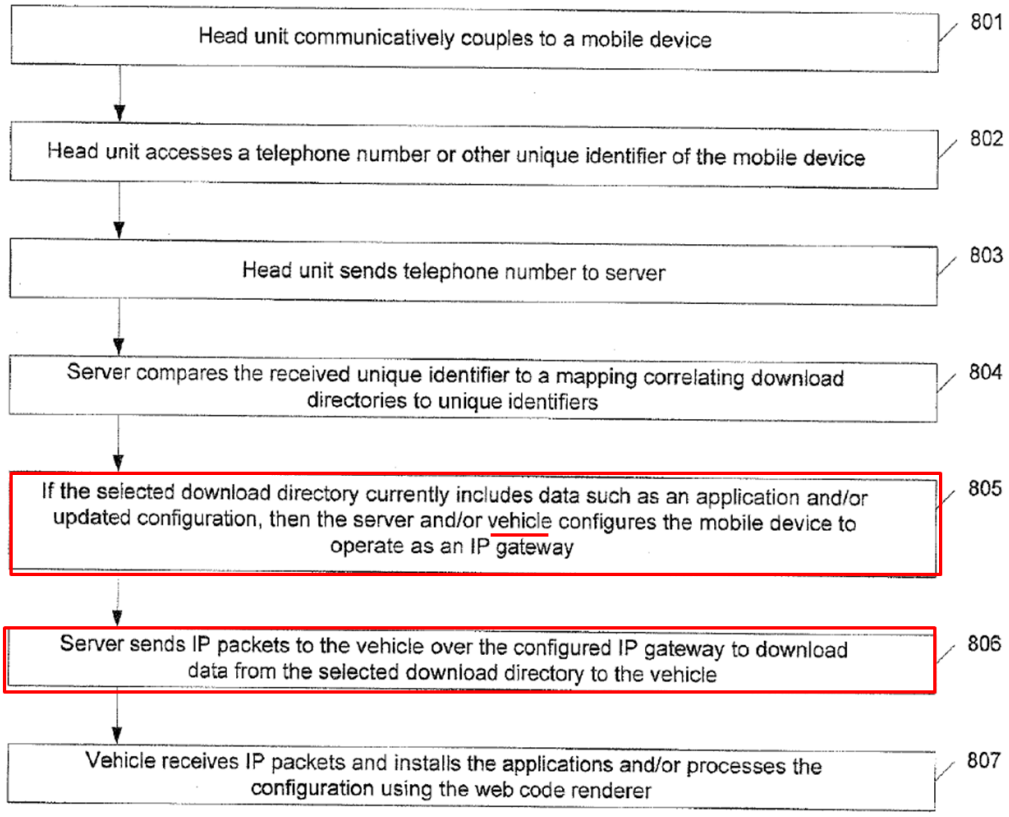
(Moinzadeh, Ex. 1013, [0067].)

202. Moinzadeh discloses that "in block 805, the [server] software 332 generates and sends signaling to cause the IP gateway software 331 on the mobile phone to operate as an IP gateway for forwarding applications to the head unit 321." (Moinzadeh, Ex. 1013, [0075].) Additionally, "the signaling 345 [sic 545] could originate from the control software 330 on the head unit 321 after the connection 540 is established." (Moinzadeh, Ex. 1013, [0075].) A POSA would have understood that the mobile phone serves as a network bridge between the vehicle and the server 322. This means that the phone provides Internet Protocol (IP) connectivity to the vehicle, allowing the head unit 321 to communicate with

the server 321 even if the vehicle itself does not have a built-in cellular or Wi-Fi connection, which leverages the mobile phone's existing data plan and connectivity and simplifies hardware requirements of the vehicle head unit. Moinzadeh further discloses that in block 806, the control software 332 of the server 322 sends IP packets 545 that contain the directory information, i.e., applications ("*capabilities*") and a frontend configuration that is associated with the user (phone number), to the mobile phone 320, which forwards the IP Packets 545 to the head unit 321:

> In block 806, the software 332 generates and sends IP packets 545 to download the data from the selected one of the directories onto the vehicle, e.g. either applications M-P and configuration A or applications Q-S and configuration B. The IP packets 545 are received by the mobile phone 320 and forwarded by operation of the software 331 to the head unit 321. It should be understood that in this particular illustration **the IP packets 545 include both applications and a configuration for the graphical user interface**, but in other scenarios the IP packets 545 might contain either an application or a configuration. Also, it should be apparent that, if there are no applications currently in the selected download directory and there have been no changes to the configurations stored in the download directory since a previous download, then the IP packets 545 may not be sent.

(Moinzadeh, Ex. 1013, [0076].)



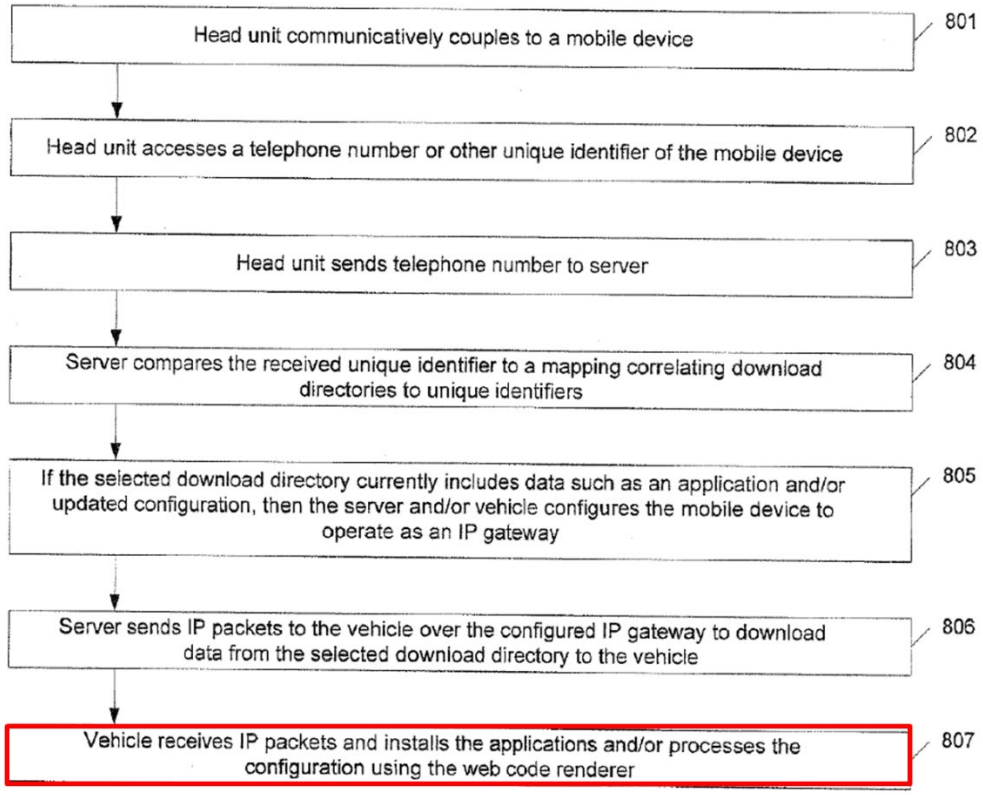
Moinzadeh, Ex. 1013, Fig. 8 (Annotated)

203. Moinzadeh provides examples of device "applications," including, "a navigation application" and "a video game application." (Moinzadeh, Ex. 1013, [0026].) A POSA would have understood that these disclosed applications indicate installed software on the device and information about the applications, e.g., version, and release date which corresponds to the "*capabilities*" of the mobile device.

204. Moinzadeh then discloses that once the control software 330 on the head unit 321 receives the IP packets 545, the mobile phone 320's applications and the frontend configuration can be installed on the head unit 321:

> In block 807, the software 330 receives the IP packets 545 and installs the applications included therein on the vehicle (installation can be on components of the head unit 321 or other vehicle components). The software 330 also processes the configuration from the IP packets 545 using the web code renderer 399 to generate a particular graphical user interface based on the detected phone number.

(Moinzadeh, Ex. 1013, [0077].)



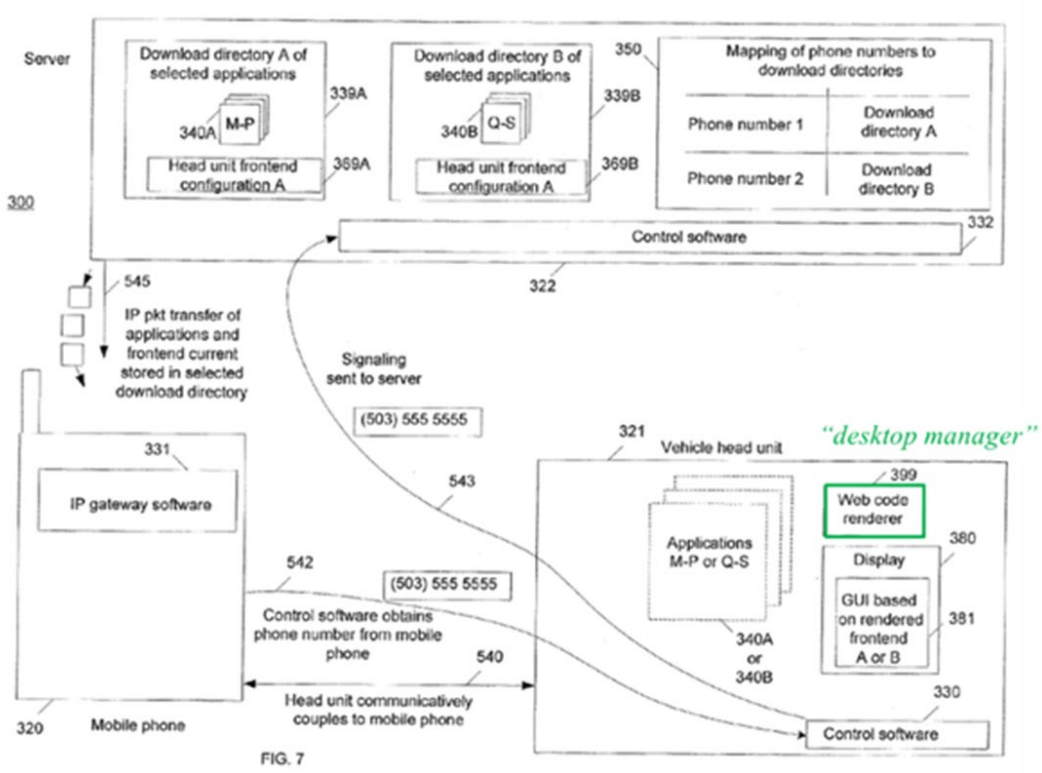
Moinzadeh, Ex. 1013, Fig. 8 (Annotated)

205. A POSA would have understood that the term "*populate*" as used in this context is synonymous with "load" and means "to insert data values into a database that previously contained no data." (IEEE Dictionary, Ex. 1051, pp. 629,

844.) Thus, Moinzadeh's disclosure of accessing and storing a phone number, communication capabilities, and installing applications teaches "f*or each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery* [computer program], *system data with device information* [phone number] *and capabilities* [e.g., connectivity capability and applications]."

[1c] refreshing, by the microprocessor executing a microprocessor executable desktop manager, graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

206. Moinzadeh discloses that the head unit 321 includes a web code renderer 399 ("*desktop manager*"):



Moinzadeh, Ex. 1013, Fig. 7 (Annotated)

207. Moinzadeh discloses a display ("*graphical display*") that can show customized graphical user interfaces, such as different wallpaper or interface buttons ("*graphical elements*"):

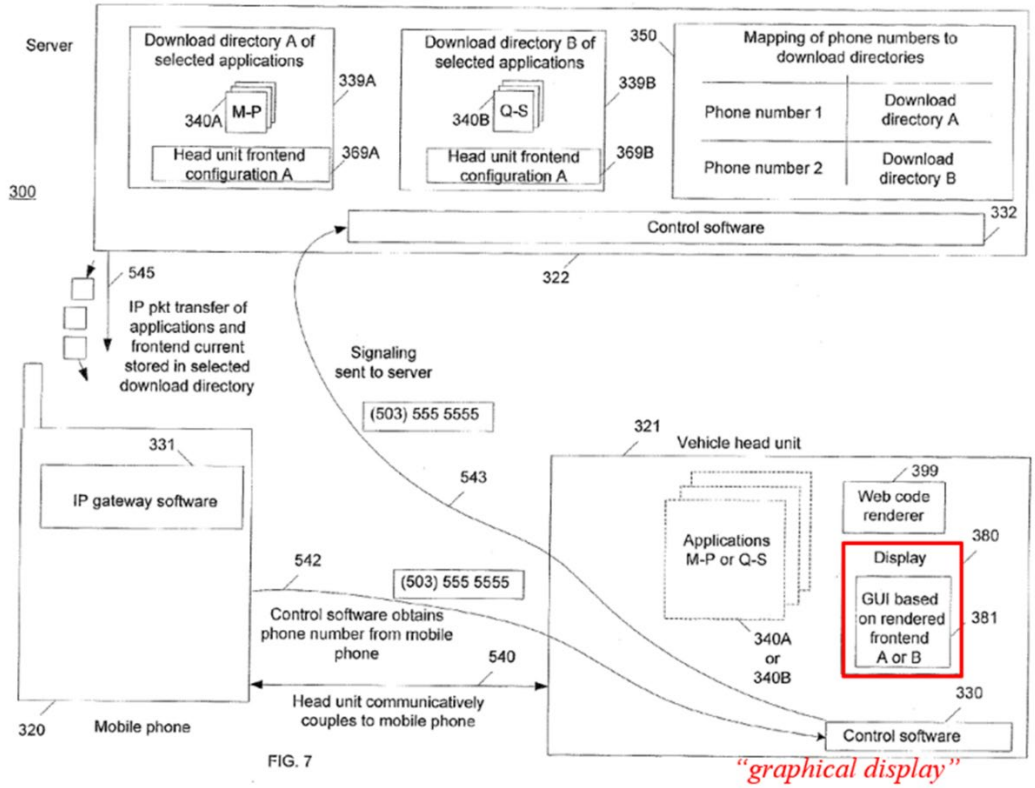
> As noted briefly in the previous paragraph, the download directories A-B include head unit frontend configurations A-B, respectively, in addition to the applications 340A and 340B. The configurations A-B can be stored as HTML code or other web code processable by the web code renderer of the 399. Depending on which one of the head unit frontend configurations A-B is downloaded to the head unit 321, a display 380 of the head unit 321 will display a different graphical user interface. Each of the different web code files 369A and 369B will produce a different graphical user interface when displayed using

> the display 380 and the renderer 399. For example, each graphical user interface could have its own user customized settings such as a particular wallpaper selected by a user.

(Moinzadeh, Ex. 1013, [0074].)

> The user web portal 905 can also include a head unit frontend configuration customization portion 928. This portion 928 allows new configurations 369A-B to be added to the download directories 339A-B, with each person's configuration customized according to their requests. For example, a first wallpaper background can be added to the download directory 339A and a second different wallpaper background can be added to the download directory 339B. Other customizations can include customized graphical interface buttons, customized graphical user interface layout, custom images, etc.

(Moinzadeh, Ex. 1013, [0087].)



Moinzadeh, Ex. 1013, Fig. 7 (Annotated)

208. Moinzadeh discloses that its system(s) (e.g. system 300), include hardware and associated software, including various processors:

> Most of the equipment discussed above comprises hardware and associated software. For example, the typical navigation device is likely to include one or more processors and software executable on those processors to carry out the operations described. We use the term software herein in its commonly understood sense to refer to programs or routines (subroutines, objects, plug-ins, etc.), as well as data, usable by a machine or processor. As is well known, computer programs generally comprise instructions that are stored in machine-readable or computer-readable storage media. Some embodiments of the present invention may include executable programs or instructions

> that are stored in machine-readable or computer-readable storage media, such as a digital memory. We do not imply that a "computer" in the conventional sense is required in any particular embodiment. For example, various processors, embedded or otherwise, may be used in equipment such as the components described herein.

(Moinzadeh, Ex. 1013, [0092].)

209. Moinzadeh further discloses memory associated with a processor, or microprocessor, for storing software:

> In some embodiments, memory associated with a given processor may be stored in the same physical device as the processor ("on-board" memory); for example, RAM or FLASH memory disposed within an integrated circuit microprocessor or the like.

(Moinzadeh, Ex. 1013, [0093].)

210. Moinzadeh discloses that "[t]he configurations A-B can be stored as HTML code or other web code processable by the web code renderer of the 399." (Moinzadeh, Ex. 1013, [0074].) Moinzadeh further discloses that its system includes "various processors" e.g., a "microprocessor" and "the present invention may include executable programs or instructions that are stored in. . . computer-readable storage media." (Moinzadeh, Ex. 1013, [0092]-[0093].)

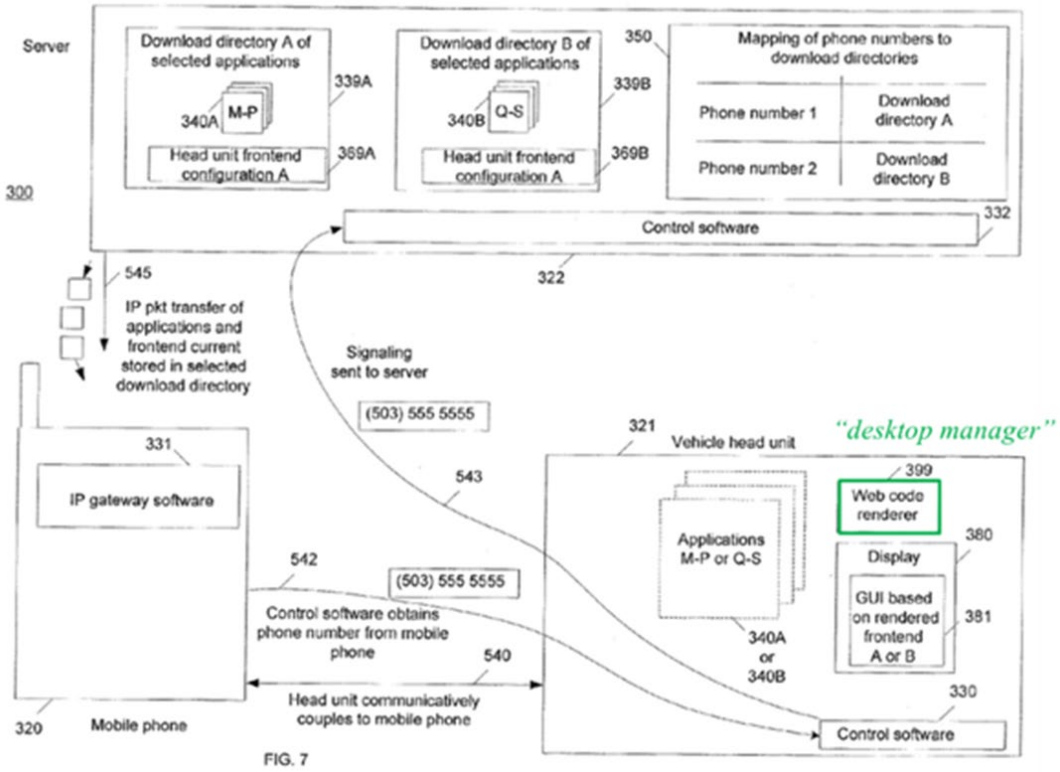
211. Therefore, a POSA would have understood that Moinzadeh teaches that the vehicle head unit 321 includes various processors, e.g., a microprocessor, for executing the web code renderer software 399. As I explained in the state-of-

the-art section, it was well-known at the time of the '153 Patent, that vehicle systems included electronic control units (ECUs) for controlling vehicle functions by processing input signals and generating appropriate output signals. (*See* ¶¶ 92-98.) Such ECUs included a microprocessor, input and output units (I/O), and memory. (Bosch, Ex. 1050, pp. 94, 96.)

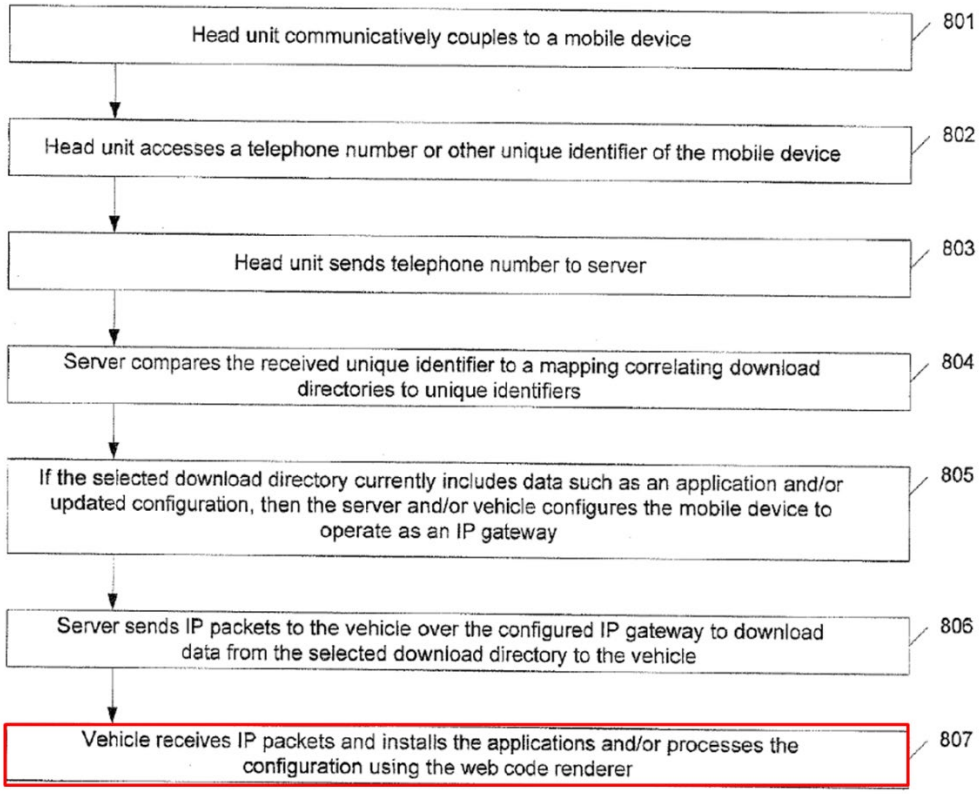
212. Moinzadeh discloses generating various graphical user interfaces, based on a mobile phone, using the software 330 in conjunction with the web code renderer 399 ("*desktop manager*"):

> In block 807, the software 330 receives the IP packets 545 and installs the applications included therein on the vehicle (installation can be on components of the head unit 321 or other vehicle components). The software 330 also processes the configuration from the IP packets 545 using the **web code renderer 399 to generate a particular graphical user interface** based on the detected phone number.

(Moinzadeh, Ex. 1013, [0077].)



Moinzadeh, Ex. 1013, Fig. 7 (Annotated)



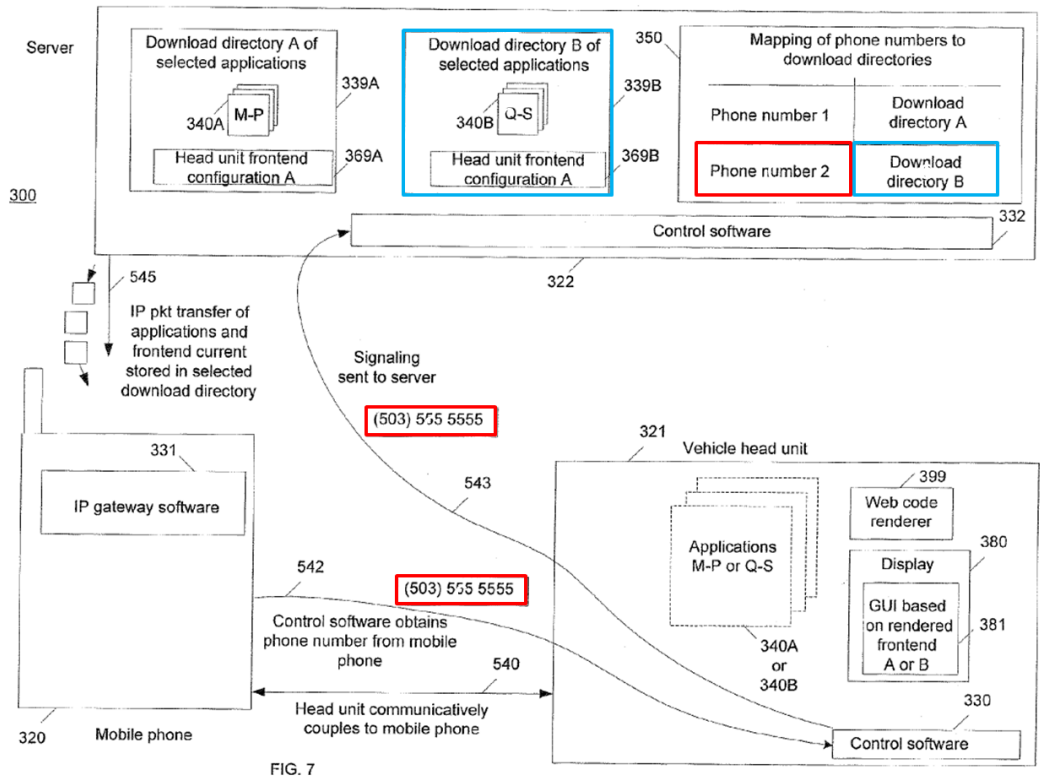
Moinzadeh, Ex. 1013, Fig. 8 (Annotated)

213. Moinzadeh discloses that the head unit 321 initiates Bluetooth pairing in response to multiple circumstances, including "re-pairing after another Bluetooth device is disconnected from the head unit 321":

> The Bluetooth pairing can be in response to the vehicle being powered up (causing the head unit to power up and search for a Bluetooth device), although it should be apparent that Bluetooth pairing could result from other circumstances such as the mobile phone 320 powering up, the mobile phone 320 being brought within range of the head unit 321, re-pairing after another Bluetooth device is disconnected from the head unit 321, etc.

(Moinzadeh, Ex. 1013, [0069].)

214. A POSA would have understood that after the head unit control software 330 ("*device discovery* [computer program]") detects that a first device disconnected, and initiates re-pairing to discover a second device with "Phone number 2" (annotated in red below), that is different from the first device with "Phone number 1", and receives a directory (Directory B, annotated in blue below) that is different than a prior directory, the web code renderer 399 updates, or "*refresh[es]*" the display 380 corresponding to the second device's preferences according to the frontend configuration 369B.



Moinzadeh, Ex. 1013, Fig. 7 (Annotated)[20]

215. Thus, Moinzadeh discloses "*refreshing, by the microprocessor executing a microprocessor executable desktop manager* [web code renderer 399], *graphical elements* [e.g. wallpaper, buttons, etc.] *of a graphical display* [display 380] *of the vehicle to reflect the discovered one or more communication devices*."

2. Dependent Claims 2-3 and 11

a. Claim 2

216. Claim 2 depends from claim 1, which I understand means that claim 2

[20] Figure 7 mislabels element 369B as "Head unit frontend configuration A." Element 369B should be labeled "Head unit frontend configuration B."

requires all of the limitations of claim 1 in addition to its additional limitations.

217. Moinzadeh discloses all of the limitations of claim 1 as described above. (*See* ¶¶ 179-215.)

> ***[2] The method of claim 1, wherein the device discovery daemon pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes.***

218. As I explained for claim [1a], Moinzadeh discloses that "the connection 540 . . . of the head unit 321 and the mobile phone 320" "is established via Bluetooth pairing" which involves the head unit "search[ing] for a Bluetooth device." (Moinzadeh, Ex. 1013, [0069].) Moinzadeh further discloses that "[t]he Bluetooth pairing can be in response to the vehicle being powered up."

> The Bluetooth pairing can be in response to the vehicle being powered up (causing the head unit to power up and search for a Bluetooth device), although it should be apparent that Bluetooth pairing could result from other circumstances such as the mobile phone 320 powering up, the mobile phone 320 being brought within range of the head unit 321, re-pairing after another Bluetooth device is disconnected from the head unit 321, etc.

(Moinzadeh, Ex. 1013, [0069].)

219. A POSA would have understood that Moinzadeh's disclosure of the head unit 321 establishing a connection 540 "via Bluetooth pairing" and searching

for a Bluetooth device "in response to the vehicle being powered up" (Moinzadeh, Ex. 1013, [0069]) indicates that the control software 330 ("*device discovery* [computer program]") "pings" the vehicle head unit 321 ("*communication subsystem*") to emit a signal over the wireless "*network*" connection 540 to initiate device discovery in response to a vehicle start condition.

220. As I explained in the state-of-the-art section, Bluetooth communication includes the transmission of information packets. For example, during device discovery, once the proper inquiry access code is received, the device will enter the Connection State, where a "connection has been established and packets can be sent back and forth." (Bluetooth Specification, Ex. 1052, Vol. 2, p. 165.) (*See* ¶ 119.) "The first information packets [in this state] contain control messages that characterize the link and give more details regarding the devices." (Bluetooth Specification, Ex. 1052, Vol. 2, p. 165.) (*See* ¶ 119.)

221. Thus, Moinzadeh discloses that "*the device discovery* [computer program] *pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes*."

b. Claim 3

222. Claim 3 depends from claim 1, which I understand means that claim 3 requires all of the limitations of claim 1 in addition to its additional limitations.

223. Moinzadeh discloses all of the limitations of claim 1 as described above. (*See* ¶¶ 179-215.)

[3] The method of claim 1, wherein the device discovery daemon determines capabilities of the one or more communication devices based on which open port the one or more communication devices exposes to the device discovery daemon.

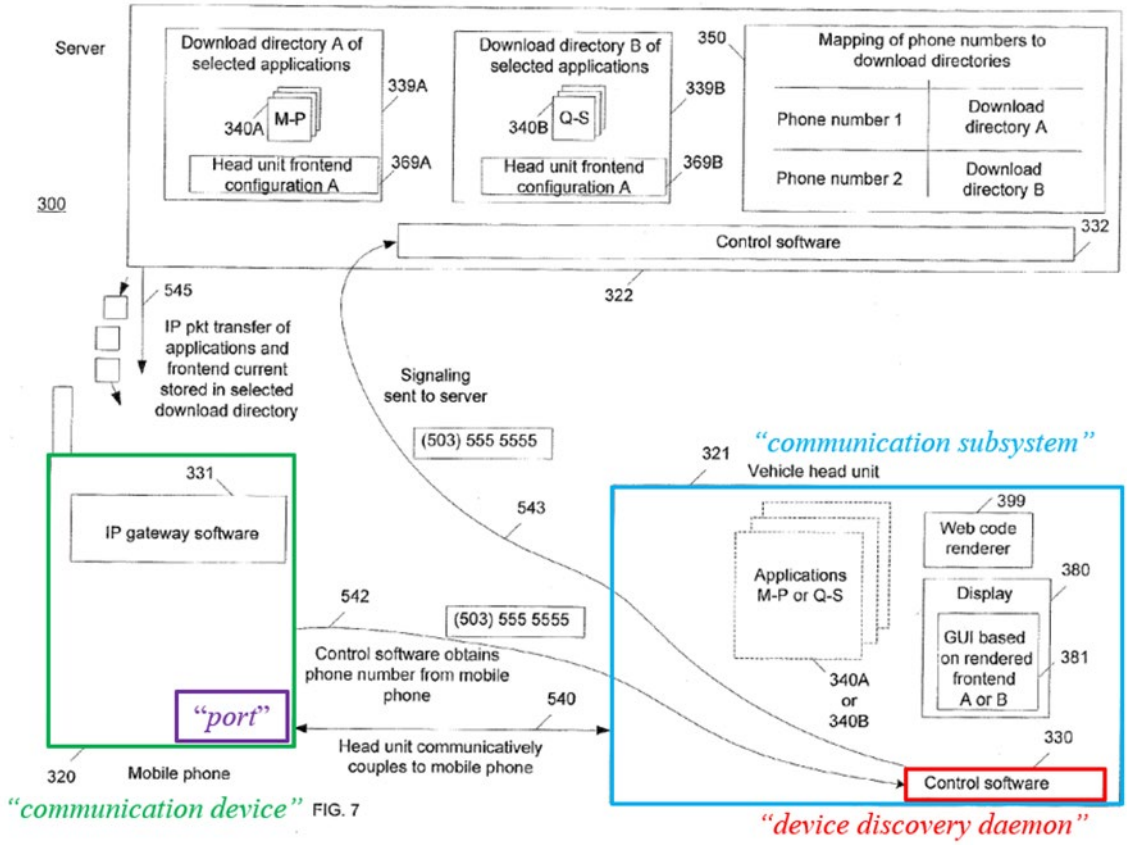
224. Moinzadeh discloses communicatively coupling the mobile device 320 to the head unit 321 wirelessly, e.g., using Bluetooth, and by a wired connection, e.g., using a USB connection:

> In block 801, the head unit 321 communicatively couples to a mobile device such as mobile phone 320. In one example, the connection 540 is established via Bluetooth pairing of the head unit 321 and the mobile phone 320. The Bluetooth pairing can be in response to the vehicle being powered up (causing the head unit to power up and search for a Bluetooth device), although it should be apparent that Bluetooth pairing could result from other circumstances such as the mobile phone 320 powering up, the mobile phone 320 being brought within range of the head unit 321, re-pairing after another Bluetooth device is disconnected from the head unit 321, etc. In other examples, the communicative connection can be established by a user connecting the mobile phone 320 to the head unit 321 using a USB connection.

(Moinzadeh, Ex. 1013, [0069].)

225. Moinzadeh further discloses that the mobile phone 320 "operate[s] as

an IP gateway for forwarding applications to the head unit 321." (Moinzadeh, Ex. 1013, [0075].) A POSA would have understood that the mobile device includes one or more "ports" or communication interface points (annotated in purple below) that the device can "*expose[]*" as "open" to facilitate communication with the head unit 321 over communication channel or connection 540:



Moinzadeh, Ex. 1013, Fig. 7 (Annotated)

226. As discussed, Moinzadeh recognizes that the connection between the vehicle head unit and the smart phone can be wired (e.g. USB) or wireless (e.g. Bluetooth or Wi-Fi): "Still referring to FIG. 1, it is noted that the mobile phone 20 can couple to the head unit 21 by using a connection such as USB, Bluetooth, or a

WiFi connection". (Moinzadeh, Ex. 1013, [0037].) Next, I analyze how in each of these technologies, the software on the Moinzadeh vehicle determines the capabilities of the device based on which open port the device exposes to the software. As explained in ¶¶ 96-98, a POSA would have understood that the term "port" includes both physical and software points of connection through which information may be transferred. A POSA would have known that USB, Bluetooth and Wi-Fi are different from one another in terms of format, speed and protocol. However, the connection is abstracted away by the control software 330, *i.e.*, in each case – USB, Bluetooth, or Wi-Fi – the software determines the capabilities of the device based on which open port is exposed to the software. "When a device is attached to or removed from the USB, the host uses a process known as bus enumeration to identify and manage the device state changes necessary." (USB 3 Spec., Ex. 1066[21], 9-6.) For example, when a USB device is plugged into a vehicle,

[21] USB 3 Spec., Ex. 1066 is a true and accurate copy of a specification that I understand was published by USB Implementers Forum (IF) consisting of Hewlett-Packard Company, Intel Corporation, Microsoft Corporation, NEC Corporation, ST-NXP Wireless, and Texas Instruments in 2008. USB 3 Spec., Ex. 1066 is available at available at https://manuais.iessanclemente.net/images/4/4b/USB30-Specification-2008.pdf, accessed on August 12, 2025.

the device makes available, *i.e.* exposes, its Device ID to the vehicle infotainment system (the host). "A device shall be configured before its function(s) may be used" and "[t]he host typically requests configuration information from the device to determine its capabilities." (USB 3 Spec, Ex. 1066, 9-8, 1-3.) Based on the Device ID, the vehicle's software determines the capabilities of the device and loads the appropriate driver software. (*See* USB 3 Spec., Ex. 1066, 9-8, 1-3.) Further, after the host software obtains the Device ID, following the USB protocol, the software assigns to the USB device a 7-bit address and additional 4 bits to denote an "endpoint". (USB 3 Spec., Ex. 1066, 8-6, 8-7, 8-25, 8-26, 9-6.) Each endpoint together with the 7-bit device address corresponds to a logical connection. "Data transfers occur between host software [e.g., of a vehicle infotainment system] and a particular endpoint on a device" and the "associations between host software to endpoints related to a particular function are called pipes" or channels. (USB 3 Spec., Ex. 1066, 3-12.) The endpoint on the USB device is a point of connection through which information may be transferred. In other words, the endpoint is a logical port. "A device may have more than one active pipe", just as there can be multiple ports associated with one IP address. (USB 3 Spec., Ex. 1066, 3-12, 4-2.) Depending on the capabilities, the software in the vehicle may also provide features such as smartphone mirroring, media playback, and hands-free calling.

227. Also, as discussed above, Bluetooth includes a complete protocol stack and in addition to the lower layers that are part of the Bluetooth controller, defines layers that are part of the host (and, as such, are typically implemented in software). The higher layers of Bluetooth do not use TCP/IP but include their own protocols such as RFCOMM and L2CAP that provide similar functionality. The biggest difference between TCP, L2CAP and RFCOMM from a network programmer's perspective is the choice of port number. Whereas TCP and L2CAP support up to 65535 open ports on a single machine, RFCOMM only allows for 60. (Bluetooth Spec. V1B, Ex. 1067[22], 272, 393.) In the case of RFCOMM they are not referred to as "ports", but as "channels". (Bluetooth Spec. V1B, Ex. 1067, 1024.) A POSA would have known that these Bluetooth RFCOMM channels are software ports. Further, many applications use RFCOMM. For example, the control channel of the Hands-Free Profile uses RFCOMM. (Bluetooth Spec. V1.0 B, Ex. 1067, 395-396.) The RFCOMM channel number is discoverable using the

[22] Bluetooth Spec. V1.0 B, Ex. 1067 is a true and accurate copy of a specification that I understand was published by Bluetooth SIG, Inc. in 1999. Bluetooth Spec. V1.0 B, Ex. 1067 is available at https://engweb.eng.wayne.edu/ad/ad57/ad5781/public_html/BluetoothWeb/BTooth_Spec1.0B_Vol1.pdf, accessed on August 12, 2025.

Service Discovery Protocol (SDP) (Bluetooth Spec. V1.0 B, Ex. 1067, 370, 373) and therefore it is exposed to the software. This allows discovery of the services associated with that RFCOMM channel number. This is not only very similar, but at a high level identical to how TCP uses ports and port numbers. Moinzadeh also recognizes that the connection between the vehicle head unit and the smart phone can be over Wi-Fi. Wi-Fi uses TCP/IP for data transmission. Further, a POSA would have understood that the microprocessor would have utilized standard scanning tools that run over TCP/IP connections (e.g., Nmap), to actively scan for open ports on devices connected via Wi-Fi, and based on which open ports are exposed, determine which communication services a device has. (*See* ¶¶ 94-98.) For example, if the TCP port 80 is open and exposed to the vehicle software, the software can conclude that the HTTP protocol is supported.

228. Thus, Moinzadeh discloses "*wherein the device discovery* [computer program] *determines capabilities of the one or more communication devices* [e.g., connectivity capabilities, e.g., USB, WiFi and Bluetooth] *based on which open port the one or more communication devices exposes to the device discovery* [computer program]" e.g., based on the location and format of data received.

c. Claim 11

229. Claim 11 depends from claim 1, which I understand means that it requires all of the limitations of claim 1 in addition to its own limitations.

230. Moinzadeh discloses all of the limitations of claim 1 as described above. (*See* ¶¶ 179-215.)

[11] A non-transitory and tangible computer readable medium comprising processor executable instructions that, when executed, perform the steps of claim 1.

231. Moinzadeh discloses that its systems, like system 300 discussed above, utilize well known variants of hardware and software, including software that can be stored "in machine-readable or computer-readable storage media" ("*non-transitory and tangible computer readable medium*"):

> Most of the equipment discussed above comprises hardware and associated software. For example, the typical navigation device is likely to include one or more processors and software executable on those processors to carry out the operations described. We use the term software herein in its commonly understood sense to refer to programs or routines (subroutines, objects, plug-ins, etc.), as well as data, usable by a machine or processor. As is well known, computer programs generally comprise instructions that are stored in machine-readable or computer-readable storage media. Some embodiments of the present invention may include executable programs or instructions that are stored in machine-readable or computer-readable storage media, such as a digital memory.

(Moinzadeh, Ex. 1013, [0092].)

> Memory for storing software again is well known. In some embodiments, memory associated with a given processor may be stored in the same physical device as the processor ("on-board" memory); for example, RAM or FLASH memory disposed within an integrated circuit microprocessor or the like. In other examples, the memory comprises an independent device, such as an external disk drive, storage array, or portable FLASH key fob. In such cases, the memory becomes "associated" with the digital processor when the two are operatively coupled together, or in communication with each other, for example by an I/O port, network connection, etc. such that the processor can read a file stored on the memory. Associated memory may be "read only" by design (ROM) or by virtue of permission settings, or not. Other examples include but are not limited to WORM, EPROM, EEPROM, FLASH, etc. Those technologies often are implemented in solid state semiconductor devices. Other memories may comprise moving parts, such as a conventional rotating disk drive. All such memories are "machine readable" or "computer-readable" and may be used to store executable instructions for implementing the functions described herein.

(Moinzadeh, Ex. 1013, [0093].)

> A "software product" refers to a memory device in which a series of executable instructions are stored in a machine-readable form so that a suitable machine or processor, with appropriate access to the software product, can execute the instructions to carry out a process implemented by the instructions. Software products are sometimes used to distribute software. Any type of machine-readable memory,

> including without limitation those summarized above, may be used to make a software product. That said, it is also known that software can be distributed via electronic transmission ("download"), in which case there typically will be a corresponding software product at the transmitting end of the transmission, or the receiving end, or both.

(Moinzadeh, Ex. 1013, [0094].)

232. A POSA would have understood that a transitory medium is temporary, such as a signal, whereas a non-transitory medium is a physical object where data can be stored, like a hard drive, Random Access Memory (RAM), Read-Only Memory (ROM), CD-ROM storage, or memory card. Semiconductor memories are divided into two main categories: volatile (short-term) memory (e.g., (RAM)) and non-volatile (long-term) memory (e.g., (ROM). (Bosch, Ex. 1050, pp. 94-95[23]; IEEE Dictionary, Ex. 1051, p. 152.) Therefore, Moinzadeh's disclosure that "[s]ome embodiments of the present invention may include executable programs or instructions that are stored in machine-readable or computer-readable storage media, such as a digital memory" (Moinzadeh, Ex. 1013, [0092]) discloses "*[a] tangible and non-transient computer readable medium including microprocessor executable instructions*."

3. Independent Claim 12

233. Independent claim 12 is largely duplicative of independent claim 1. To illustrate, the table below shows a side-by-side comparison of claims 1 and 12. Claim 12 is "marked up" to show the minor differences.

'153 Patent Claim 1	**'153 Patent Claim 12**
1[pre]. A method, comprising:	12[pre]. A vehicle, comprising:
[1a] discovering, by a microprocessor executing a microprocessor executable device discovery daemon,	[12a] a microprocessor; [12b] a network and/or communication subsystem of a vehicle; [12c] a microprocessor executable device discovery daemon stored in a computer readable medium and configured to discover
one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle;	one or more communication devices connected wirelessly to the network and/or communication subsystem of a vehicle and,

[1b] for each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery daemon, system data with device information and capabilities; and	[12d] for each of the discovered one or more communication device, populate [] system data with device information and capabilities; and
[1c] refreshing, by the microprocessor executing a microprocessor executable desktop manager, graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.	[12e] a microprocessor executable desktop manager stored in the computer readable medium and configured to refresh graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

12[pre]. A vehicle, comprising:

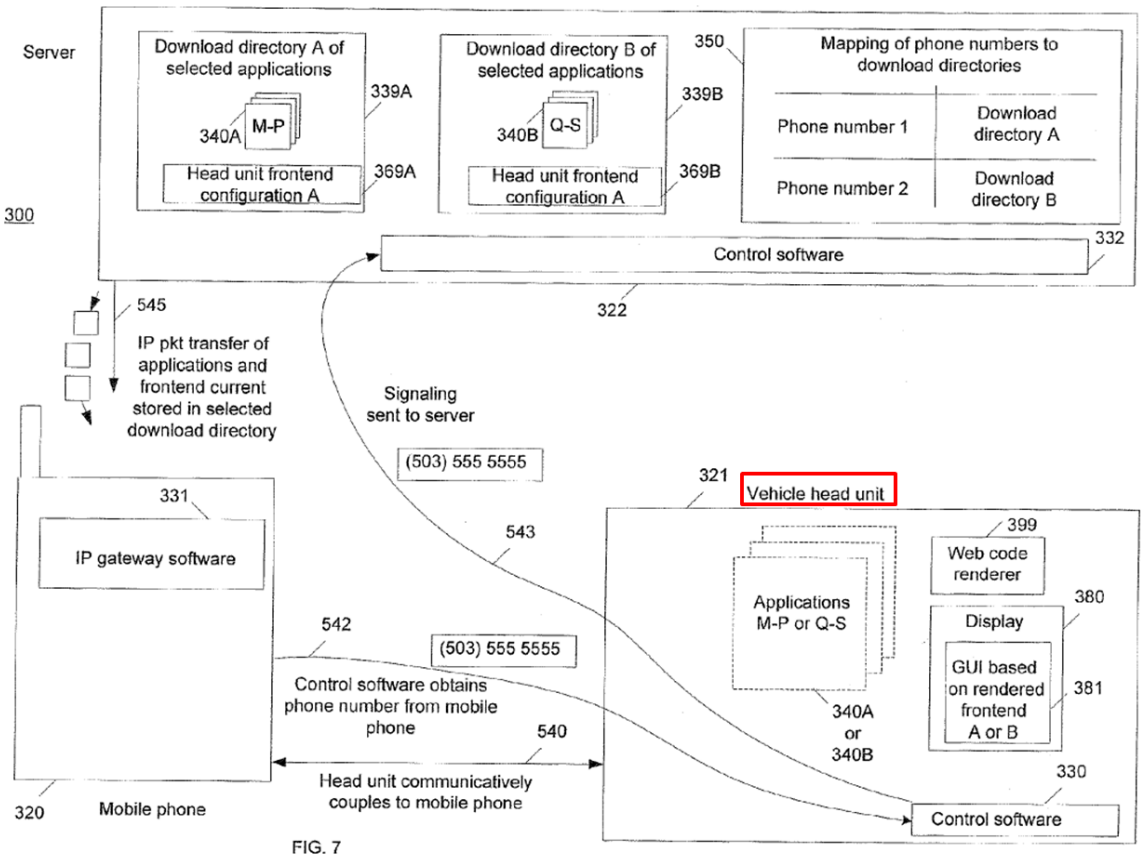
234. Moinzadeh discloses:

In one example, a user couples a phone to a **motor vehicle** head unit using a wired or wireless connection for the purpose of using the head unit as an extended interface for the phone.

(Moinzadeh, Ex. 1013, [0018].)

> FIG. 7 illustrates a system to select and distribute applications to **a vehicle** in a safe and intelligent manner according to user preferences. One difference between the previously discussed system of FIG. 1 and the system of FIG. 7 is the install location for applications. Whereas the applications A-C in the system 100 of FIG. 1 are installed and operating on the mobile phone 20 (using the head unit 21 or other interface powered by the vehicle as an extended interface), the applications M-P/Q-S in the system 300 of FIG. 7 are installed on the **head unit 321 or other component powered by the vehicle.** In system 300 of FIG. 7, the software 330-332 enables a provider to select which applications can be installed on the head unit 321 and control distribution of the selected applications to the vehicle.

(Moinzadeh, Ex. 1013, [0065]-[0066].)



Moinzadeh, Ex. 1013, Fig. 7 (Annotated)

235. Thus, Moinzadeh discloses "*a vehicle*."

[12a] a microprocessor;

236. *See* Claim 1a.

[12b] a network and/or communication subsystem of a vehicle;

237. *See* Claims 1a and 1b.

[12c] a microprocessor executable device discovery daemon stored in a computer readable medium and configured to discover one or more communication devices connected wirelessly to the network and/or communication subsystem of a vehicle and,

[12d] for each of the discovered one or more communication device, populate system data with device information and capabilities; and

238. Claim limitations [12c]-[12d] are substantially similar to limitations [1a] and [1b] of claim 1. However, claim 12 requires a "*computer readable medium*," whereas claim 1 does not.

239. Moinzadeh discloses that the system 300 includes a software 330, or a computer program, included on the head unit 321 of the vehicle ("*device discovery* [computer program]") to control vehicle applications:

> [T]he applications M-P/Q-S in the system 300 of FIG. 7 are installed on the head unit 321 or other component powered by the vehicle. In system 300 of FIG. 7, the software 330-332 enables a provider to select which applications can be installed on the head unit 321 and control distribution of the selected applications to the vehicle.

(Moinzadeh, Ex. 1013, [0066].)

240. Moinzadeh discloses that its systems utilize well known variants of hardware and software, including software that can be stored "in machine-readable or computer-readable storage media" ("*computer readable medium*"):

> Most of the equipment discussed above comprises hardware and associated software. For example, the typical navigation device is likely to include one or more processors and software executable on those processors to carry out the operations described. We use the term software herein in its commonly understood sense to refer to

> programs or routines (subroutines, objects, plug-ins, etc.), as well as data, usable by a machine or processor. As is well known, computer programs generally comprise instructions that are stored in machine-readable or computer-readable storage media. Some embodiments of the present invention may include executable programs or instructions that are stored in machine-readable or computer-readable storage media, such as a digital memory.

(Moinzadeh, Ex. 1013, [0092].)

241. Thus, Moinzadeh discloses "*a microprocessor executable device discovery* [computer program] *stored in a computer readable medium . . . .*"

242. The remaining elements of limitations [12a]-[12d] recite the same elements as limitations [1a] and 1[b], except they are rearranged or in a different order, as illustrated in the table above. (*See* ¶¶ 184-205.) For example, limitations [12a] and [12c] require "*a microprocessor*," and "*a network and/or communication subsystem of a vehicle*." While limitation [1a] requires "*discovering, by a microprocessor executing a microprocessor executable device discovery* [computer program]*, one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle*." Limitation [1a] is essentially the combination of limitations [12a] and [12b]. The remaining differences between the claim limitations are of the same form and do not alter the meaning of the claim, therefore, I refer back to my analysis of limitations [1a] and [1b] of claim 1 to

establish that these limitations are met by Moinzadeh.

[12e] a microprocessor executable desktop manager stored in the computer readable medium and configured to refresh graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

243. Claim limitation [12e] is substantially similar to limitation [1c] of claim 1; however, limitation [12e] also requires that the "*desktop manager* [is] *stored in the computer readable medium,*" whereas limitation [1c] does not require a computer readable medium. I refer back to my analysis of limitations [12a]-[12c] to establish that Moinzadeh teaches a "*computer readable medium*."

244. The remainder of limitation [12e] is identical to limitation [1c], therefore, I refer back to my analysis of this limitation of claim 1 to establish that this is met by Moinzadeh.

4. Dependent Claims 13 and 14

a. Claim 13

[13] The vehicle of claim 12, wherein the device discovery daemon pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes.

245. Claim 13 depends from claim 12, therefore I understand that claim 13 includes all the limitations of claim 12. Moinzadeh discloses all of the limitations of claim 12 as discussed above. (*See* ¶¶ 233-244.)

246. Claim 13 is largely duplicative of claim 2. To illustrate, the table below shows a side-by-side comparison of claims 2 and 13. Claim 13 is "marked up" to show the minor differences.

'153 Patent Claim 2	**'153 Patent Claim 13**
[2] The method of claim 1,	**[13]** The vehicle of claim 12,
wherein the device discovery daemon pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes.	wherein the device discovery daemon pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes.

247. As the differences between claims 2 and 13 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 2 to establish that these limitations are met by Moinzadeh.

b. Claim 14

[14] The vehicle of claim 12, wherein the device discovery determines capabilities of the one or more communication devices

based on which open port the one or more communication devices exposes to the device discovery.

248. Claim 14 depends from claim 12, therefore I understand that claim 14 includes all the limitations of claim 12. Moinzadeh discloses all of the limitations of claim 12 as described above. (*See* ¶¶ 233-244.)

249. Claim 14 is largely duplicative of claim 3. To illustrate, the table below shows a side-by-side comparison of claims 3 and 14. Claim 14 is "marked up" to show the minor differences.

'153 Patent Claim 3	**'153 Patent Claim 14**
[3] The method of claim 1,	**[14]** The vehicle of claim 12,
wherein the device discovery daemon determines capabilities of the one or more communication devices based on which open port the one or more communication devices exposes to the device discovery daemon.	wherein the device discovery daemon determines capabilities of the one or more communication devices based on which open port the one or more communication devices exposes to the device discovery daemon.

250. As the differences between claims 3 and 14 are not substantial and they contain identical language other than the claims they depend from, I refer

back to my analysis of claim 3 to establish that these limitations are met by Moinzadeh.

B. Ground 2 – The Combination of Moinzadeh and Clement Teaches all of the Limitations of Claims 4-5, 7-10, 15-16, and 18-21

1. Rationale to Combine

251. It would have been obvious to a POSA at the time of the alleged invention to combine the vehicle system disclosed in Moinzadeh, with the known technique of location-based vehicle function permission management disclosed in Clement to provide additional functionality e.g., to improve safety and security. A POSA would have understood that Moinzadeh and Clement are complementary technologies that are combinable, for example, Moinzadeh discloses that:

> Having described and illustrated the principles of the invention in a preferred embodiment thereof, it should be apparent that the invention may be modified in arrangement and detail without departing from such principles. We claim all modifications and variations coming within the spirit and scope of the following claims.

(Moinzadeh, Ex. 1013, [0095].)

a. Analogous Art

252. Moinzadeh and Clement are from the same field – communication between a vehicle system and one or more electronic devices:

> In one example, a network device stores a mapping of application operation modes to vehicle conditions such as a first condition of the vehicle powered but not moving and a second condition of the vehicle moving. The network device receives a wirelessly transmitted request (sent by either a wireless transmitter of the vehicle or of a mobile device coupled to the vehicle) for a particular application to utilize an interface powered by the vehicle. The network device compares an application identifier specified by the received request to the mapping. The network device then identifies a portion of the vehicle interface according to the comparison and signals control software on the vehicle to grant the particular application access to only the identified portion of the vehicle interface. The application can reside on the mobile device and utilize the vehicle interface as an extended interface, or the application can reside on the vehicle itself.

(Moinzadeh, Ex. 1013, [0008], *see also* Abstract.)

> In system 300 of FIG. 7, the software 330-332 enables a provider to select which applications can be installed on the head unit 321 and control distribution of the selected applications to the vehicle.

(Moinzadeh, Ex. 1013, [0066].)

> In one aspect, a vehicle is provided that is configured to receive user input for controlling the vehicle. The user input may be entered via a control device, such as a portable computing device. Examples of such devices may include a cell phone, a tablet, a laptop, or a portable gaming device. By way of example, the user input may specify a control action for the vehicle to perform.

(Clement, Ex. 1010, 4:42-46.)

> The vehicle control unit 320 may be coupled to the control device 230 via a wireless or wired connection and it may be operable to receive instructions from the control device 230 to change the state of one or more of the vehicle systems 310*a-f*.

(Clement, Ex. 1010, 7:8-11.)

b. Motivation to Combine

253. Moinzadeh discloses a system that permits access to vehicle applications on fixed electronic devices in the vehicle based on multiple factors, including the location of fixed electronic devices. For example, Moinzadeh discloses permitting access to a video game application C at a back seat display but not permitting such access at the head unit 321 to limit driver distractions:

> One real world example might be a navigation application A and a video game application C, where even when a passenger is present the system 100 will not allow the video game application C to be displayed on the head unit 21 screen 1 as this is deemed to be too much of a **distraction for a driver** whereas the navigation application A can be displayed on the head unit 21 screen 1. Another real world application can be a vehicle with a plurality of interfaces, such as a head unit and a display attached to the back of a seat. An application can be granted access to the back seat display under conditions where the same application would not be granted access to the head unit.

(Moinzadeh, Ex. 1013, [0026].)

254. However, Moinzadeh does not disclose regulating user access to vehicle applications based on the location of a portable device.

(1) Control of Vehicle System Functionality from a Portable Device

255. Clement discloses a permission management system for controlling vehicle system functions from a portable device to increase vehicle safety:

> Having a permission management system is important with respect to ensuring the safety of the vehicle. For instance, it is unsafe for a 5-year-old sitting in the rear seat of the vehicle to be allowed to steer the vehicle, via the control device, should he or she manage somehow to grab the control device and bring it in the backseat. To increase the vehicle's safety, the location of the control device inside the vehicle may be monitored and a determination may be made as to what region of the vehicle's cab the control device is located in. Possible regions may include a region where the driver's seat is located, a region where the front passenger's seat is located, and a region where the backseats are located.
>
> In one example, the control device may be permitted to perform safety-critical actions, such as steering or applying the brakes, only if it is located in the region where the driver seat is located. In this regard, the ability to perform safety-critical actions may be denied when the control device is located elsewhere in the vehicle's cab. This ensures that only the person in the driver's seat retains control over aspects of the operation of the vehicle that are important with respect to safety. Nevertheless, the control device may be permitted to control

> non-safety critical aspects of the operation of the vehicle when it is located in other parts of the vehicle, like the backseat. For example, the control device may be permitted to perform actions from the backseat, such as activating an air-conditioner, rolling down a window, or changing the station playing on the vehicle's radio.

(Clement, Ex. 1010, 5:6-32.)

256. Clement discloses a "vehicle control unit 320 . . . coupled to the control device 230 . . . may be operable to receive instructions from the control device 230 to change the state of one or more . . . vehicle systems 310*a-f*." (Clement, Ex. 1010, 7:8-11.) Clement further discloses that the vehicle control unit 320 can identify a "current location of the portable control device [230] within a passenger compartment of the vehicle, and depending on the current location of the portable control device [230]," permit certain vehicle functions. (Clement, Ex. 1010, 1:42-51, *see also*, 7:40-50, Fig. 8.)

257. Clement discloses that "[a]t task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230" and if so "task 885 is executed" i.e., the vehicle control unit 320 "Execute[s] the Instruction;" otherwise, "task 895 is performed":

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The

> determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

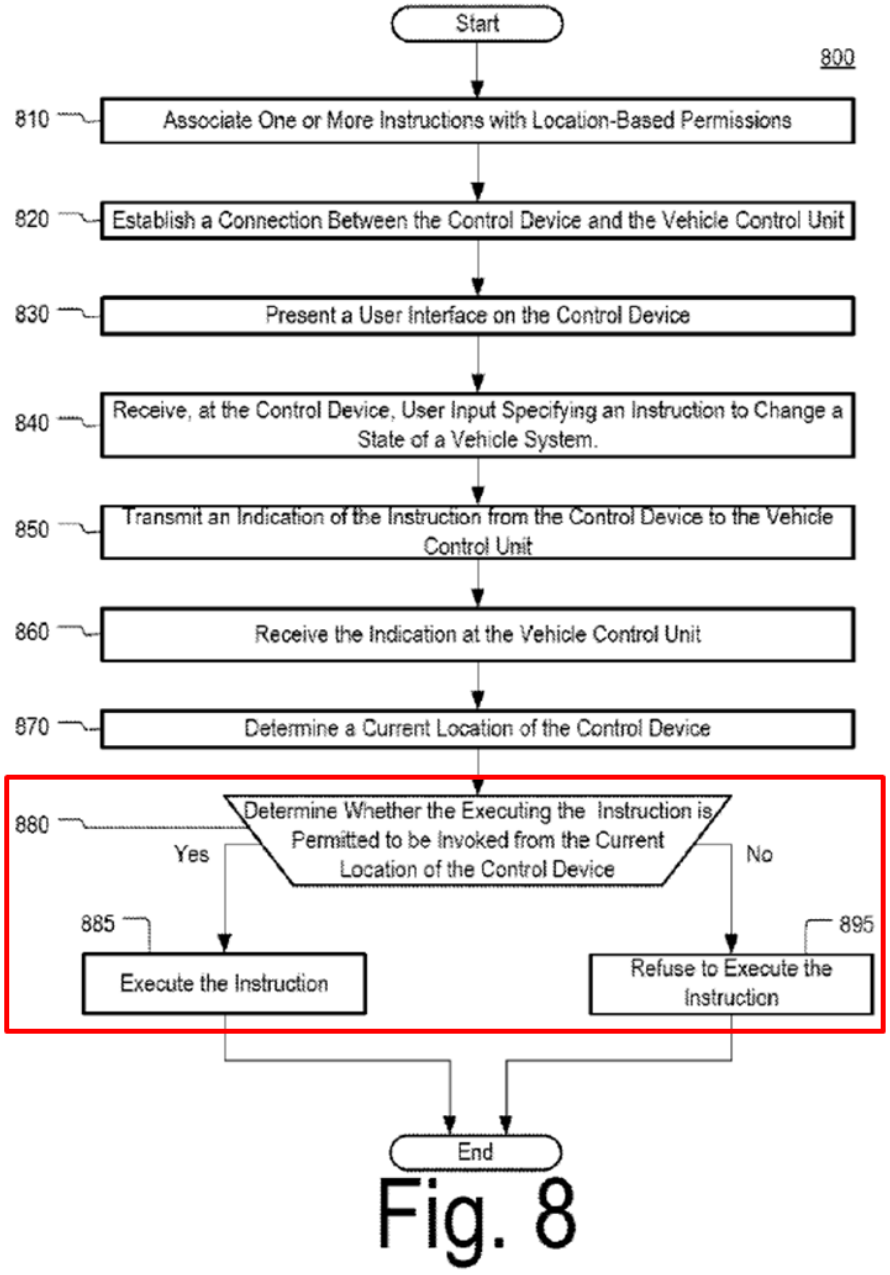


Fig. 8

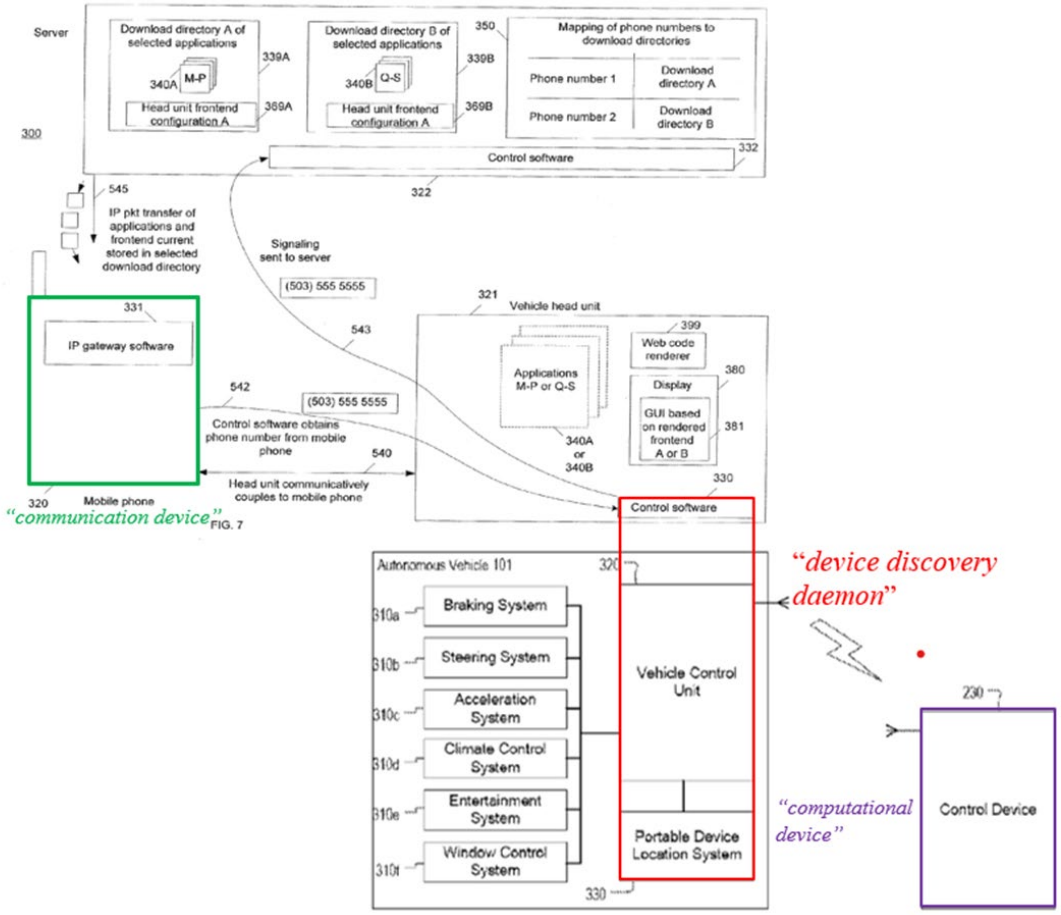
Clement, Ex. 1010, Fig. 8 (Annotated)

258. A POSA at the time of the alleged invention would have been motivated to combine the vehicle system disclosed in Moinzadeh with the location-based permission management techniques disclosed in Clement to yield predictable results, e.g., to expand the functionality of Moinzadeh's system to also control

vehicle system functionality, by being able to determine the specific location of a portable/mobile device and restrict access to vehicle systems based on that location. The ability to restrict access to applications and vehicle system functionality based on the location of a portable device provides additional safety measures, e.g., limiting the control of safety critical features to the driver. Additionally, allowing passengers to control other vehicle system functionality, e.g., audio and climate controls from a portable device, may limit driver distraction.

c. A POSA would have understood how to combine Moinzadeh and Clement

259. A POSA would have understood how to combine Moinzadeh and Clement with a reasonable expectation of success. In terms of hardware modifications, a POSA would have modified Moinzadeh's vehicle system to include Clement's vehicle control unit 320, the location system 330 including receivers 610*a-d*, and the control device 230. As illustrated in the figure below, a POSA would have understood that due to the complementary nature of the systems, Moinzadeh's head unit 321 and Clement's vehicle control unit 320 would have been combined to share hardware and software:



Moinzadeh, Ex. 1013, Fig. 7 (Annotated); Clement, Ex. 1010, Fig. 3 (Annotated)

260. The combined Moinzadeh/Clement system includes Clement's control device 230 and the location system 330 including receivers 610*a-d* for determining the position of the control device 230 within the vehicle.

> The vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230.

(Clement, Ex. 1010, 7:40-42.)

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

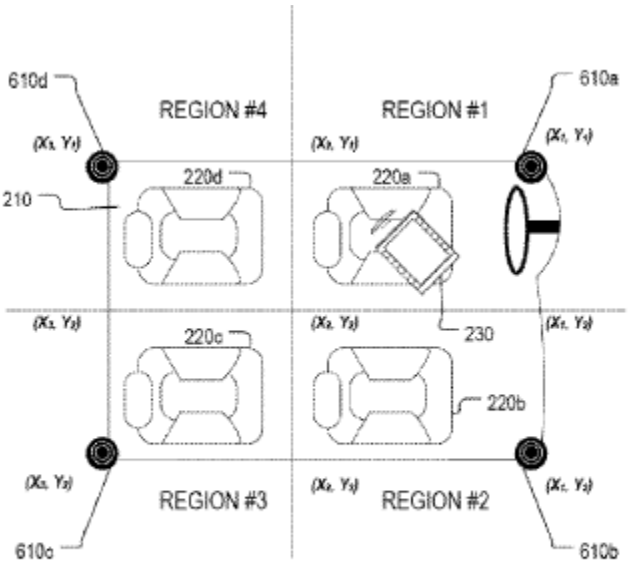


Fig. 6

Clement, Ex. 1010, Fig. 6

261. In terms of the portable device, Moinzadeh discloses that its vehicle system permits access to vehicle application through mobile phone 320, when

mobile phone 320 is in a fixed location. (Moinzadeh, Ex. 1013, [0026], [0069].) Clement discloses a control device 230, where "[t]he operational capabilities of the control device 230 may vary with the control device's location in the passenger compartment 210." (Clement, Ex. 1010, 5:59-61.) As shown in Clement's Figure 6 above, the passenger compartment 210 is separated into Regions 1-4. Since the control device's location is dynamically determined using receivers 610*a-d* within Regions 1-4, a POSA would have understood that the control device 230 does not have to be in a fixed location to obtain access to vehicle systems, but the control device 230 needs to be physically present within the vehicle.

262. In addition to the elements discussed above, a POSA would have modified Moinzadeh's vehicle system to include the associated software needed to operate Clement's vehicle control unit 320 and the location system 330, to enable determining the position of a mobile device within the vehicle.

263. Clement discloses that the vehicle control unit 320 includes a processor 410 and executable code 440 that is executed by the processor 410:

> FIG. 4 depicts a schematic diagram of the vehicle control unit 320 in accordance with aspects of the disclosure. As illustrated, the vehicle control unit 320 may include a processor 410 and memory 420. Memory 420 of vehicle control unit 320 may store information accessible by processor 410, including executable code 440 that may be executed by the processor 410.

(Clement, Ex. 1010, 7:51-57.)

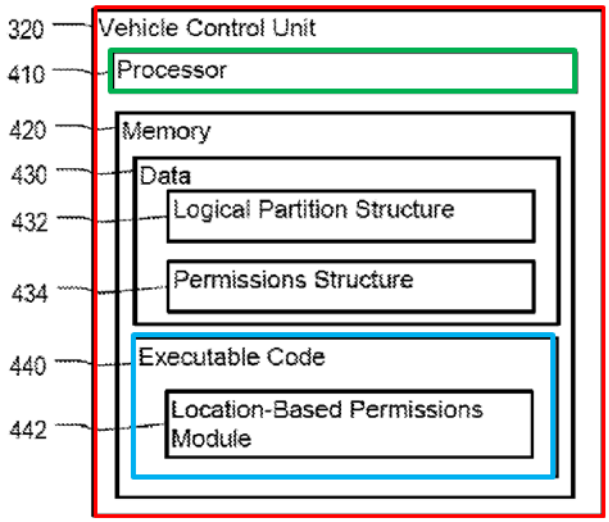


Fig. 4

Clement, Ex. 1010, Fig. 4 (Annotated)

264. Clement further discloses that the executable code 440 of the vehicle control unit 320 includes a location-based permissions module 442 that is configured to enforce location-based restriction policies, such as those described with reference to Figure 8:

> The executable code 440 may perform at least some of the tasks of the process 800 depicted in FIG. 8. For example, the executable code 440 may include a location-based permissions module 442 that is configured to enforce location-based restriction policies.

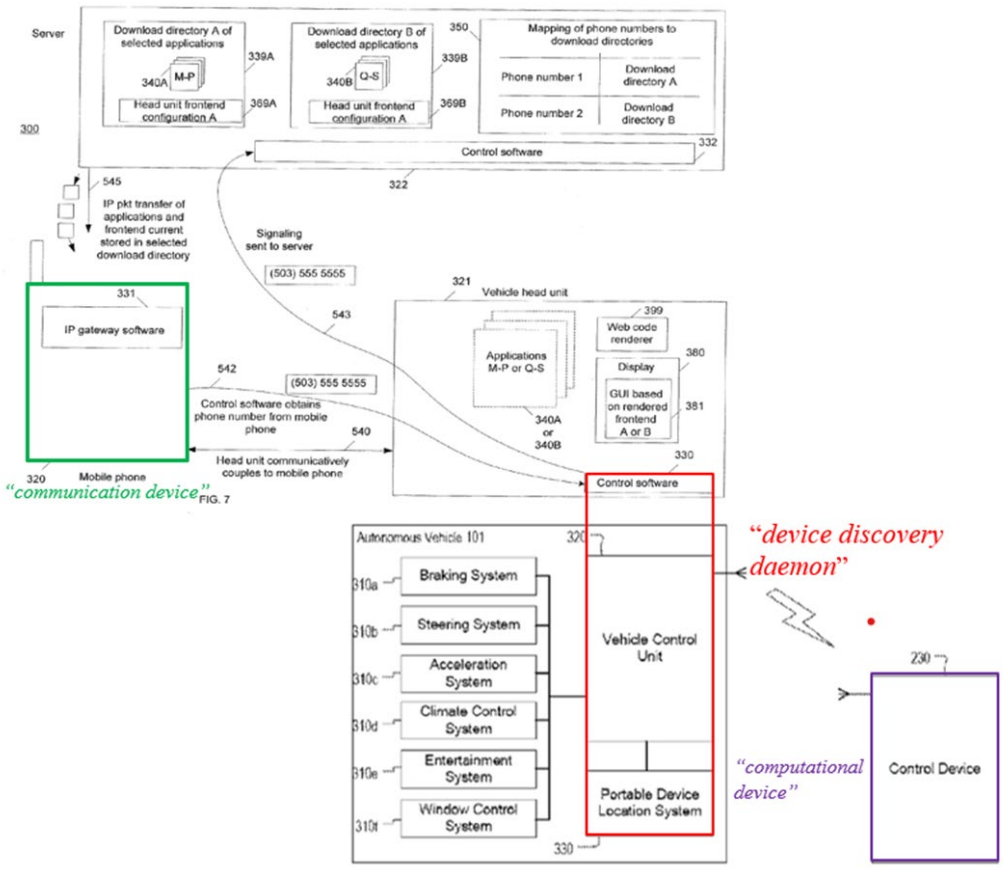
(Clement, Ex. 1010, 8:13-17, Fig. 8.)

265. Clement further discloses that the location system 330 includes software for determining the location of device 230:

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

266. The combination of Moinzadeh's vehicle system and Clement's control device 230, vehicle control unit 320, location system 330, including receivers 610*a-d*, and its associated software, would allow vehicle systems to be accessed by a device in various locations within a vehicle, increasing ease of use and functionality, while ensuring that access is only given when the device is physically inside the vehicle, thereby increasing safety and security.



Moinzadeh, Ex. 1013, Fig. 7 (Annotated); Clement, Ex. 1010, Fig. 3 (Annotated)

267. Regarding software, both Moinzadeh and Clement disclose strategies for discovering and pairing electronic devices. A POSA would have known how to modify Moinzadeh's vehicle system to include the associated software needed to operate Clement's vehicle control unit 320 and the location system 330, to enable determining the position of a mobile device within the vehicle. For example, Clement discloses that the "location system 330 includes receivers 610*a-d*. . . located in different parts of the passenger compartment 210" that "may take measurements of the strength of radio signal(s) transmitted by the control device

230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230." (Clement, Ex. 1010, 7:23-32.) As illustrated in the combined Moinzadeh/Clement figure above, a POSA would have been able to incorporate this functionality into Moinzadeh's vehicle system (e.g., implement Clement's software on Moinzadeh's head unit 321 or server 322) and apply known triangulation techniques to determine the device's location.

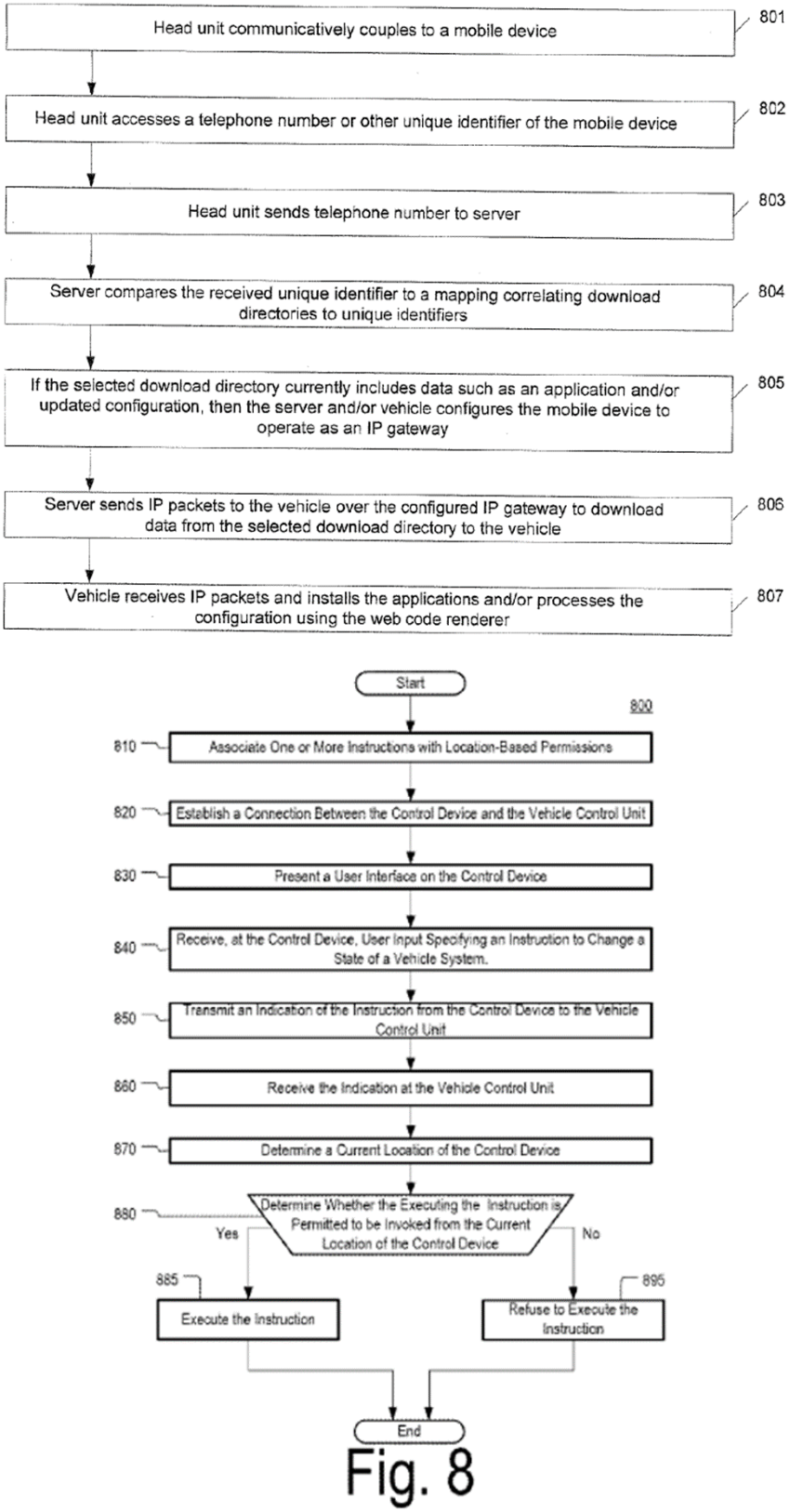


Fig. 8

Moinzadeh, Ex. 1013, Fig. 8; Clement Ex. 1010, Fig. 8

268. These modifications would include receivers and corresponding software for detecting the location of a portable electronic device within a vehicle to limit access to vehicle system functionality based on the location of the portable electronic device. This modification would have been a straightforward combination of known elements in the prior art, yielding the predictable result of reducing driver distractions and increasing user convenience.

2. Dependent Claims 4-10

a. Claim 4

269. Claim 4 depends from claim 1, which I understand means that claim 4 requires all of the limitations of claim 1 in addition to its additional limitations.

270. Moinzadeh discloses all of the limitations of claim 1 as described above. (*See* ¶¶ 179-215.)

[4a] The method of claim 1, further comprising: determining, by the microprocessor executable device discovery daemon, that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle;

271. In my analysis I apply the proposed construction of the term "*daemon*" as a computer program. (*See* ¶¶ 83-85.)

272. I understand that claim 4 is referring to the same network, communication subsystem, and vehicle as those recited in claim 1 despite claim 4 reciting "*a network*" and "*a vehicle*" rather than "the" network and "the" vehicle.

273. It is therefore my understanding that claim [4a] should be interpreted as "determining, by the microprocessor executable device discovery [computer program], that a computational device is connected to or attempting to connect to [the] network and/or communication subsystem of [the] vehicle."

274. As explained for limitation [1a], Moinzadeh discloses that the control software 330 of the head unit 321 searches for a Bluetooth device to establish a connection with the mobile device 320 ("*communication device*") (Moinzadeh, Ex. 1013, [0069].) Further, as I explained in the rationale to combine section, the combined Moinzadeh/Clement system would also enable discovery of Clement's control device 230 ("*computational device*"). (*See* ¶¶ 184-194, 251-268.)

275. Clement discloses that its vehicle control unit 320 software performs a similar device discovery procedure. (*See* ¶¶ 150-158.) As explained in the rationale to combine section, the combination of Moinzadeh and Clement collectively teach the "*device discovery* [computer program]" limitations of Ground 2.

276. Clement discloses a vehicle 101 that includes a vehicle control unit 320 and a portable device location system 330:

> FIG. 3 depicts a schematic diagram of the vehicle 101 in accordance with aspects of the disclosure. As illustrated, vehicle 101 includes vehicle systems 310*a-f*, a vehicle control unit 320, and a portable device location system 330.

(Clement, Ex. 1010, 6:27-30.)

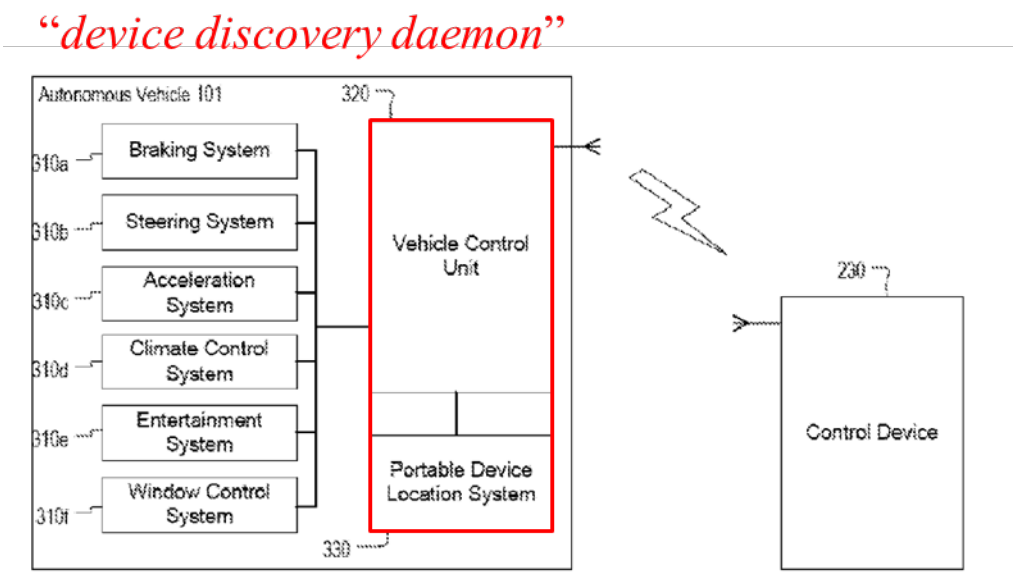


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

277. Clement further discloses that the vehicle control unit 320 may be integrated with the location system 330:

> Although in this example, the location system 330 and the vehicle control unit 320 are depicted as separate blocks, in some instances, they may be (completely or partially) integrated together.

(Clement, Ex. 1010, 7:32-36.)

278. With reference to Figure 3, the "[v]ehicle control unit 320 may also be operatively connected to one or more of the vehicle systems 310*a-f* and it may be operable to change the state of any one of these systems." (Clement, Ex. 1010, 6:63-66.) A POSA would have understood that the vehicle control unit 320 and the vehicle systems 310 would have been connected to each other over a wired

connection, i.e., a vehicle communication network ("*network*") to facilitate the vehicle control unit 320 controlling, or changing the state of, the vehicle systems 310*a-f*.

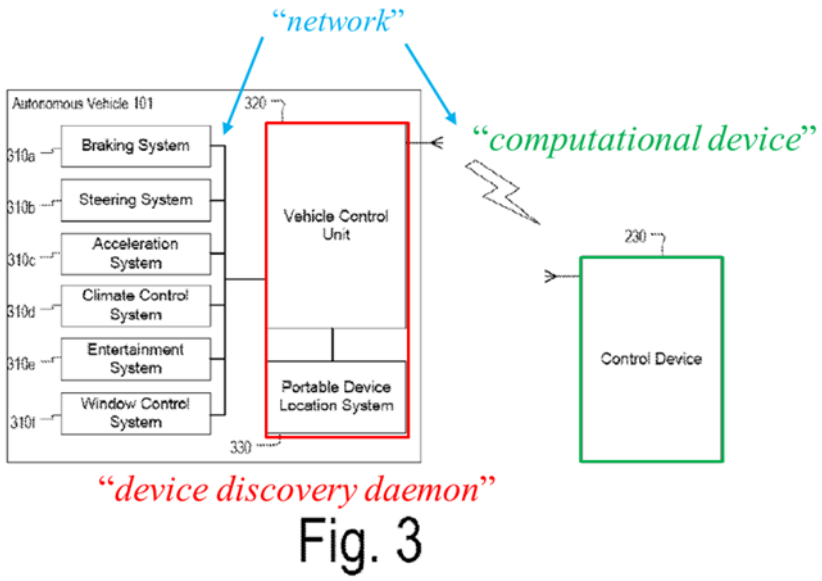


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

279. Clement also discloses that the vehicle control unit 320 includes a processor 410 and executable code 440 that is executed by the processor 410:

> FIG. 4 depicts a schematic diagram of the vehicle control unit 320 in accordance with aspects of the disclosure. As illustrated, the vehicle control unit 320 may include a processor 410 and memory 420. Memory 420 of vehicle control unit 320 may store information accessible by processor 410, including executable code 440 that may be executed by the processor 410.

(Clement, Ex. 1010, 7:51-57.)

280. Clement further discloses that the executable code 440 of the vehicle control unit 320 includes a location-based permissions module 442 that is configured to enforce location-based restriction policies, such as those described with reference to Figure 8:

> The executable code 440 may perform at least some of the tasks of the process 800 depicted in FIG. 8. For example, the executable code 440 may include a location-based permissions module 442 that is configured to enforce location-based restriction policies.

(Clement, Ex. 1010, 8:13-17, Fig. 8.)

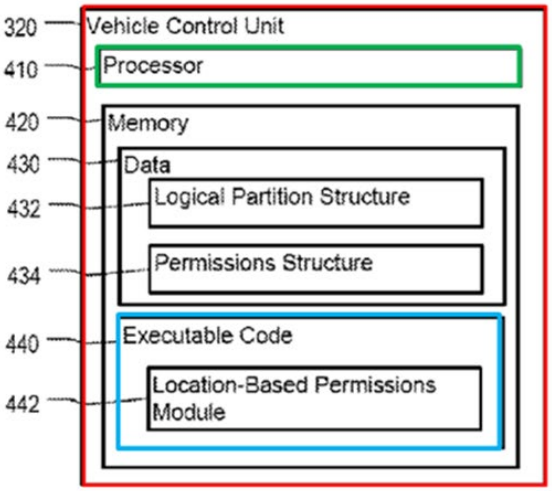


Fig. 4

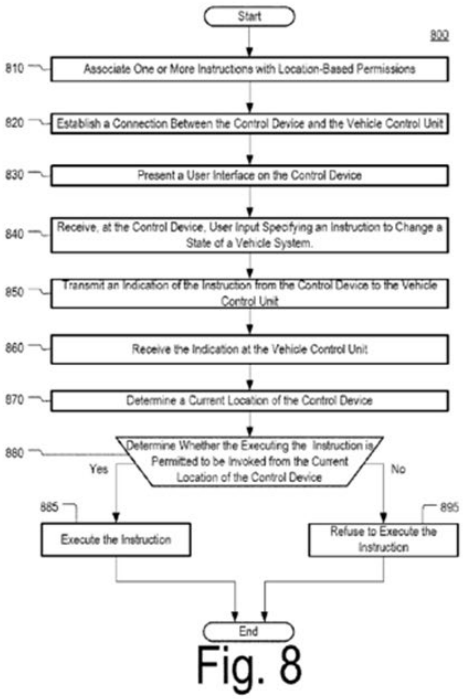
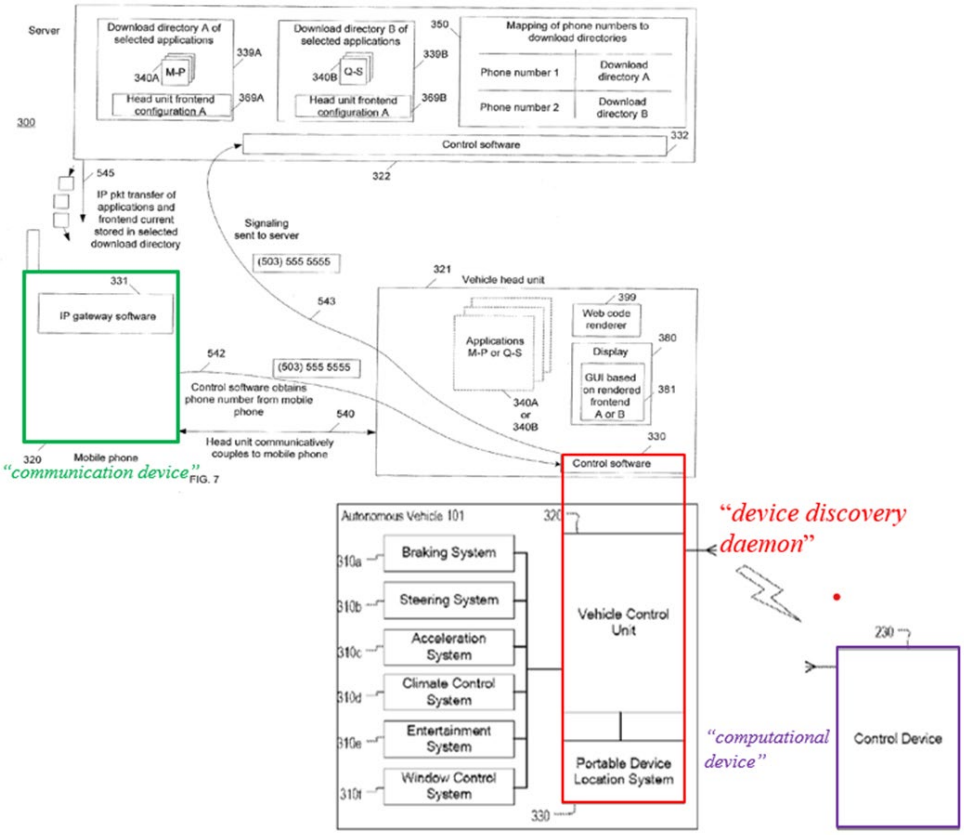


Fig. 8

Clement, Ex. 1010, Figs. 4, 8 (Annotated)

281. Moinzadeh's control software 330, combined with Clement's executable code 440, including the location-based permissions module 442, of the

vehicle control unit 320 combined with the portable device location system 330, collectively provide a "*microprocessor executable device discovery* [computer program]."



Moinzadeh, Ex. 1013, Fig. 7 (Annotated); Clement, Ex. 1010, Fig. 3 (Annotated)

282. Clement's Figure 8 "depicts a schematic diagram of a process associated with controlling of the vehicle of FIG. 1 by the vehicle control unit of FIG. 4." (Clement, Ex. 1010, 4:27-29.) At task 820, the vehicle control unit 320 establishes a connection with the control device 230 utilizing "any communication[] protocol" such as "Bluetooth":

At task 820, a connection between the control device 230 and the vehicle control unit 320 is established. The connection may be either wired or wireless. To establish the connection, any communications protocol may be utilized, such as TCP/IP, Bluetooth, USB, wireless USB, WiFi, or a custom communications protocol.

(Clement, Ex. 1010, 9:45-50.)

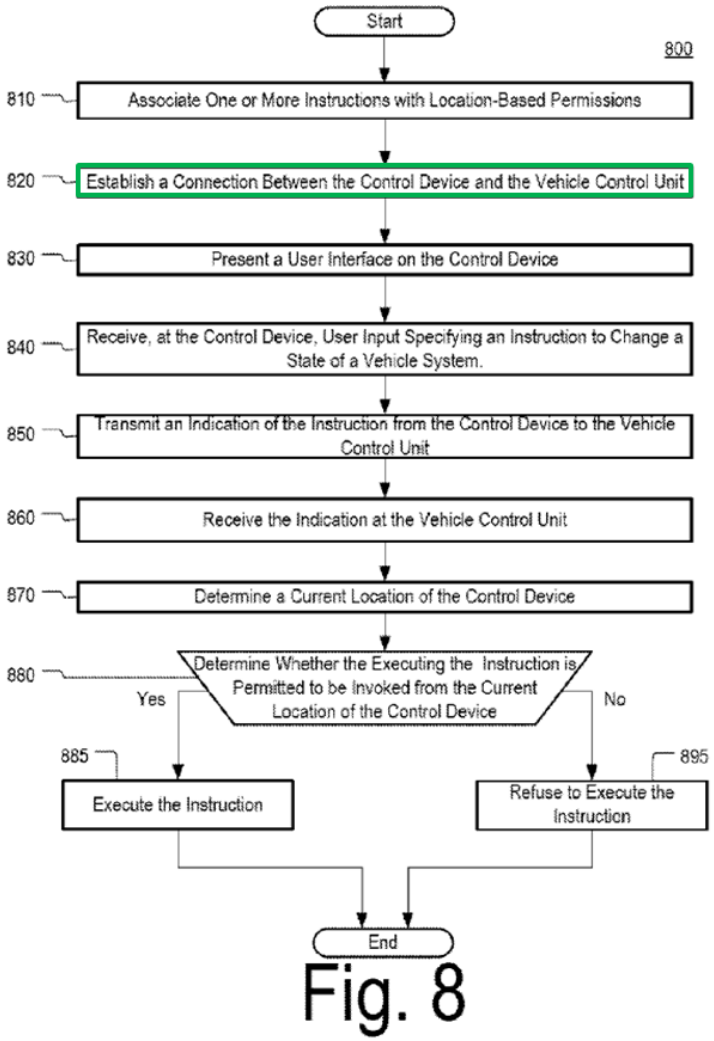


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

283. Clement discloses that the vehicle control unit 320 communicates

with the control device 230 ("*computational device*") to receive instructions and its executable code 440 controls, or changes the state of, vehicle systems 310*a-f* based on the instructions:

> The vehicle control unit 320 may be coupled to the control device 230 via a wireless or wired connection and it may be operable to receive instructions from the control device 230 to change the state of one or more of the vehicle systems 310*a-f*.

(Clement, Ex. 1010, 7:8-11.)

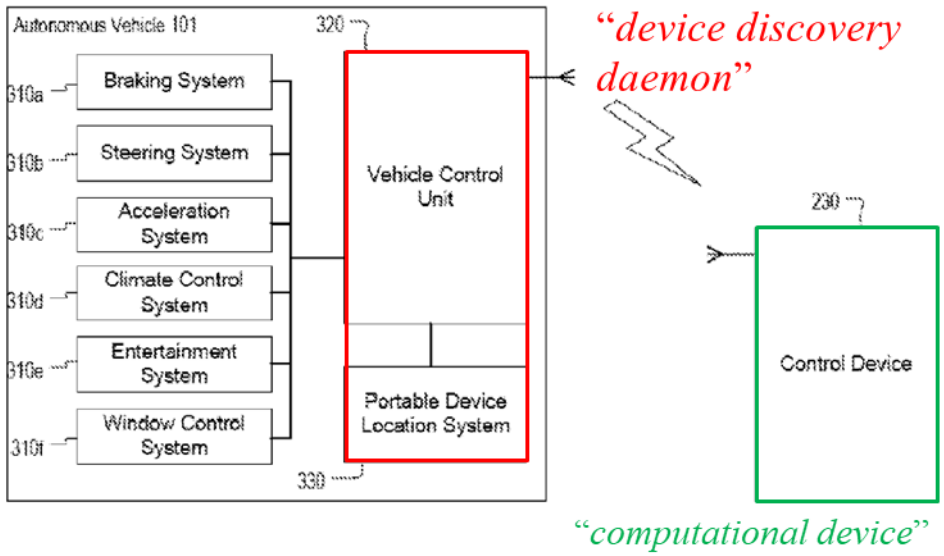


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different

> parts of the of the passenger compartment 210. The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

284. A POSA would have understood that Clement's disclosure of the vehicle control unit 320 "chang[ing] the state of one or more of the vehicle systems 310*a-f*" and the lines connecting the corresponding boxes in Figure 3, indicates that vehicle control unit 320 communicates with the vehicle systems 310*a-f* over a vehicle network ("*network*"). (Clement, Ex. 1010, 7:8-11.) A POSA would have further understood that by establishing a connection with, and receiving instructions from, the control device 230, the vehicle control unit 320 "*determines*" that the control device 230 is connected to the vehicle network.

285. Accordingly, the combination of Moinzadeh and Clement teaches "determining, by the microprocessor executable device discovery [computer program], that a computational device [control device 230] is connected to or attempting to connect to a network and/or communication subsystem of a vehicle."

[4b] in response, determining, by the device discovery daemon, whether the computational device is located within a predetermined area and/or zone of the vehicle; and

286. Clement discloses that after establishing a connection at task 820 (annotated in green below), "the vehicle control unit 320 determines the current location of the control device 230" "[a]t task 870" (annotated in red below):

> At task 870, the vehicle control unit 320 determines the current location of the control device 230. Without limitation, the current location of the control device 230 may be the location where the control device is located when task 870 is executed, the location where the control device is located when task 860 is executed, or the location of the control device 230 at another time instant that is substantially cotemporaneous with the time instant when either one of task 860 or task 870 is executed.

(Clement, Ex. 1010, 10:37-45.)

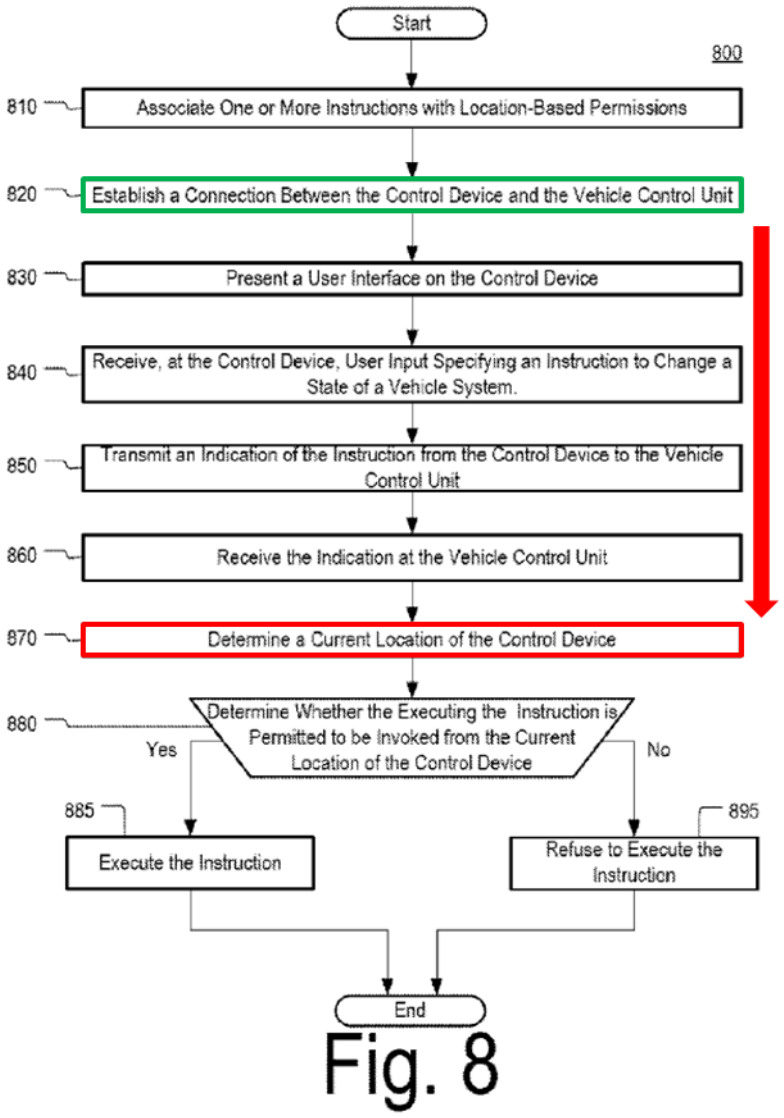


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

287. Clement discloses that the location system 330 software, which may be incorporated with the vehicle control unit 320, determines the location of the control device 230 ("*computational device*") within the passenger compartment 210 of the vehicle using multiple approaches, including triangulation based the strength of the radio signal(s) transmitted by the control device 230:

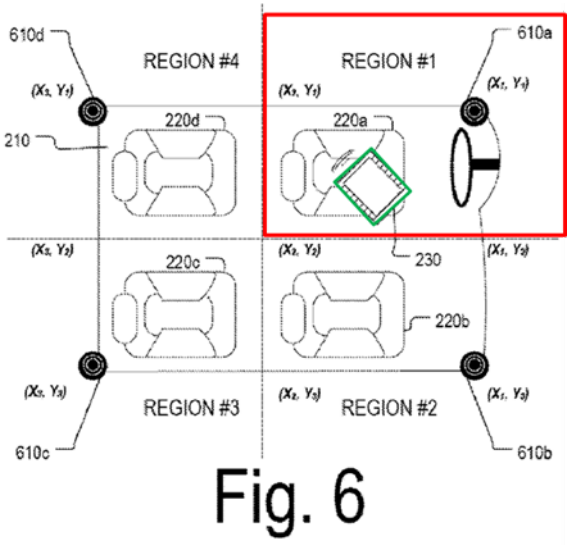
> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

288. Clement further discloses that the location of the control device 230 refers to the specific ("*predetermined*") region (e.g., Regions 1-4) of the vehicle that the control device 230 is located in:

> The executable code 440 may perform at least some of the tasks of the process 800 depicted in FIG. 8. For example, the executable code 440 may include a location-based permissions module 442 that is configured to enforce location-based restriction policies. That is, when an instruction is received from the control device 230, the module 432 may determine the current location of the control device 230 in the passenger compartment 210 and <u>execute the instruction only if the control device 230 is located in a region of the passenger compartment 210 where the instruction is permitted to be invoked from.</u>

(Clement, Ex. 1010, 8:14-24.)



Clement, Ex. 1010, Fig. 6 (Annotated)

289. As I explained above with reference to the rationale to combine section, the combination of Moinzadeh and Clement includes Clement's location system 330 with receivers 610*a-d* to provide a determination of a device's location within a predetermined area.

290. Thus, the combination of Moinzadeh and Clement teaches "in response, determining, by the device discovery [computer program], whether the computational device is located within a predetermined area and/or zone of the vehicle [Regions 1-4]."

[4c] applying, by the device discovery daemon, at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the

computational device to access or attempt to access the vehicle network and/or communication subsystem; and

291. In my analysis I apply the proposed construction of the term "*access or attempt to access the vehicle network and/or communication subsystem*" as "access or attempt to access functionality of the vehicle network and/or communication subsystem." (*See* ¶¶ 86-89.)

292. It is therefore my understanding that claim [4c] should be interpreted as "when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access [functionality of] the vehicle network and/or communication subsystem."

293. Clement discloses that the vehicle control unit 320 makes a "determin[ation]" whether an instruction is "permitted" at task 880, which a POSA would have understood to be applying rules:

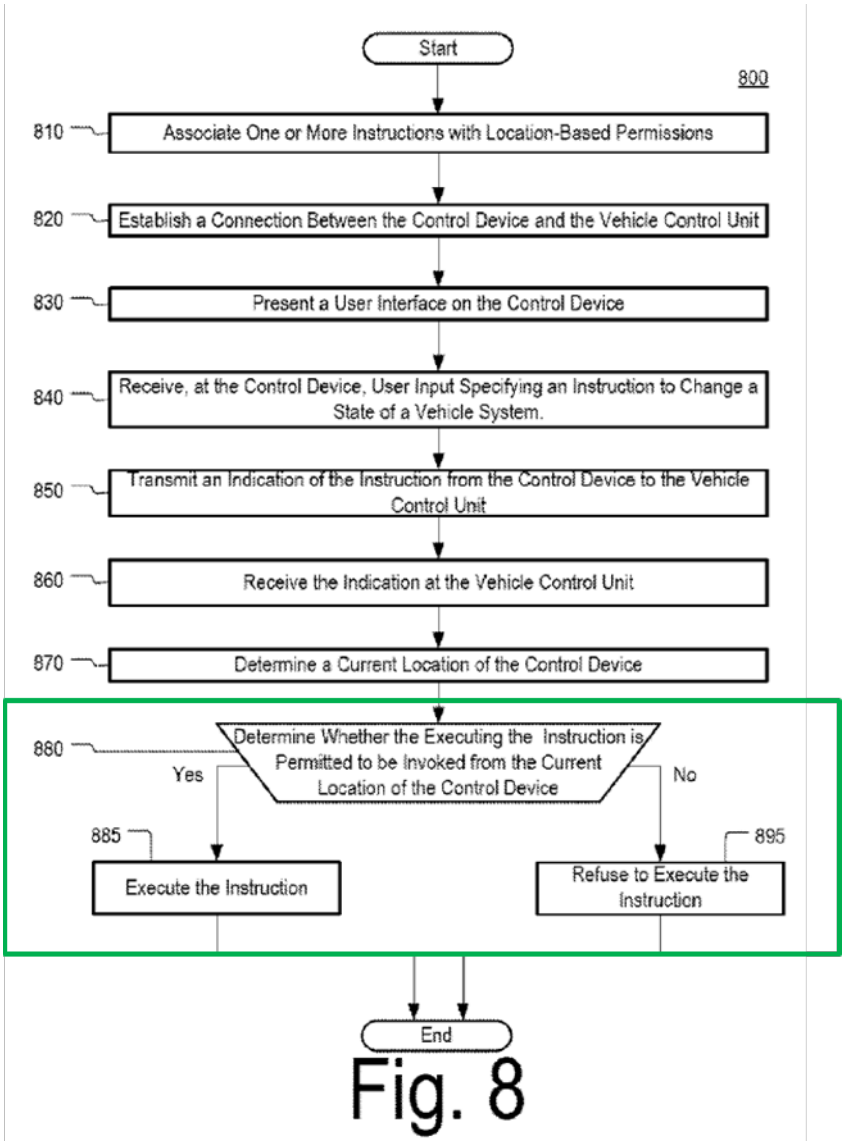


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

294. Clement discloses that the "vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230":

> The vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230. As discussed above, some instructions, such as

> steering the vehicle 101, may be invoked only when the control device 230 is located in the area of the driver seat 220a. Thus, before executing an instruction invoked using the control device 230, the vehicle control unit 320 may determine the current location of the control device 230 in the passenger compartment 210 and execute the instruction only if that instruction is permitted to be invoked from the control device's current location.

(Clement, Ex. 1010, 7:40-50.)

295. With reference to Figure 8, Clement discloses that "[a]t task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230" and if so "task 885 is executed" i.e., the vehicle control unit 320 "Execute[s] the Instruction":

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

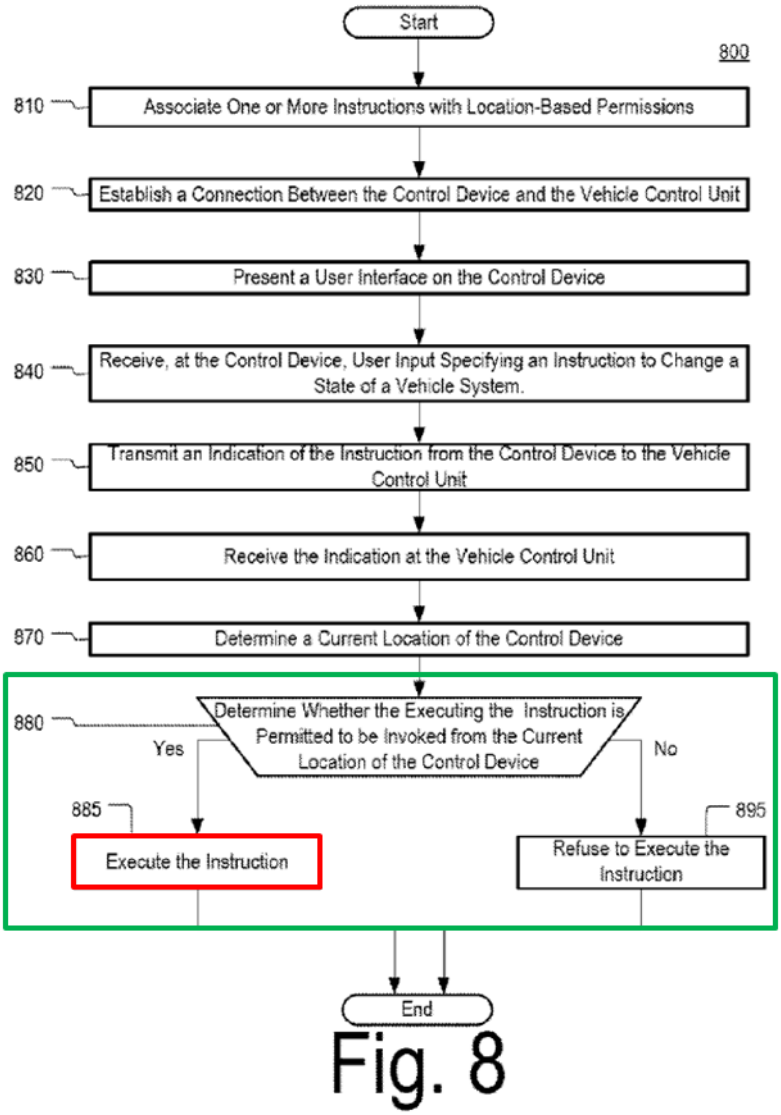


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

296. Clement discloses an example of such a task, e.g., "some instructions, such as steering the vehicle 101, may be invoked only when the control device 230 is located in the area of the driver seat 220*a*." (Clement, Ex. 1010, 7:42-45.) A POSA would have understood that the control device 230 connects to the vehicle

network, through the vehicle control unit 320, to control the steering system 310*b*.

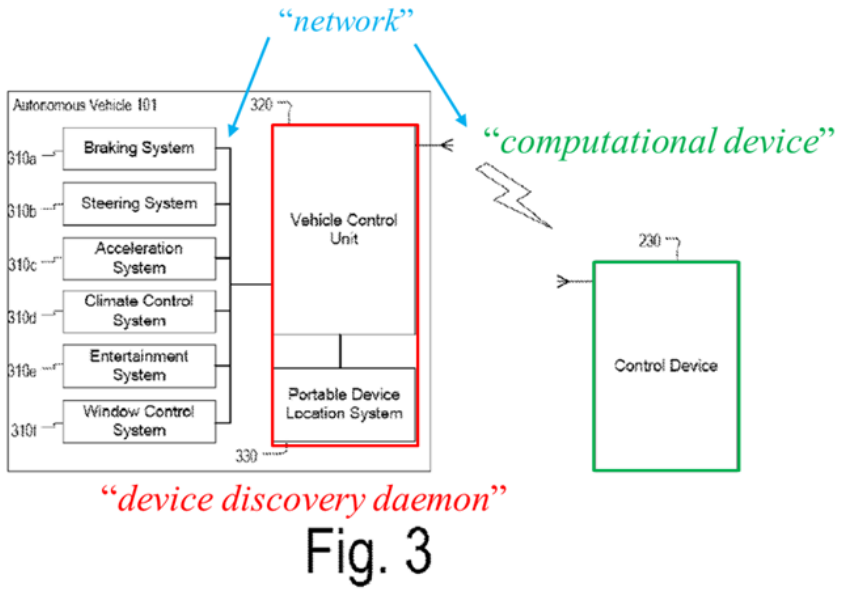


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

297. Clement also discloses that the user interface of control device 230 displays "buttons" 910*a-j* (mislabeled as 900*a-j* in the figures) that allow the user to control different aspects or features:

> As illustrated in FIG. 9A, the user interface 900A may provide buttons 910*a-j* that enable control over different aspects of the operation of the vehicle 101. For example, clicking on the button 910*a* may lead users to a menu that enables the steering, stopping, or acceleration of the vehicle 101.

(Clement, Ex. 1010, 9:55-60.)

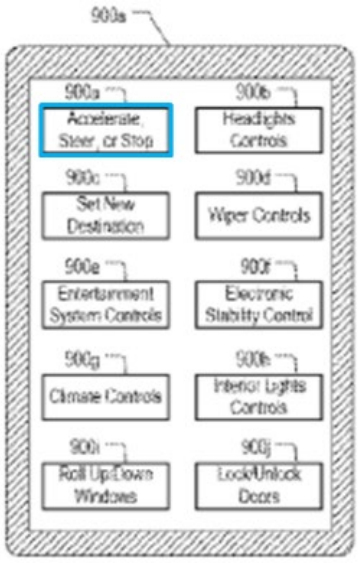


Fig. 9A

Clement, Ex. 1010, Fig. 9A (Annotated)

298. Clement also discloses varying the menu of available input components displayed on the user interface of control device 230 based on its location, e.g., only displaying "buttons" for safety-critical features like steering (annotated in blue above) if the control device 230 is located in the area of the driver seat, i.e., region 1:

> In some aspects, the user interface presented by the control device 230 may be varied in dependence upon the location of the control device 230 in the vehicle cab 210. For example, only if the control device 230 is located in region #1, the menu 900A may be displayed. By contrast, when the control device 230 is located in regions #2-3, the menu 900B may be displayed. As illustrated in this example, the interface 900A may include input components (e.g., buttons, text

input field, sliders, check boxes, etc.) for safety-critical aspects of the operation of the vehicle 101, such as accelerating, **steering**, and braking, whereas the interface 900B may lack such input components for controlling safety-critical aspects of the operation of the vehicle 101.

(Clement, Ex. 1010, 10:14-26.)

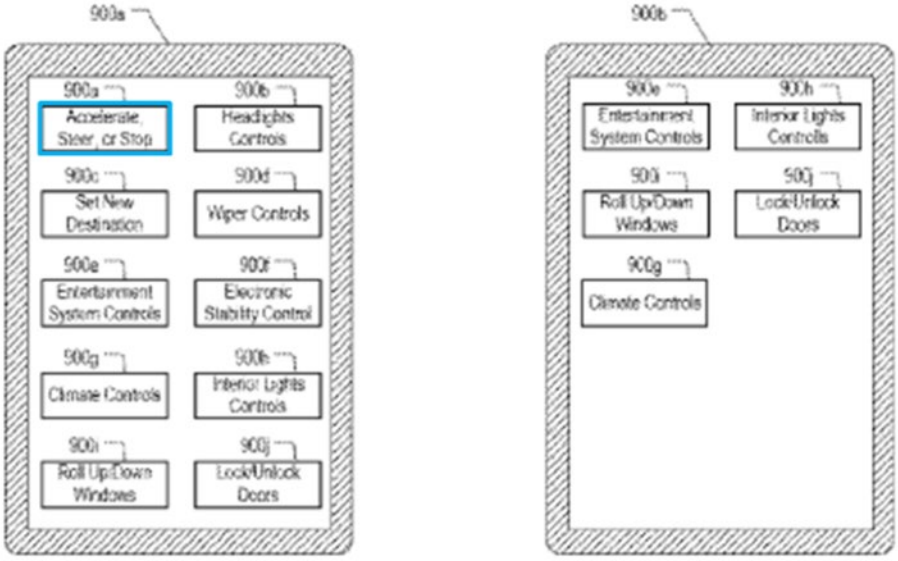


Fig. 9A Fig. 9B

Clement, Ex. 1010, Fig. 9A (Annotated) and Fig. 9B

299. Thus, the combination of Moinzadeh and Clement teaches "*applying, by the device discovery* [computer program], *at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle* [e.g., in the driver seat area of Region 1], *permitting the computational device to access or attempt to access* [functionality of] *the vehicle*

network and/or communication subsystem [e.g., to control safety critical systems, e.g., the steering system]."

[4d] (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle, not permitting the computational device to access or attempt to access the vehicle network and/or communication subsystem.

300. In my analysis I apply the proposed construction of the term "*access or attempt to access the vehicle network and/or communication subsystem*" as "access or attempt to access functionality of the vehicle network and/or communication subsystem." (*See* ¶¶ 86-89.)

301. It is therefore my understanding that claim [4d] should be interpreted as "when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access [functionality of] the vehicle network and/or communication subsystem."

302. Clement further discloses that "[a]t task 880" "if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed" and as illustrated in Figure 8 below, the vehicle control unit 320 "Refuse[s] to Execute the Instruction" at task 895.

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the

> permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, <u>if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed</u>.

(Clement, Ex. 1010, 10:55-67.)

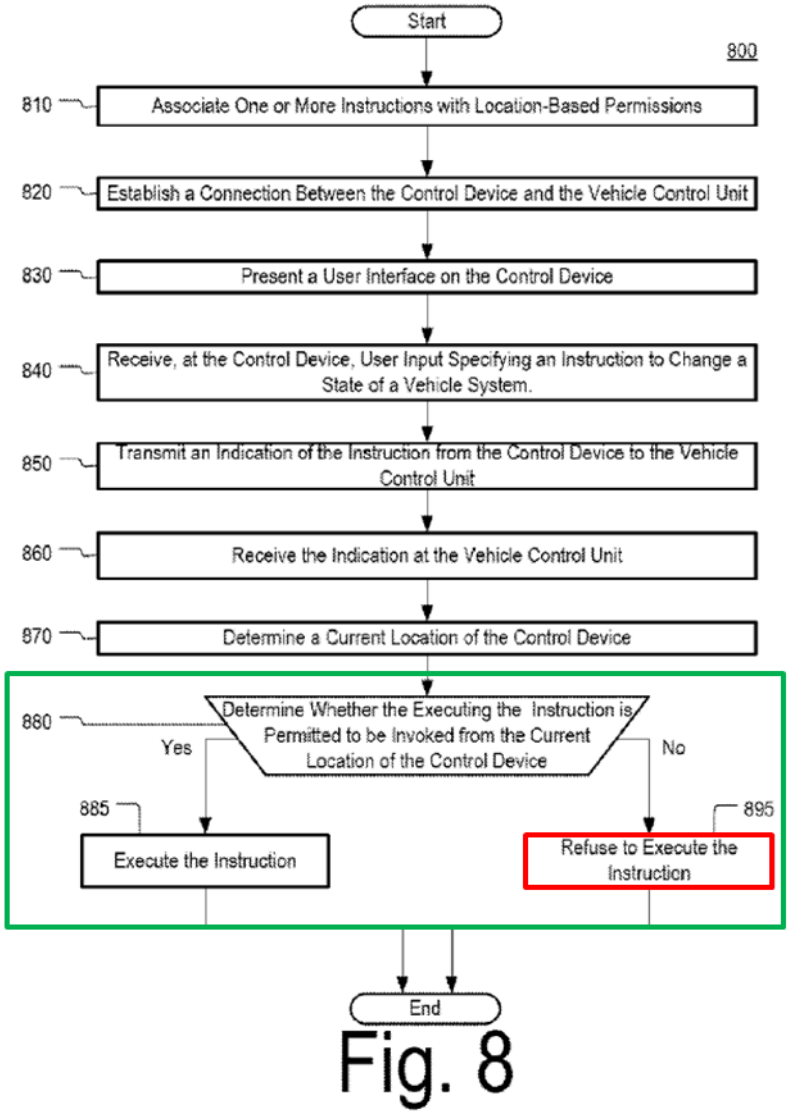


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

303. Clement discloses that "some instructions, such as steering the vehicle 101, may be invoked only when the control device 230 is located in the area of the driver seat 220*a*." (Ex. 1010, 7:42-45.) Steering button 900a is not displayed on the user interface 900b when the user is located in a passenger seat (Fig. 9B), however the steering button 900a (annotated in blue) is displayed on the user interface 900a

when the user is located in the driver seat (Fig. 9A), as illustrated by a comparison of Figures 9A and 9B below:

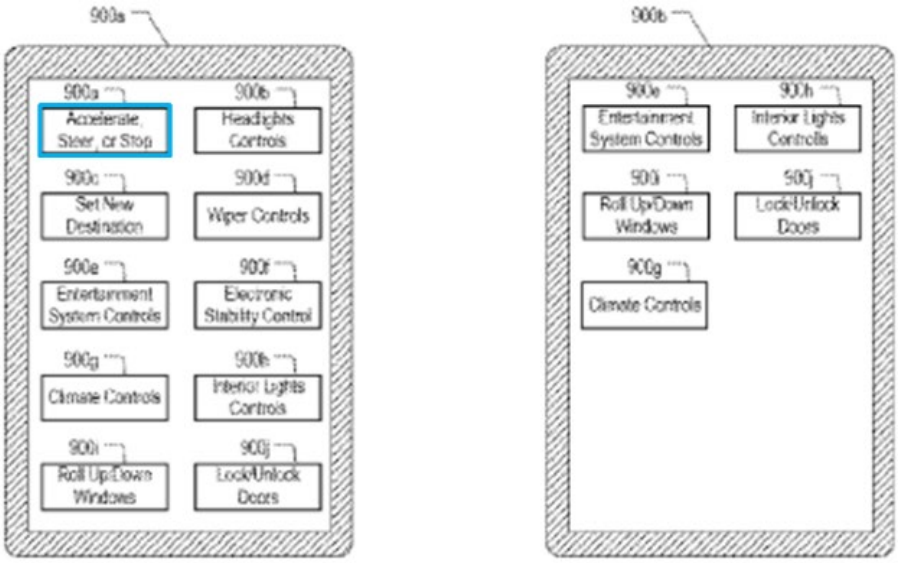


Fig. 9A Fig. 9B

Clement, Ex. 1010, Fig. 9A (Annotated) and Fig. 9B

304. Thus, the combination of Moinzadeh and Clement teaches "*applying, by the device discovery* [computer program], *at least the following rules*: . . . (C2) *when the computational device is not located within the predetermined area and/or zone of the vehicle* [e.g., not located in the driver seat area of Region 1], *not permitting the computational device to access or attempt to access* [functionality of] *the vehicle network and/or communication subsystem* [e.g., prevent control of safety critical systems, e.g., the steering system]."

b. Claim 5

305. Claim 5 depends from claim 4, which I understand means that claim 5 requires all of the limitations of claim 4 in addition to its additional limitations.

306. The combination of Moinzadeh and Clement teaches all of the limitations of claim 4 as described above. (*See* ¶¶ 269-304.)

[5a] The method of claim 4, wherein a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality of predetermined areas and/or zones, to be used in applying the rules,

307. As I explained for claim [4b], the vehicle control unit 320 and location system 330 execute a code to determine the location of the control device 230, e.g., using triangulation of the signal strength measurements. (Clement, Ex. 1010, 7:23-32.) Clement also discloses that the control device 230 may determine its own location:

> In other examples, the control device 230 may determine its location and communicate it to the vehicle control unit 320.

(Clement, Ex. 1010, 10:48-49.)

> FIG. 11 depicts a flowchart of a process 1100 that is associated with the operation of the control device 230. Tasks in the process 1100 may be performed by the control device 230 or by both the control device 230 and the vehicle control unit 320. At task 1110, the current location of the control device 230 within the passenger compartment 230 is determined. As noted, the control device 230 may determine

> the current location by itself, or alternatively, it may receive an indication of the current location from the vehicle control unit 230 [*sic* 320]. At task 1120, one of a plurality of user interfaces (or user interface components) is selected based on the location of the control device 230.

(Clement, Ex. 1010, 12:14-25.)

308. Clement further discloses that for such an embodiment, the vehicle may include transmitters instead of receivers, and "the control device 230 may triangulate signal strength measurements from those transmitters to independently determine its location within the passenger compartment 210":

> As discussed above, the current location of the control device 230 may be determined using the radio receivers 610*a-d*. In other examples, the control device 230 may determine its location and communicate it to the vehicle control unit 230 [*sic* 320]. For example, instead of the radio receivers 610*a-d*, transmitters may be positioned at various locations in the vehicle 101 and the control device 230 may triangulate signal strength measurements from those transmitters to independently determine its location within the passenger compartment 210.

(Clement, Ex. 1010, 10:46-54.)

309. A POSA would have been motivated to modify the Moinzadeh/Clement vehicle system to include transmitters in the vehicle and have the control device 230 determine its own location as a way to shift processing

responsibilities to the control unit 320 and free up processing capacity on the vehicle control unit 320.

310. Clement further discloses determining the location of control device 230 within a specific region of the passenger compartment:

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within **one or more regions in the passenger compartment 210** where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

311. Clement illustrates Regions 1-4 in Figure 6:

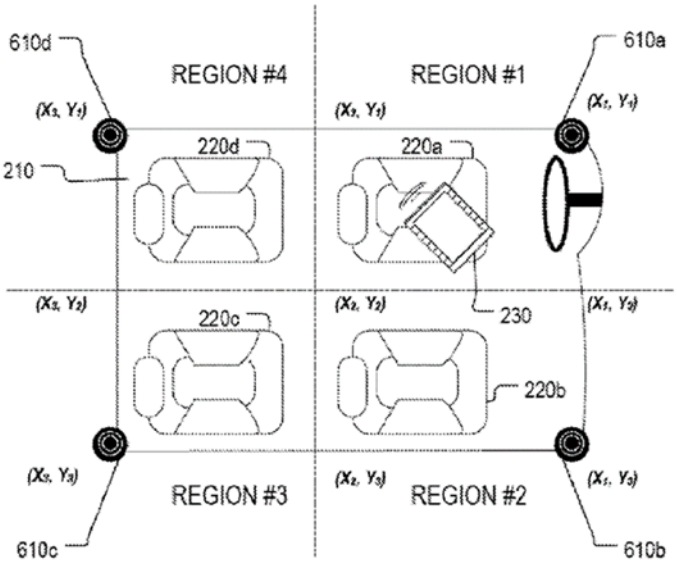


Fig. 6

Clement, Ex. 1010, Fig. 6

312. Thus, the combination of Moinzadeh and Clement teaches "*a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality of predetermined areas and/or zones* [e.g., within Region 1 of Regions 1-4], *to be used in applying the rules*."

[5b] wherein the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant, and

313. Clement discloses that the control device ("*computational device*") could be a tablet computer, laptop, smart phone, and/or personal digital assistant:

> The control device 230 may be a tablet, a smart phone, a laptop, or another type of portable computing device.

(Clement, Ex. 1010, 6:9-10.)

314. Thus, the combination of Moinzadeh and Clement teaches that the

"*the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant*."

[5c] wherein the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment.

315. Clement further discloses that the "*predetermined area and/or zone*" may include the passenger compartment 210 of the vehicle:

> As discussed above, the current location of the control device 230 may be determined using the radio receivers 610*a-d*. In other examples, the control device 230 may determine its location and communicate it to the vehicle control unit 230 [*sic* 320]. For example, instead of the radio receivers 610*a-d*, transmitters may be positioned at various locations in the vehicle 101 and the control device 230 may triangulate signal strength measurements from those transmitters to independently **determine its location within the passenger compartment 210.**

(Clement, Ex. 1010, 10:46-54.)

316. Clement further discloses determining the location of the control device within a specific region of the passenger compartment:

> The method further includes identifying a current location of the portable control device within a passenger compartment of the vehicle, and depending on the current location of the portable control device, performing one of the following tasks: executing the instruction when it is determined that the portable control device is

located in a first region in the passenger compartment of the vehicle, or refusing to execute the instruction when it is determined that the portable control device is located in a second region in the passenger compartment of the vehicle.

(Clement, Ex. 1010, 1:42-51.)

317. Clement illustrates Regions 1-4 in Figure 6:

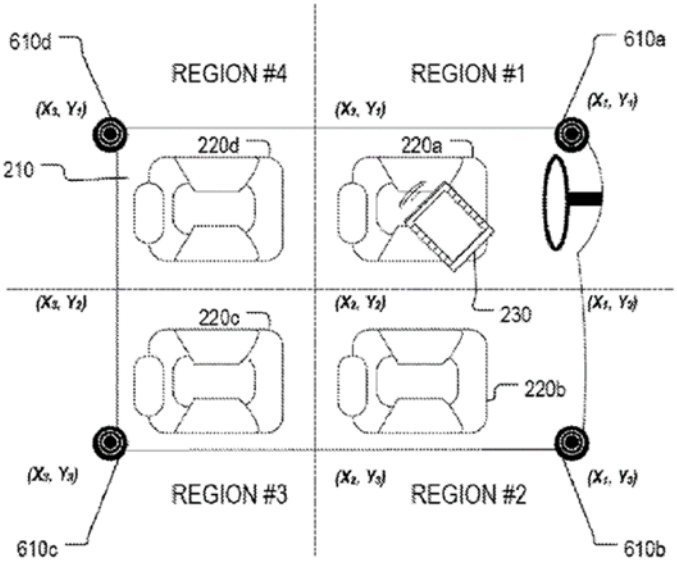


Fig. 6

Clement, Ex. 1010, Fig. 6

318. Clement further discloses permitting different functionality depending on the specific location of the control device within the passenger compartment, and a POSA would have understood that this teaching is also applicable to the embodiment in which the control device 230 determines its own location.

The operational capabilities of the control device 230 may vary with the control device's location in the **passenger compartment 210**. If

the control device 230, for example, is held by the driver occupying seat 220*a* as shown in FIG. 2, the portable device may be capable of steering or accelerating the vehicle 101. If, however, the portable device 230 is held by a passenger occupying the seat 220*b*, the portable device may be permitted to control the vehicle's entertainment system, but not steer or apply the brakes of the vehicle.

(Clement, Ex. 1010, 5:59-67.)

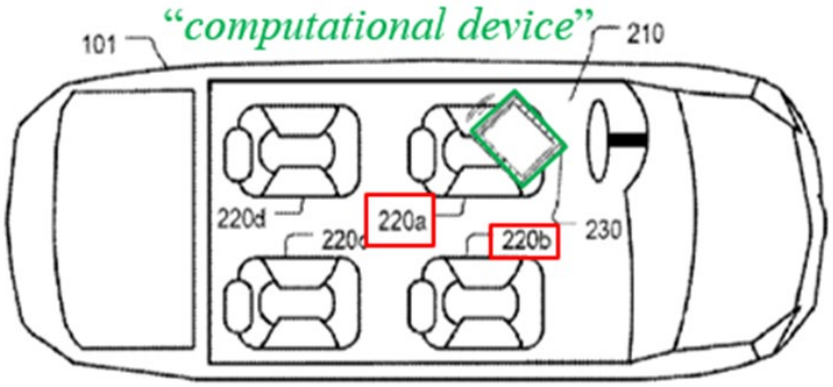


Fig. 2

Clement, Ex. 1010, Fig. 2 (Annotated)

319. Thus, the combination of Moinzadeh and Clement teaches that "the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment."

320. Intentionally left blank.

321. Intentionally left blank.

322. Intentionally left blank.

323. Intentionally left blank.

324. Intentionally left blank.

325. Intentionally left blank.

326. Intentionally left blank.

327. Intentionally left blank.

328. Intentionally left blank.

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337. Intentionally left blank.

c. Claim 7

338. Claim 7 depends from claim 4, which I understand means that claim 7 requires all of the limitations of claim 4 in addition to its additional limitations.

339. The combination of Moinzadeh and Clement teaches all of the

limitations of claim 4 as described above. (*See* ¶¶ 269-304.)

> ***[7] The method of claim 4, wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on <u>one or more</u> of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, <u>triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle</u>, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.***

340. Claim [7] depends from claim 4, but claim 4 does not recite a "*determining step (b)*". The reference to "*step(b)*" in claim 7 appears to be referring to the determining step of claim [4b]: "*determining, by the device discovery* [computer program]*, whether the computational device is located within a predetermined area and/or zone of the vehicle;. . . .*"

341. I understand that since claim 7 requires "*wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle* on one or more of . . . ." followed by a long list of localization options, a reference need only disclose one of the recited localization options to meet the claim.

342. Clement describes the method illustrated in Figure 8 as including a series of "tasks", e.g., "[a]t task 870, the vehicle control unit 320 determines the current location of the control device 230." (Clement, Ex. 1010, 10:37-38.) A POSA would have understood that a task and a step are synonymous terms used in describing a method.

343. Clement discloses determining the location of the control device 230 based on triangulating the radio signals:

> The radio receivers may measure the power of radio signals emitted by the control device 230 and triangulate the signals to determine the location of the control device 230.

(Clement, Ex. 1010, 8:43-46.)

344. Clement discloses that the location system 330, which as described above may be incorporated with the vehicle control unit 320, ("*device discovery* [computer program]") determines the location of the control device 230 ("*computational device*") within the passenger compartment 210 of the vehicle

using triangulation based on the strength of the radio signal(s) that are transmitted by the control device 230 and received by receivers 610*a-d* of the vehicle ("*multiple access points of the vehicle*"):

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes **receivers 610*a-d*** (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. **The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230**.

(Clement, Ex. 1010, 7:23-32.)

345. Clement illustrates Regions 1-4 of the passenger compartment 210 in Figure 6:

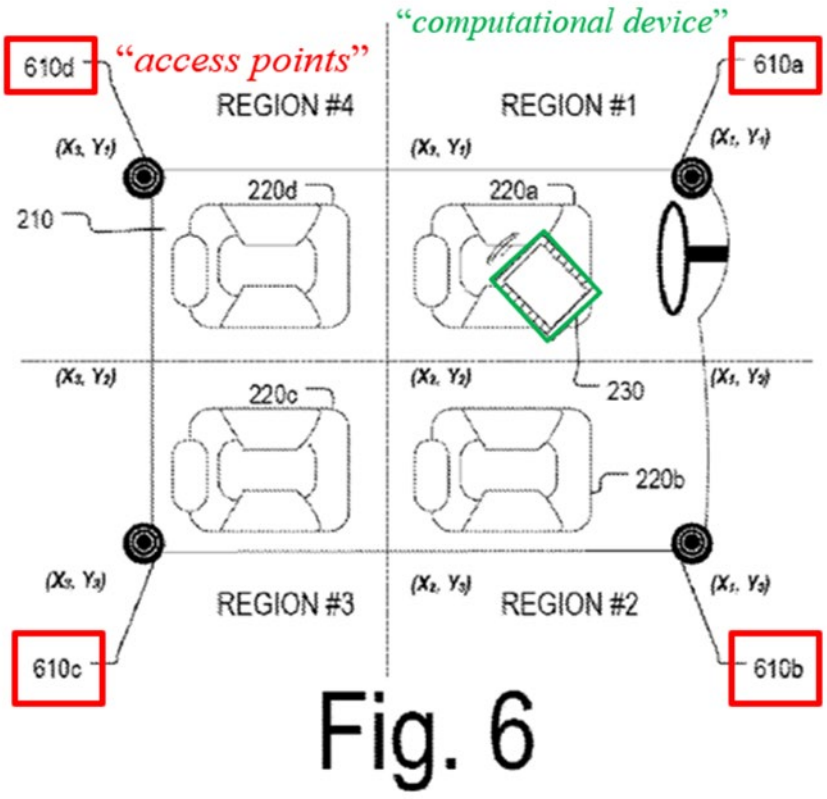


Fig. 6

Clement, Ex. 1010, Fig. 6 (Annotated)

346. A POSA would have understood that Clement teaches determining the location of the portable control device within the vehicle using at least triangulation of the measurements of signal strength because the system includes multiple receivers positioned within the vehicle that take measurements of the radio signals transmitted by the control device 230 and the system can calculate and compare the signal strength values from the different receivers and sends those measurements to the vehicle control unit 320 to estimate the device's location; which is an established triangulation technique.

347. As I explained above in the rationale to combine, the combination of Moinzadeh and Clement includes Clement's vehicle control unit 320 with location system 330 and receivers 610*a-d*, providing the ability to perform triangulation to determine the location of a device. Accordingly, the combination of Moinzadeh and Clement teaches "*wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle* [e.g., Regions 1-4] *on* <u>*one or more*</u> *of. . . triangulation based on relative received signal strengths of a signal from the computational device* [control device 230] *as received by multiple access points* [radio receivers 610*a-d*] *of the vehicle . . . .*"

d. Claim 8

348. Claim 8 depends from claim 7, which I understand means that claim 8 requires all of the limitations of claim 7 in addition to its additional limitations.

349. The combination of Moinzadeh and Clement teaches all of the limitations of claim 7 as described above. (*See* ¶¶ 338-347.)

[8a] The method of claim 7, ~~wherein the~~ wherein the computational device determined to be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and

350. I understand the additional "*wherein the*" phrase at the beginning of claim [8a] to be a typographical error, so I have shown it with strikethrough text

above.

351. Claim [8a] is largely duplicative of claim [4c]. To illustrate, the table below shows a side-by-side comparison of claims [4c] and [8a].

'153 Patent Claim [4c]	**'153 Patent Claim [8a]**
[4c] applying, by the device discovery daemon, at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access the vehicle network and/or communication subsystem; and	**[8a]** The method of claim 7, ~~wherein the~~ wherein the computational device [ ] determined to be located within the predetermined area and/or zone of the vehicle and is permitted [ ] to access or attempt to access the vehicle network and/or communication subsystem and

352. Due to the similarities in the claims, I refer back to my analysis of this limitation in claim [4c] to establish that it is met by the combination of Moinzadeh and Clement.

[8b] wherein the device discovery daemon determines a set of tasks, functions, and/or operations that can be performed and a set of

tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device.

353. Clement discloses that "[t]he vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230." (Clement, Ex. 1010, 7:40-42.) With reference to Figure 8, Clement discloses that:

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

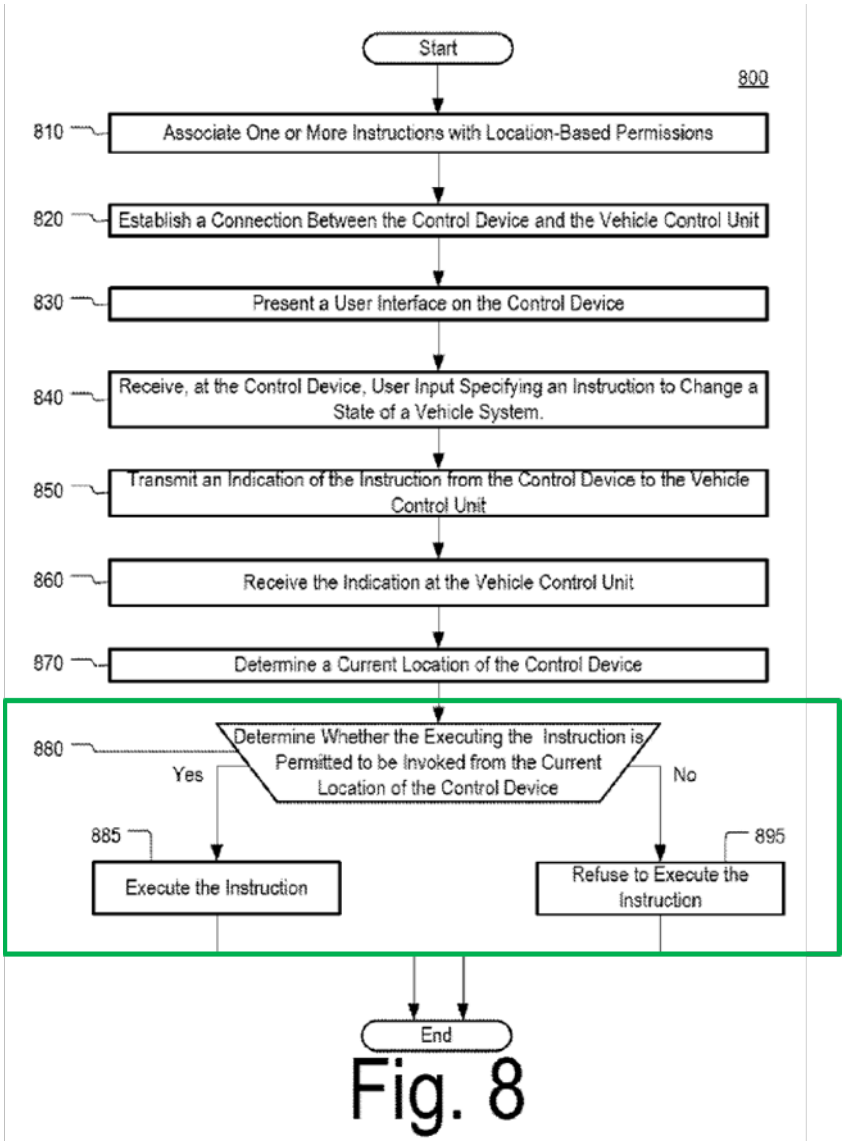


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

354. For example, Clement discloses that if the control device 230 is located in a passenger seat of the vehicle, then the passenger will be able to control the vehicle entertainment system using the control device 230, but not "steer or apply the brakes of the vehicle":

> The operational capabilities of the control device 230 may vary with the control device's location in the passenger compartment 210. If the

> control device 230, for example, is held by the driver occupying seat 220*a* as shown in FIG. 2, the portable device may be capable of steering or accelerating the vehicle 101. If, however, the portable device 230 is held by a passenger occupying the seat 220*b*, the portable device may be permitted to control the vehicle's entertainment system, but not steer or apply the brakes of the vehicle.

(Clement, Ex. 1010, 5:59-67.)

355. Clement also discloses varying the menu of buttons corresponding to available input components ("*set of tasks . . . that can be performed*") displayed on the user interface of control device 230 based on its location, e.g., only displaying inputs for operations that are available based on the current location. For example, Figure 9B below depicts buttons for a set of available operations, e.g., entertainment system controls 900e, when the control device 230 is located in passenger Regions #2-3, but lacks buttons for controlling a set of safety-critical aspects of the operation of the vehicle 101 that are only available to the driver located in Region 1:

> In some aspects, the user interface presented by the control device 230 may be varied in dependence upon the location of the control device 230 in the vehicle cab 210. For example, only if the control device 230 is located in region #1, the menu 900A may be displayed. By contrast, when the control device 230 is located in regions #2-3, the menu 900B may be displayed. As illustrated in this example, the interface 900A may include input components (e.g., buttons, text

input field, sliders, check boxes, etc.) for safety-critical aspects of the operation of the vehicle 101, such as accelerating, steering, and braking, whereas the interface 900B may lack such input components for controlling safety-critical aspects of the operation of the vehicle 101.

(Clement, Ex. 1010, 10:14-26.)

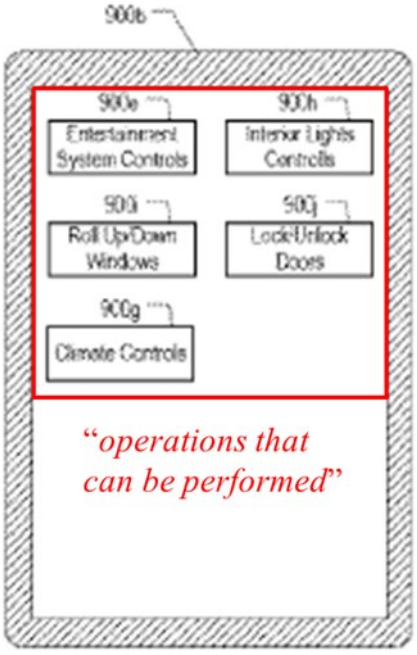


Fig. 9B

Clement, Ex. 1010, Fig. 9B (Annotated)

356. Thus, the combination of Moinzadeh and Clement teaches "*wherein the computational device determined to be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and wherein the device*

discovery [computer program] *determines a set of tasks, functions, and/or operations that can be performed* [e.g., input components displayed in menu 900B when the control device 230 is located in Regions #2-3] *and a set of tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device* [e.g., input components NOT displayed in menu 900B (e.g., steering and braking input components) when the control device 230 is located in Regions #2-3]."

e. Claim 9

357. Claim 9 depends from claim 7, which I understand means that claim 9 requires all of the limitations of claim 7 in addition to its additional limitations.

358. The combination of Moinzadeh and Clement teaches all of the limitations of claim 7 as described above. (*See* ¶¶ 338-347.)

[9] The method of claim 7, wherein the device discovery daemon uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or

communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

359. I understand that since claim 9 requires "*wherein the device discovery* [computer program] *uses multiple of the one or more of . . .*" followed by a long list of localization options, a reference need only disclose two of the recited localization options to meet the claim.

360. As illustrated below, claim 9 includes the same list of localization options as claim 7.

'153 Patent Claim [7]	**'153 Patent Claim [9]**
[7] The method of claim 4, wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on one or more of signal strength of a	**[9]** The method of claim 7, wherein [ ] the device discovery daemon uses multiple of the one or more of signal strength of a

signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the	signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the

computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.	computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

361. As I explained above with reference to claim 7, Clement discloses determining the location of the control device 230 ("*computational device*") based on triangulation.

362. Clement also discloses determining location of the control device 230 ("*computational device*") based on radio signal strength:

> The location of the portable control device may further be determined based on a radio signal transmitted by the portable control device.

(Clement, Ex. 1010, 3:13-15.)

> The location of the control device 230, as discussed, may be determined using radio receivers 610*a-d*.

(Clement, Ex. 1010, 8:42-43.)

363. Clement further discloses using a simple coordinate-based model to define a region:

> As illustrated in FIG. 5, the different regions of passenger compartment 210 may be represented as sets of coordinates. In one alternative example however, each region may be presented as a single coordinate and a radius.

(Clement, Ex. 1010, 8:47-50.)

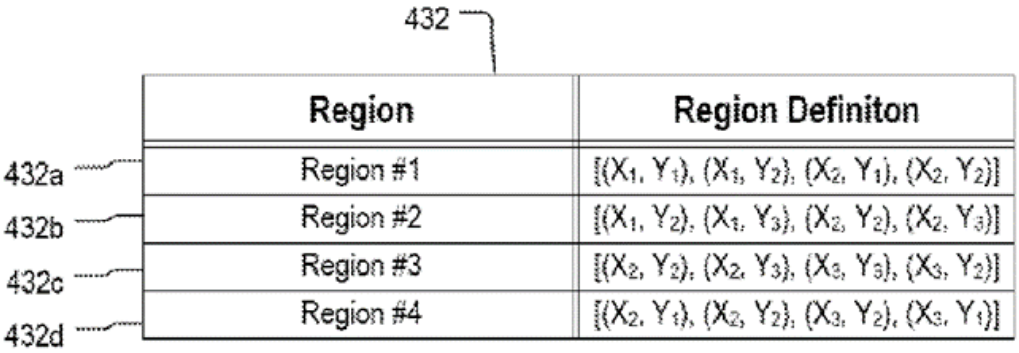


Fig. 5

Clement, Ex. 1010, Fig. 5

364. A POSA would have understood that Clement's disclosure that each region may be represented as a "single coordinate and a radius" (Clement, Ex. 1010, 8:47-50) to indicate a range of signal strength values, and thus a single

access point can be used to determine whether the device is located within that region, as this reflects a simplified method of localization.

365. Clement further discloses defining each region (i.e., Regions 1-4) using 4-tupples of signal strength ranges:

> As illustrated in FIG. 5, the different regions of passenger compartment 210 may be represented as sets of coordinates. . . . In another alternative example, however, regions #1-4 may be represented by 4-tupples of signal strength ranges (e.g., sets of signal strength ranges that are expected to be measured by each of the receivers 610*a-d* when the control device 230 is in a given region). Stated succinctly, the indications of regions of the logical partition structure 432 may include any type of information capable of being used to distinguish from one another different portions of the passenger compartment 210.

(Clement, Ex. 1010, 8:47-58.)

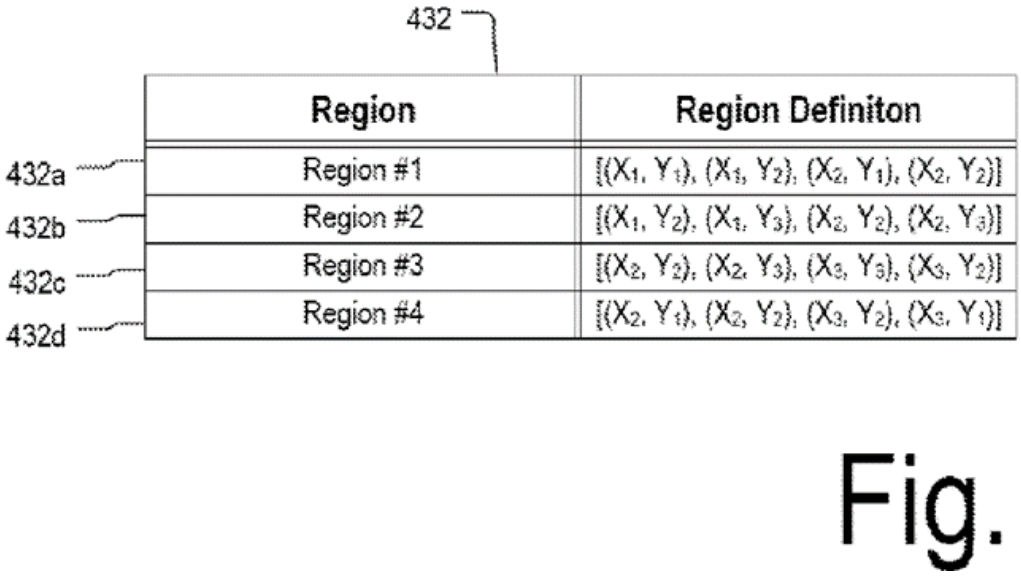
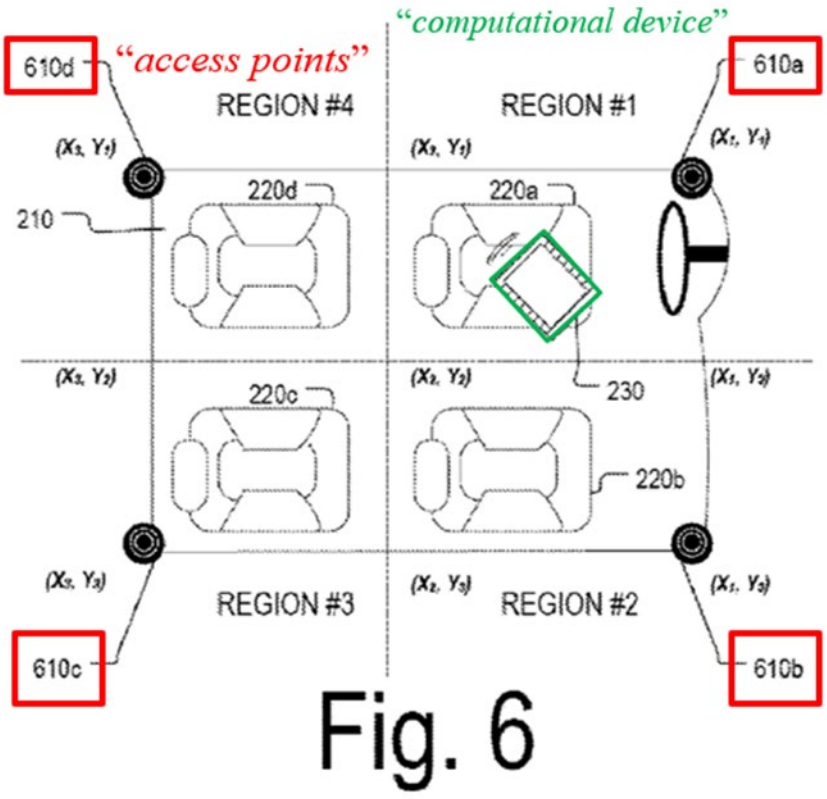


Fig. 5

Clement, Ex. 1010, Fig. 5

366. A POSA would have also understood that each of Clement's radio receivers 610*a-d* is an "*access point*" as each receiver 610*a-d* receives signals from the device for localization purposes.



Clement, Ex. 1010, Fig. 6 (Annotated)

367. In regard to the 4-tupples approach, a POSA would have understood that if a transmitted signal can be received and measured by each of the receivers 610*a-d* at all four access points, this indicates that each receiver 610*a-d* is independently capable of detecting and measuring the signal strength of that same transmission. Thus, a POSA would have understood that a single receiver (i.e. a single access point) is used to measure the signal strength and signal strength information from four access points is used to determine the location of the control device.

368. A POSA would have understood that Clement's disclosure of

determining the location of the portable control device 230 based on a "radio signal" indicates determining location based on the signal strength of a radio signal from the portable control device as received by an access point of the vehicle because Clement describes using a receiver within the vehicle to measure the signals strength emitted by the control device and using the signal strength to determine the device's location; which is an approach consistent with well-known methods of using RSSI for localization.

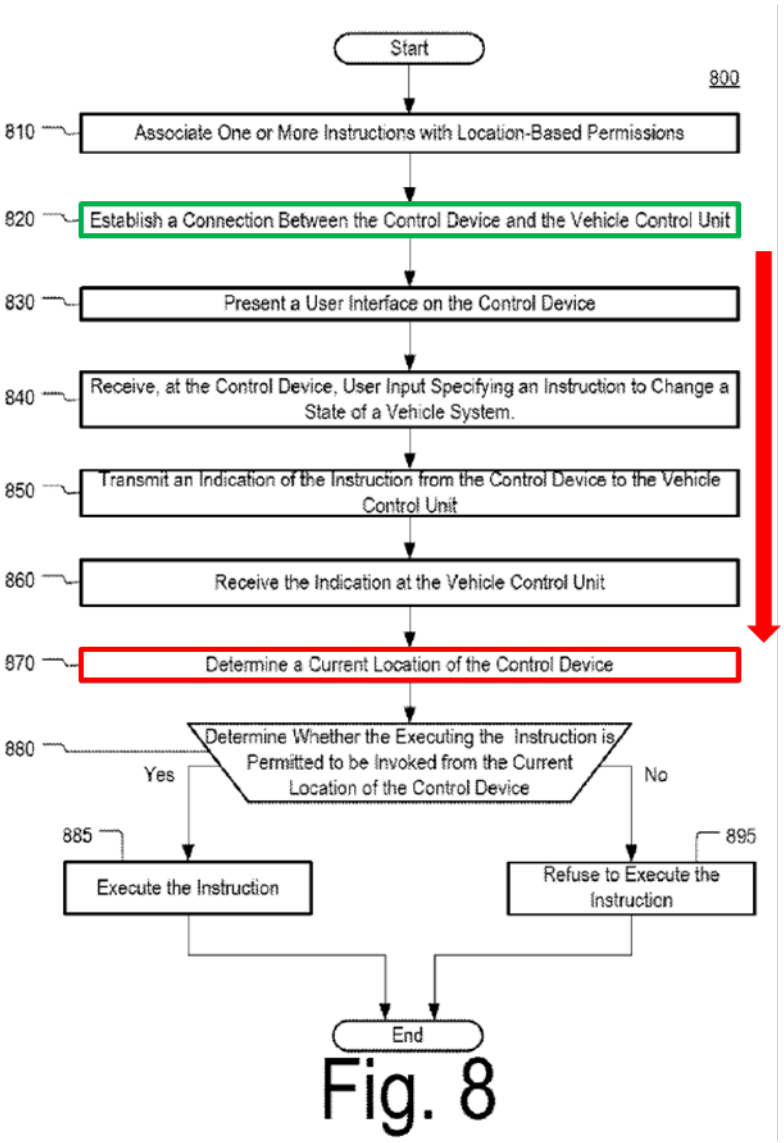


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

369. Therefore, the combination of Moinzadeh and Clement teaches "*wherein the device discovery* [computer program] *uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the vehicle* [e.g., as a single coordinate and a radius or as sets of signal strength ranges that are measured by each receiver 610a-d and represented

as a 4-tupple of signal strength ranges], . . . [and] *triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle* [as explained for claim 7]."

f. Claim 10

370. Claim 10 depends from claim 9, which I understand means that claim 10 requires all of the limitations of claim 9 in addition to its additional limitations.

371. The combination of Moinzadeh and Clement teaches all of the limitations of claim 9 as described above. (*See* ¶¶ 357-369.)

[10] The method of claim 9, wherein the device discovery daemon determines a level of confidence that the computational device is located within the predetermined area and/or zone and wherein the device discovery daemon determines that the computational device is located within the predetermined area and/or zone when the level of confidence has at least a threshold value.

372. Clement discloses that "[t]he receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the signal strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230." (Clement, Ex. 1010, 7:28-32.)

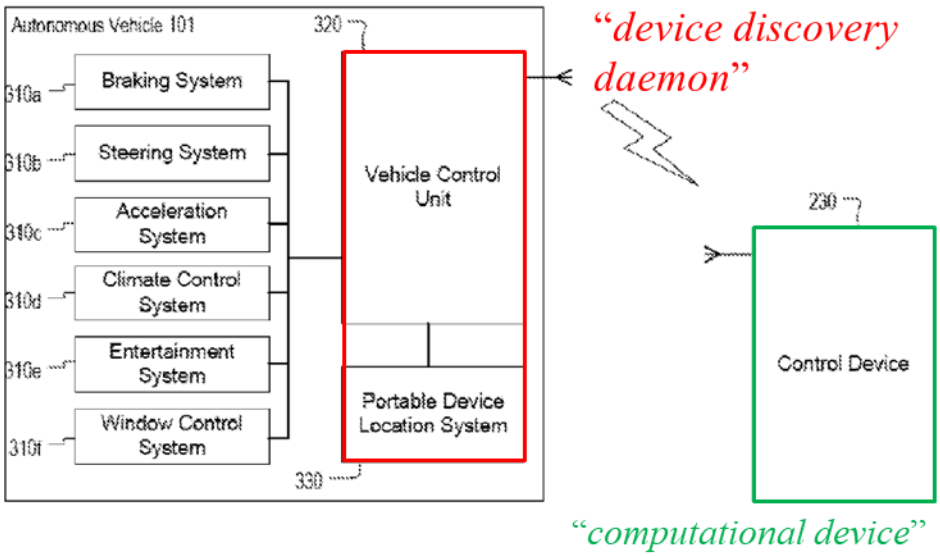


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

373. Clement further discloses that the passenger compartment 210 may be divided into regions, where each region is associated with a particular signal strength range. The vehicle control unit 320 measures the signal strength transmitted by the control device 230 and determines the location of control device 230 by where in the range the measured signal strength falls:

> As illustrated in FIG. 6, region #1 is collocated with the driver seat 220*a*, region #2 is collocated with the front passenger seat 220*b*, and regions #3 and #4 are collocated with the rear passenger seats 220*c-d*. The location of the control device 230, as discussed, may be determined using radio receivers 610*a-d*. The radio receivers may measure the power of radio signals emitted by the control device 230

and triangulate the signals to determine the location of the control device 230.

As illustrated in Figure 5, the different regions of passenger compartment 210 may be represented as sets of coordinates. In one alternative example however, each region may be presented as a single coordinate and a radius. In another alternative example, however, regions #1-4 may be represented by **4-tupples** of signal strength ranges (e.g., sets of signal strength ranges that are expected to be measured by each of the receivers 610*a-d* when the control device 230 is in a given region).

(Clement, Ex. 1010, 8:38-55.)

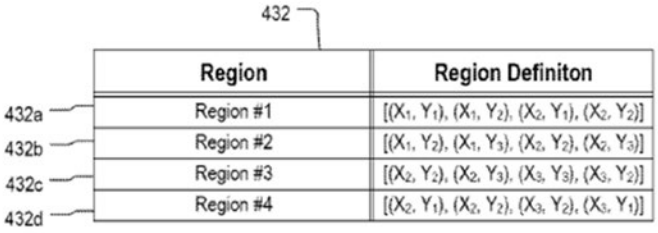


Fig. 5

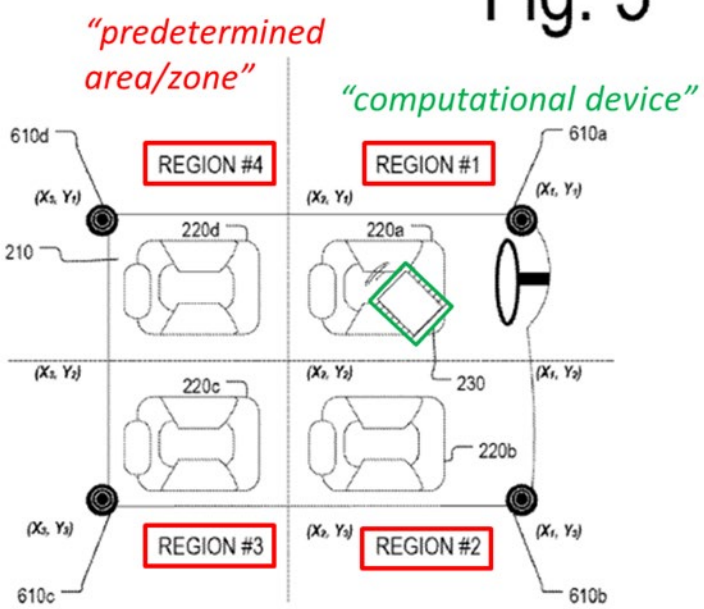


Fig. 6

Clement, Ex. 1010, Figs. 5 and 6 (Annotated)

374. Clement further discloses:

> Stated succinctly, the indications of regions of the logical partition structure 432 may include any type of information capable of being used to distinguish from one another different portions of the passenger compartment 210.

(Clement, Ex. 1010, 8:55-58.)

375. A POSA would have understood that the 4-tupple structure disclosed

in Clement reflects a "*level of confidence*" in determining the location of the portable control device 230. Each 4-tupple represents a set of expected signal strength ranges corresponding to the receivers positioned within the vehicle, with each set associated with a specific region, and the limits of each range representing a "*threshold*." When the system receives signal strength measurements from the receivers, it compares those values to the expected or predefined signal strength measurements for each region. The degree to which the measured values match a given 4-tupple determines the level of confidence with which the system can identify the device's location. Generally, the closer the measured signal is to the middle of the range for a given region, the more likely it is that the device is located in that region, supporting a high-confidence determination. The farther away the measured signal is from the middle of the range (but still within the range), the less likely it is that the device is located in that region, indicating a low-confidence determination. A POSA would have understood that the structure and use of the 4-tupples teaches a signal-based framework through which a relative level of confidence in location estimation can be derived.

376. A POSA would have also understood that Clement's use of 4-tupples indicates the use of a threshold value to determine whether the measured signal strengths match a given region. Each signal strength range defines upper and lower bounds, i.e., "*thresholds*" and the system determines whether the received signal

measurement falls within those bounds. A POSA would have understood that this process involves comparing the measured values against these predetermined threshold values to assess whether a receiver's signal is strong enough, or weak enough, to be consistent with a specific region's profile.

377. Therefore, the combination of Moinzadeh and Clement teaches "*wherein the device discovery* [computer program] *determines a level of confidence that the computational device is located within the predetermined area and/or zone and wherein the device discovery* [computer program] *determines that the computational device is located within the predetermined area and/or zone when the level of confidence has at least a threshold value* [e.g., when the measured value is within the predetermined range]."

3. Dependent Claims 15-21

a. Claim 15

[15a] The vehicle of claim 12, wherein the device discovery daemon is further configured to: determine that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle;

[15b] in response, determine whether the computational device is located within a predetermined area and/or zone of the vehicle; and

[15c] apply at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permit the computational device to access

or attempt to access the vehicle network and/or communication subsystem; and

[15d] (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle, not permit the computational device to access or attempt to access the vehicle network and/or communication subsystem.

378. Claim 15 depends from claim 12, which I understand means that claim 15 requires all the limitations of claim 12 in addition to its own limitations. Moinzadeh discloses all of the limitations of claim 12 as discussed above. (*See* ¶¶ 233-244.)

379. Claim limitations [15a]-[15d] are largely duplicative of claim limitations [4a]-[4d]. To illustrate, the table below shows a side-by-side comparison of claims 4 and 15. Claim 15 is "marked up" to show the minor differences.

'153 Patent Claim 4	**'153 Patent Claim 15**
[4a] The method of claim 1, further comprising: determining, by the microprocessor executable device discovery daemon,	**[15a]** The vehicle of claim 12, wherein the device discovery daemon is further configured to: determine

that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle;	that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle;
[4b] in response, determining, by the device discovery daemon, whether the computational device is located within a predetermined area and/or zone of the vehicle; and	**[15b]** in response, determine [ ] whether the computational device is located within a predetermined area and/or zone of the vehicle; and
[4c] applying, by the device discovery daemon, at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access the vehicle network and/or	**[15c]** apply [ ] at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permit the computational device to access or attempt to access the vehicle network and/or

communication subsystem; and	communication subsystem; and
[4d] (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle, not permitting the computational device to access or attempt to access the vehicle network and/or communication subsystem.	**[15d]** (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle, not permit the computational device to access or attempt to access the vehicle network and/or communication subsystem.

380. As the differences between claims 4 and 15 are not substantial and do not change the meaning of the claim, I refer back to my analysis of claim 4 to establish that these limitations are met by the combination of Moinzadeh and Clement.

b. Claim 16

[16a] The vehicle of claim 15, wherein a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality of predetermined areas and/or zones, to be used in applying the rules,

[16b] wherein the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant, and

[16c] wherein the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment.

381. Claim 16 depends from claim 15, therefore I understand that claim 16 includes all of the limitations of claim 15, in addition to the limitations of claim 12. The combination of Moinzadeh and Clement teaches all of the limitations of claims 12 and 15 as discussed above. (*See* ¶¶ 233-244, 378-380.)

382. Claim limitations [16a]-[16c] are largely duplicative of claim limitations [5a]-[5c]. To illustrate, the table below shows a side-by-side comparison of claims 5 and 16. Claim 16 is "marked up" to show the minor differences.

'153 Patent Claim 5	**'153 Patent Claim 16**
[5a] The method of claim 4,	**[16a]** The vehicle of claim 15,
wherein a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality of predetermined areas and/or zones, to be used in applying the rules,	wherein a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality of predetermined areas and/or zones, to be used in applying the rules,

[5b] wherein the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant, and	**[16b]** wherein the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant, and
[5c] wherein the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment.	**[16c]** wherein the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment.

383. As the differences between claims 5 and 16 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 5 to establish that these limitations are met by the combination of Moinzadeh and Clement.

384. Intentionally left blank.

385. Intentionally left blank.

386. Intentionally left blank.

387. Intentionally left blank.

388. Intentionally left blank.

389. Intentionally left blank.

c. Claim 18

[18] The vehicle of claim 15, wherein the determining operation (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

390. Claim 18 depends from claim 15, therefore I understand that claim 18 includes all of the limitations of claim 15, in addition to the limitations of claim 12. The combination of Moinzadeh and Clement teaches all of the limitations of claims 12 and 15 as discussed above. (*See* ¶¶ 233-244, 378-380.)

391. Claim 18 is largely duplicative of claim 7. To illustrate, the table

below shows a side-by-side comparison of claims 7 and 18. Claim 18 is "marked up" to show the minor differences.

'153 Patent Claim 7	**'153 Patent Claim 18**
[7] The method of claim 4,	**[18]** The vehicle of claim 15,
wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple	wherein the determining operation (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple

access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and	access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and

input received from a user of the computational device.	input received from a user of the computational device.

392. Claim [18] depends from claim 15, but claim 15 does not recite a "*determining step (b)*". The reference to "*operation (b)*" in claim 18 appears to be referring to the determining operation of claim [15b]: "*determine whether the computational device is located within a predetermined area and/or zone of the vehicle; . . .*"

393. As the differences between claims 7 and 18 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 7 to establish that these limitations are met by the combination of Moinzadeh and Clement.

d. Claim 19

[19a] The vehicle of claim 15, wherein the wherein the computational device determined to be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and

[19b] wherein the device discovery daemon determines a set of tasks, functions, and/or operations that can be performed and a set of tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device.

394. Claim 19 depends from claim 15, therefore I understand that claim 19 includes all the limitations of claim 15, in addition to the limitations of claim 12. The combination of Moinzadeh and Clement teaches all of the limitations of claims 12 and 15 as discussed above. (*See* ¶¶ 233-244, 378-380.)

395. Claim limitations [19a] and [19b] are largely duplicative of claim limitations [8a] and [8b]. To illustrate, the table below shows a side-by-side comparison of claims 8 and 19. Claim 19 is "marked up" to show the minor differences.

'153 Patent Claim 8	**'153 Patent Claim 19**
[8a] The method of claim 7, wherein the wherein the computational device determined to be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and	**[19a]** The vehicle of claim 15, wherein the wherein the computational device determined to be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and
[8b] wherein the device discovery daemon determines a set of tasks,	**[19b]** wherein the device discovery daemon determines a set of tasks,

functions, and/or operations that can be performed and a set of tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device.	functions, and/or operations that can be performed and a set of tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device.

396. As the differences between claims 8 and 19 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 8 to establish that these limitations are met by the combination of Moinzadeh and Clement.

e. Claim 20

[20] The vehicle of claim 15, wherein the device discovery daemon uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or

communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

397. Claim 20 depends from claim 15, therefore I understand that claim 20 includes all of the limitations of claim 15, in addition to the limitations of claim 12. The combination of Moinzadeh and Clement teaches all of the limitations of claims 12 and 15 as discussed above. (*See* ¶¶ 233-244, 378-380.)

398. Claim 20 is largely duplicative of claim 9. To illustrate, the table below shows a side-by-side comparison of claims 9 and 20. Claim 20 is "marked up" to show the minor differences.

'153 Patent Claim 9	**'153 Patent Claim 20**
[9] The method of claim 7,	**[20]** The vehicle of claim 15,
wherein the device discovery daemon uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the	wherein the device discovery daemon uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the

vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point	vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point

during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.	during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

399. As the differences between claims 9 and 20 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 9 to establish that these limitations are met by the combination of Moinzadeh and Clement.

f. Claim 21

[21] The vehicle of claim 20, wherein the device discovery daemon determines a level of confidence that the computational device is located within the predetermined area and/or zone and wherein the device discovery daemon determines that the computational device is located within the predetermined area and/or zone when the level of confidence has at least a threshold value.

400. Claim 21 depends from claim 20, therefore I understand that claim 21

includes all of the limitations of claim 20, in addition to the limitations of claim 15 and claim 12. The combination of Moinzadeh and Clement teaches all of the limitations of claims 12, 15, and 20 as discussed above. (*See* 233-244, 378-380, 397-399.)

401. Claim 21 is largely duplicative of claim 10. To illustrate, the table below shows a side-by-side comparison of claims 10 and 21. Claim 21 is "marked up" to show the minor differences.

'153 Patent Claim 10	**'153 Patent Claim 21**
[7] The method of claim 9,	**[21]** The vehicle of claim 20,
wherein the device discovery daemon determines a level of confidence that the computational device is located within the predetermined area and/or zone and wherein the device discovery daemon determines that the computational device is located within the predetermined area and/or zone when the level of	wherein the device discovery daemon determines a level of confidence that the computational device is located within the predetermined area and/or zone and wherein the device discovery daemon determines that the computational device is located within the predetermined area and/or zone when the level of

confidence has at least a threshold value.	confidence has at least a threshold value.

402. As the differences between claims 10 and 21 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 10 to establish that these limitations are met by the combination of Moinzadeh and Clement.

C. Ground 3 – The Combination of Rasin and Bosch Teaches all of the Limitations of claims 1, 3, 11-12, and 14

1. Rationale to Combine

403. It would have been obvious to a POSA at the time of the invention to combine the vehicle user interface system disclosed in Rasin with known electronic control unit, including a microprocessor and memory, as disclosed in Bosch, e.g., to improve a similar device in the same way, e.g., to reduce cost for a high-volume component. A POSA would have understood that Rasin and Bosch are complementary technologies that are combinable, for example, Rasin discloses that:

> As required, detailed embodiments of the present invention are disclosed herein. However, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not

> necessarily to scale, and some features may be exaggerated or minimized to show details of particular proponents. Therefore, specific functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for the claims and/or as a representative basis for teaching one skilled in the art to variously employ in the present invention.

(Rasin, Ex. 1015, 2:16-26.)

> While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

(Rasin, Ex. 1015, 5:24-28.)

a. Analogous Art

404. Rasin and Bosch are from the same field – automotive systems that include controllers or electronic control units (ECUs):

> User interface system 16 also includes a user interface module 19 having a controller that is capable of processing and storing data in memory.

(Rasin, Ex. 1015, 2:55-57.)

> ECUs developed for use in motor vehicles all have a similar design. Their structure can be subdivided in the conditioning of input signals, the logic processing of these signals in the microcomputer, and the output of logic and power levels as regulation or control signals.

(Bosch, Ex. 1050, p. 1065.)

> A microcomputer consists of:
>
> -Microprocessor serving as CPU (central processing unit). . . .
>
> -Input and output units (I/O) . . .
>
> -Program memory . . .
>
> -Data memory . . .

(Bosch, Ex. 1050, p. 94.)

> The main components of a microcomputer are normally combined as separate components on printed-circuit boards. "Single-chip" computers are becoming used more and more for simpler tasks, e.g., internet access in wireless communications, which is a growing trend, or functions integrated on a single silicon chip (SoC: System on a chip). The performance of these high integrations systems is limited by the relatively small amount of RAM which can be accommodated at reasonable expense on the chip.

(Bosch, Ex. 1050, p. 96.)

> The microprocessor represents the integration of a computers central processing unit on a single chip. Microprocessor design seeks to avoid individualization in the face of large-scale integration, and the units can be programmed to meet the varied requirements associated with specific operation conditions.

(Bosch, Ex. 1050, p. 94.)

b. Improvement – Reduced Cost

405. A POSA would have been motivated to use a microprocessor to execute software code implementing Rasin's device discovery and refresh functionality to "avoid individualization in the face of large-scale integration," as described in Bosch, to provide a common microprocessor for high-volume automotive application, for relatively simple tasks like discovering mobile devices and refreshing content on a display, to reduce the piece-price of the microprocessor. (Bosch, Ex. 1050, p. 94.)

c. A POSA would have understood how to combine Rasin and Bosch

406. A POSA would have known how to implement Rasin's control strategies on a microprocessor to achieve predictable results, e.g., cost reduction. As explained by Bosch, "[w]ith modern semiconductor technology [in 2004], powerful microcomputers can be integrated on relatively few chips together with their accompanying program and data memories, and special peripheral circuits designed specifically for real-time applications." (Bosch, Ex. 1050, p. 1064.) Such semiconductor technology was further developed at the time of the '153 Patent, making it more common to utilize a microprocessor (single chip) to control a vehicle system. (*See* ¶¶ 92-95.)

407. Intentionally left blank.

2. Independent Claim 1

408. I have given each of the limitations of claim 1 a unique numerical identifier, as shown in the chart below:

U.S. Patent No. 9,290,153
1[pre]. A method, comprising:
1[a] discovering, by a microprocessor executing a microprocessor executable device discovery daemon, one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle;
1[b] for each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery daemon, system data with device information and capabilities; and
1[c] refreshing, by the microprocessor executing a microprocessor executable desktop manager, graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

1[pre]. A method, comprising:

409. Rasin discloses, with reference to Figure 3, "a flow chart of a method for enabling access to electronics devices through the use of a user interface system in accordance with an embodiment of the present invention." (Rasin, Ex. 1015, 2:8-11.)

410. Rasin further discloses:

> Now, referring to FIG. 3, a flow chart illustrates a method for accessing services available through the electronic device. Block 42 illustrates a step wherein the electronic device is introduced or acknowledged. Block 44 illustrates a step wherein the user interface system, through the use of the networking gateway determines whether the electronic device offers any services (also referred to as service discovery). If the electronic device does not offer any services, the method terminates as indicated at block 43. If the device does offer services, a block 46 occurs. At block 46, in response to data provided by the data repository (block 48), the user interface system obtains data that indicates the services available through the electronic device.

(Rasin, Ex. 1015, 4:50-64.)

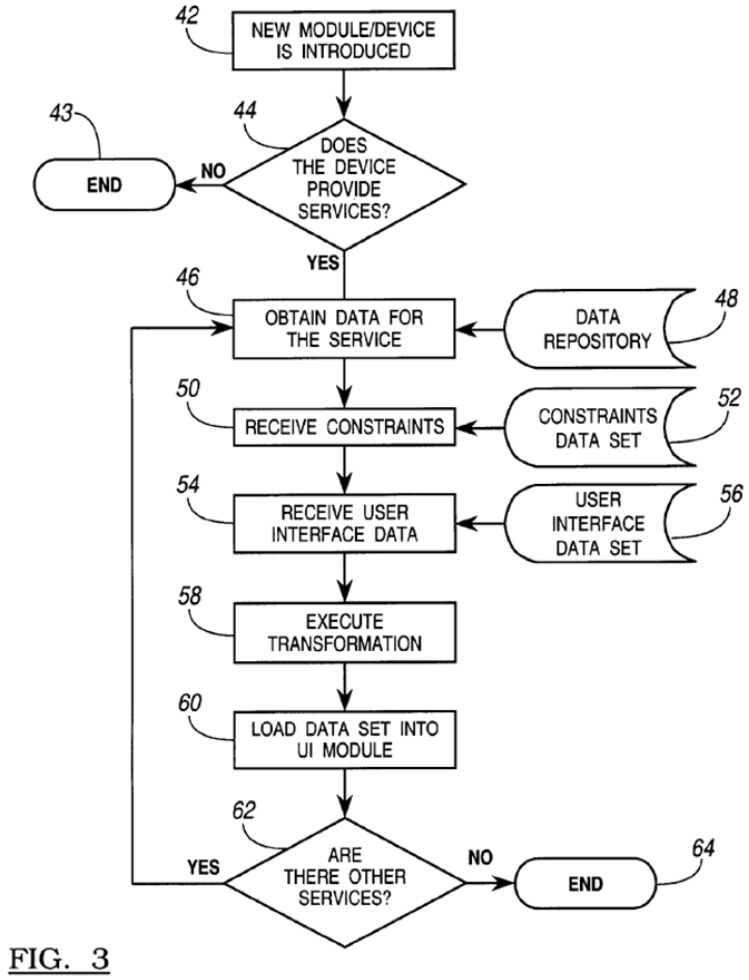


FIG. 3

Rasin, Ex. 1015, Fig. 3

411. Thus, the combination of Rasin and Bosch teaches a "*method*."

… ***[1a] discovering, by a microprocessor executing a microprocessor executable device discovery daemon, one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle;***

412. In my analysis I apply the proposed construction of the term "*daemon*" as a computer program. (*See* ¶¶ 83-85.) I understand that the term "and/or" is interpreted as "one or more".

413. It is therefore my understanding that claim [1a] should be interpreted as "*discovering, by a microprocessor executing a microprocessor executable device discovery* [computer program], *one or more communication devices connected wirelessly to* [one or more of] *a network and*[] *communication subsystem of a vehicle*."

414. Rasin discloses a vehicle 10 "configured to communicate and enable access to electronic devices including services and/or applications (collectively referred to as services) available via the electronic devices." (Rasin, Ex. 1015, 2:27-30.)

415. Rasin discloses that the vehicle 10 includes a user interface system 16 ("*communication subsystem*") that "provides vehicle occupants information/data pertaining to vehicle 10, its systems, and devices, including services available through an electronic device 12." (Rasin, Ex. 1015, 2:40-42.)

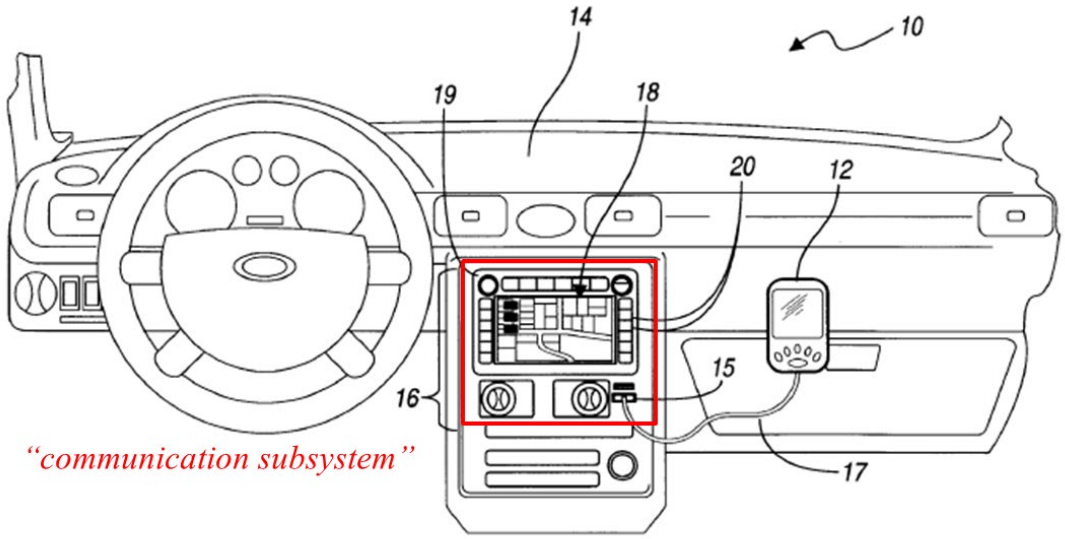
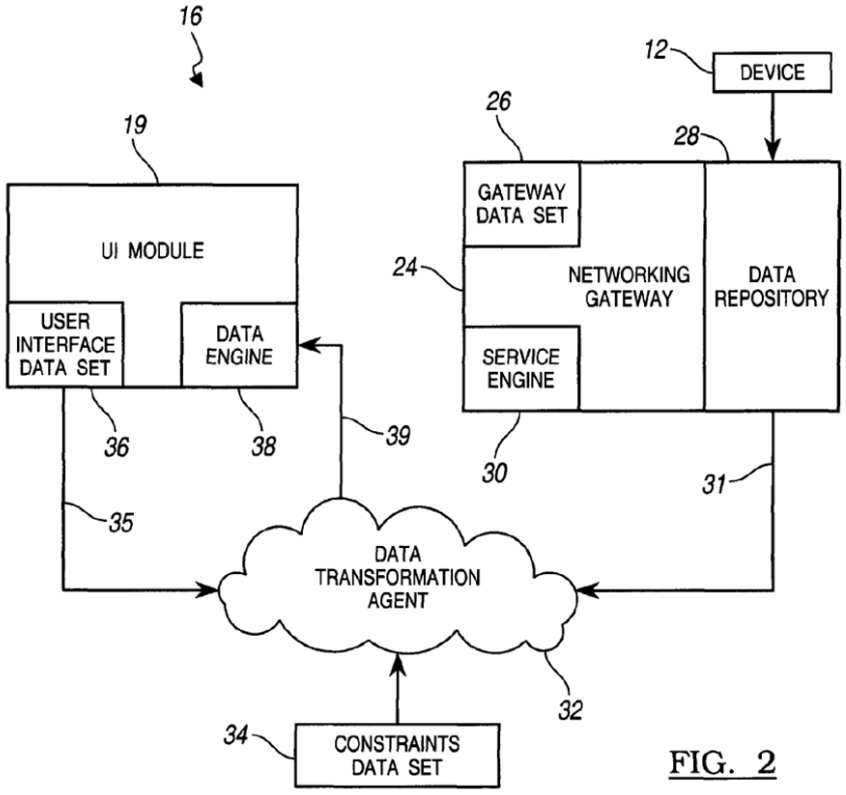


FIG. 1

Rasin, Ex. 1015, Fig. 1 (Annotated)

416. As illustrated in Figure 2 below, Rasin discloses that the "user interface system 16 includes user interface module 19, a networking gateway 24, and a data transformation agent 32." (Rasin, Ex. 1015, 3:24-27.)



Rasin, Ex. 1015, Fig. 2

417. Rasin discloses that "upon connection of device 12 to the vehicle (either by-wire or wirelessly), device 12 transmits a data set to user interface system 16. Reception of the data set may be referred to as service discovery, ..." (Rasin, Ex. 1015, 3:33-36.) Rasin further discloses that the networking gateway 24 within the user interface system 16 initially receives data and determines service information of the device:

> The networking gateway 24 initially receives the data set. Networking gateway 24 includes a data repository 28, a gateway data set 26, and a service engine 30.

(Rasin, Ex. 1015, 3:39-41.)

> Now, referring to FIG. 3, a flow chart illustrates a method for accessing services available through the electronic device. Block 42 illustrates a step wherein the electronic device is introduced or acknowledged. Block 44 illustrates a step wherein the user interface system, through the use of the networking gateway determines whether the electronic device offers any services (also referred to as service discovery). If the electronic device does not offer any services, the method terminates as indicated at block 43. If the device does offer services, a block 46 occurs. At block 46, in response to data provided by the data repository (block 48), the user interface system obtains data that indicates the services available through the electronic device. As described above, the step of obtaining the data may occur through the use of the networking gateway (FIG. 2).

(Rasin, Ex. 1015, 4:50-64.)

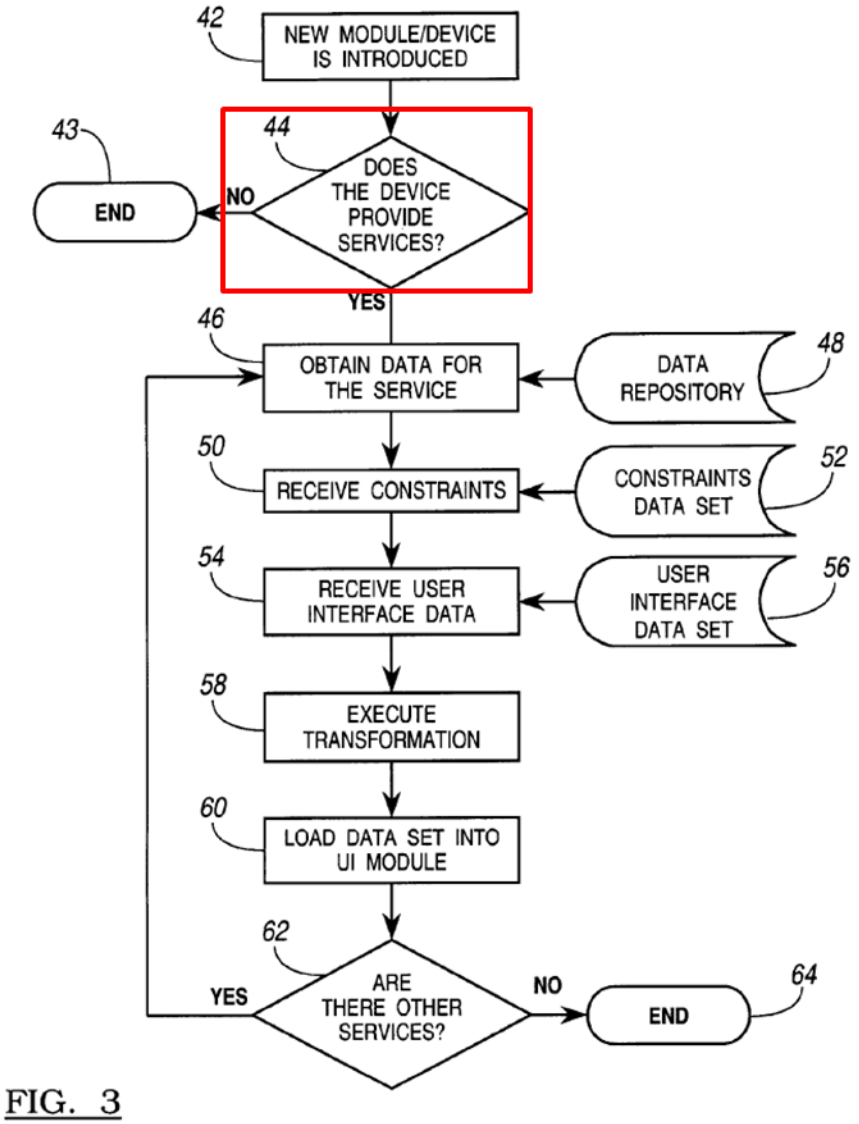


FIG. 3

Rasin, Ex. 1015, Fig. 3 (Annotated)

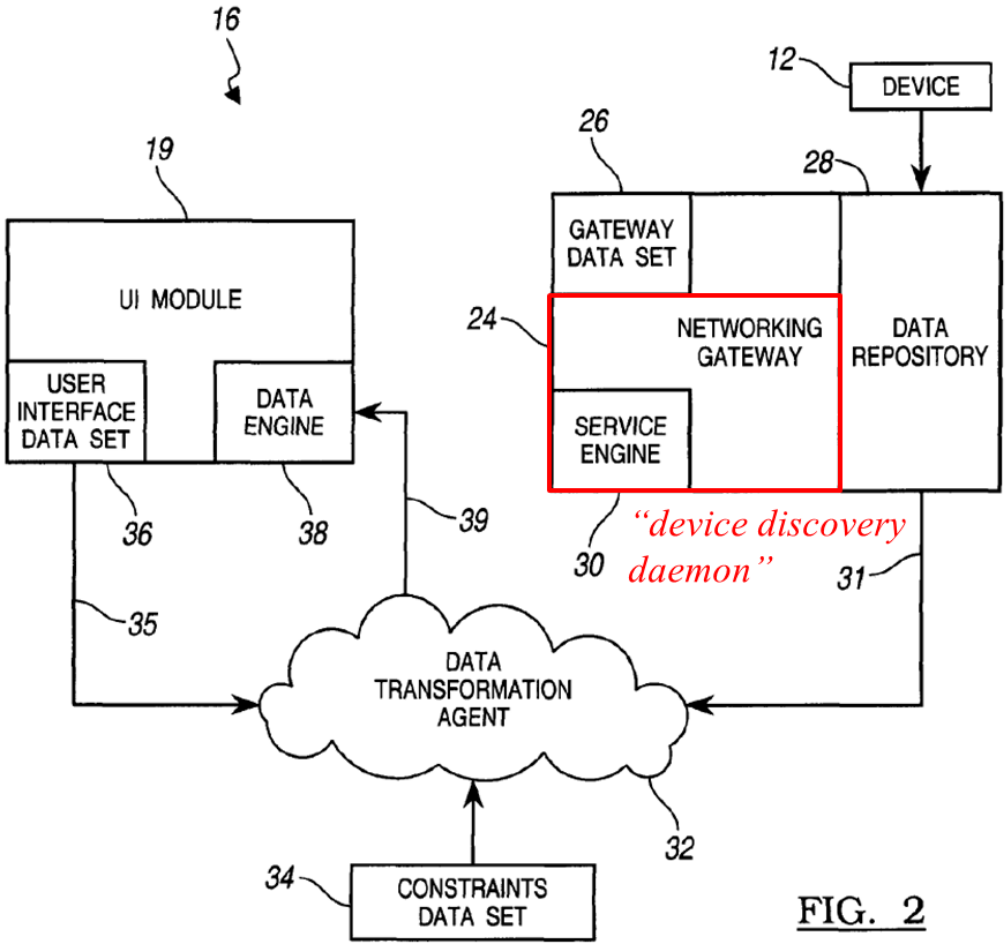
418. Rasin further discloses that the networking gateway 24 includes the service engine 30 that can communicate with device 12 and process data:

> The networking gateway 24 initially receives the data set. Networking gateway 24 includes a data repository 28, a gateway data set 26, and a service engine 30. Service engine 30 is configured to establish communications with devices such as device 12 and to generate a

> corresponding data set in a desired format that describes the available services. In one embodiment, service engine 30 may be referred to as a vehicle services description language (VSDL) engine, which may be an extensible markup language (XML) based description of the services. The VSDL embodiment does not require heterogenous elements that are found in heterogenous systems (e.g., web service definition language (WSDL), simple object access protocol (SOAP), etc.).

(Rasin, Ex. 1015, 3:39-51.)

419. A POSA would have understood that Rasin's disclosure of the networking gateway 24 "initially receiv[ing] the data set" (Rasin, Ex. 1015, 3:39) and the service engine 30 "establish[ing] communications with devices . . . and generat[ing] a corresponding data set" (Rasin, Ex. 1015, 3:41-43), teach that the combination of the networking gateway 24 and service engine 30 is a "*device discovery* [computer program]" that enables detection of devices and processing subsequent data received by the devices.



Rasin, Ex. 1015, Fig. 2 (Annotated)

420. Rasin discloses that the networking gateway 24 and service engine 30 receive and process data received by the device 12:

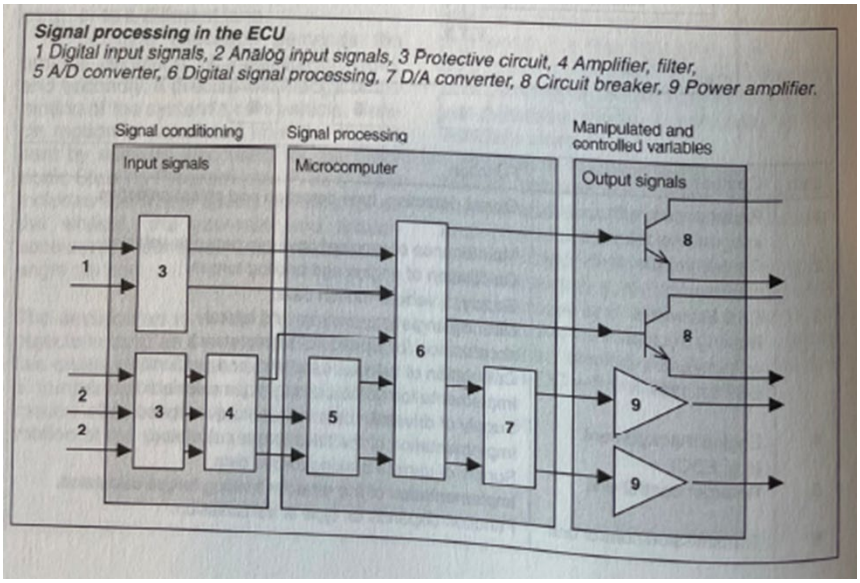
> The networking gateway 24 initially receives the data set. Networking gateway 24 includes a data repository 28, a gateway data set 26, and a service engine 30. Service engine 30 is configured to establish communications with devices such as device 12 and to generate a corresponding data set in a desired format that describes the available services. In one embodiment, service engine 30 may be referred to as a vehicle services description language (VSDL) engine, which may be

> an extensible markup language (XML) based description of the services. The VSDL embodiment does not require heterogenous elements that are found in heterogenous systems (e.g., web service definition language (WSDL), simple object access protocol (SOAP), etc.).

(Rasin, Ex. 1015, 3:39-51.)

421. A POSA would have understood that hardware is required to receive and process data from the device 12. Although not expressly disclosed, Rasin at least suggests that the Rasin's user interface system 16 includes hardware, such as a microprocessor to control the networking gateway 24 and service engine 30.

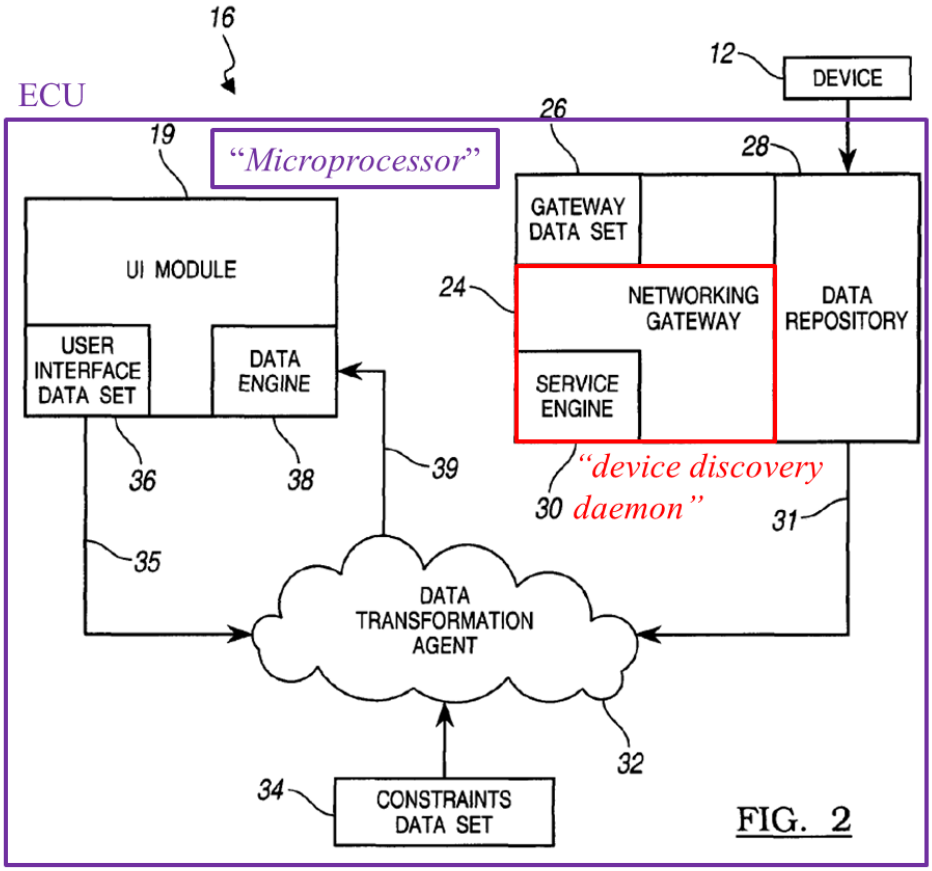
422. Bosch discloses that vehicle systems include electronic control units (ECUs) for controlling vehicle functions. An ECU receives signals from vehicle sensors and "then converts to the signals required to adjust the final-control elements/actuators." (Bosch, Ex. 1050, p. 1064.) As illustrated in the figure below, "ECUs developed for use in motor vehicles all have a similar design. Their structure can be subdivided in the conditioning of input signals, the logic processing of these signals in the microcomputer, and the output of logic and power levels as regulation or control signals." (Bosch, Ex. 1050, p. 1065.)



Bosch, Ex. 1050, p. 1064

423. A microcomputer includes: a microprocessor, input and output units (I/O), and memory. (Bosch, Ex. 1050, p. 94.) "The microprocessor represents the integration of a computers central processing unit on a single chip" and "can be programmed to meet the varied requirements associated with specific operating conditions." (Bosch, Ex. 1050, p. 94.)

424. Accordingly, in would have been obvious to a POSA to combine Rasin's user interface system 16 with Bosch's ECU, including a "*microprocessor*" to control or "*execute*[]" the networking gateway 24 and service engine 30 ("*device discovery* [computer program]") as illustrated in the figure below:



Rasin, Ex. 1015, Fig. 2 (Annotated)

425. Rasin discloses an electronic device 12 ("*communication device*") that can connect to the user interface 16 ("*communication subsystem*"):

> In either embodiment, electronic device 12 may be connected to user interface system 16 through the use of a port 15, which includes universal serial bus (USB) ports and the like.

(Rasin, Ex. 1015, 3:4-6.)

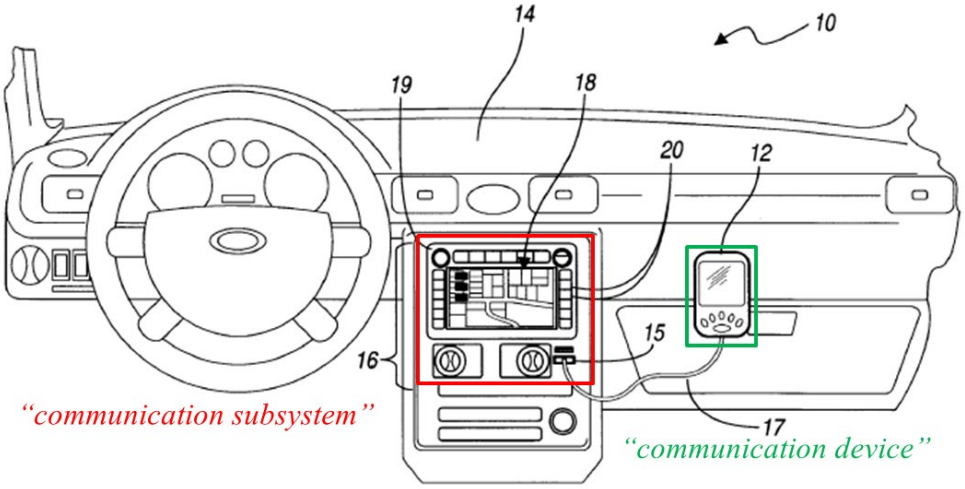


FIG. 1

Rasin, Ex. 1015, Fig. 1 (Annotated)

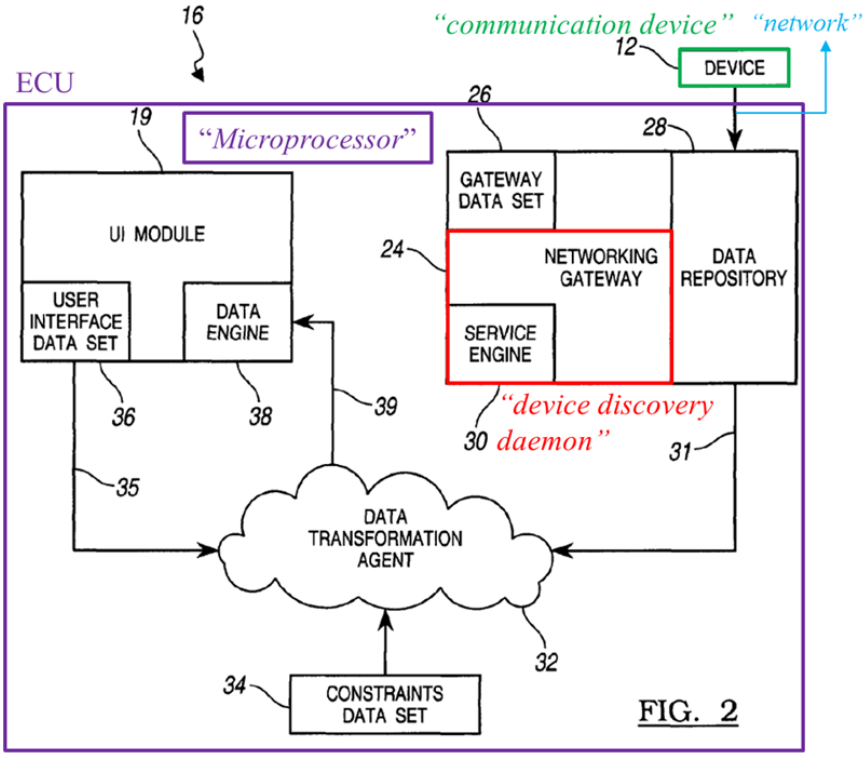
426. Rasin discloses that the electronic device 12 may be connected to the user interface system 16 by wired or wireless communication, e.g., Bluetooth:

> In either embodiment, electronic device 12 may be connected to user interface system 16 through the use of a port 15, which includes universal serial bus (USB) ports and the like. However, although electronic device 12 is physically connected to user interface 16 through the use of a cable 17, it is recognized that communications may occur wirelessly. For instance, it is contemplated by the present invention that electronic device 12 may communicate with user interface system 16 via a wireless protocol including, but not limited to bluetooth, wi-fi, and the like. As described above, unlike conventional systems, user interface system 16 is capable of automatic programming, reprogramming and/or synchronization with devices,

> such as electronic device 12, to enable access to services available through the devices.

(Rasin, Ex. 1015, 3:4-17.)

427. As I explained in the state-of-the art section, a POSA would have understood that Bluetooth was a very popular protocol used by most if not all vehicle systems for transmitting wireless signals to/from wireless devices. (*See* ¶ 108.) As also discussed above, Bluetooth includes aspects of device discovery in which a computer program runs in the background to discover such wireless devices. (*See* ¶¶ 109-121.) Accordingly, a POSA would have understood that Rasin's disclosure of the networking gateway 24 and service engine 30 software ("*device discovery* [computer program]") establishing a connection with the electronic device 12 through "wireless protocol including, but not limited to bluetooth," (Rasin, Ex. 1015, 3:12-13) teaches that the networking gateway 24 and service engine 30 software ("*device discovery* [computer program]") is discovering and wirelessly connecting the electronic device 12 ("*communication device*") to the user interface system 16 ("*communication subsystem*") over a wireless "*network*."



Rasin, Ex. 1015, Fig. 2 (Annotated)

428. Accordingly, the combination of Rasin and Bosch teaches "*discovering, by a microprocessor executing a microprocessor executable* [computer program] [networking gateway 24 and service engine 30], *one or more communication devices* [electronic device 12] *connected wirelessly to a network and/or communication subsystem* [user interface system 16] *of a vehicle.*"

> … ***[1b] for each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery daemon, system data with device information and capabilities; and***

429. Rasin discloses that after establishing a connection between the user

interface system 16 and the electronic device 12, the "device 12 transmits a data set to user interface system 16. Reception of the data set ["*device information*"] may be referred to as service discovery, wherein services available through device 12 are acknowledged by user interface system 16." (Rasin, Ex. 1015, 3:33-38.)

430. Rasin further discloses that the networking gateway 24 within the user interface system 16 "receives the data set" from the device 12; and "includes a data repository 28, a gateway data set 26, and a service engine 30." (Rasin, Ex. 1015, 3:39-41.) The "[d]ata repository 28 provides a plurality of default software constructs that describes communication parameters, features of device 12, and services that may be available via device 12." (Rasin, Ex. 1015, 3:52-55.) Rasin explains that the data repository 28 stores (i.e. it is populated with) the data that describes the services available through the device 12. (Rasin, Ex. 1015, 4:14-17.) A POSA would have understood that the microprocessor and data repository 28 within the vehicle uses default software constructs to interpret the data set, which indicates that the data set includes: communication protocols, device capabilities, and supported service types i.e., "*device information and capabilities*".

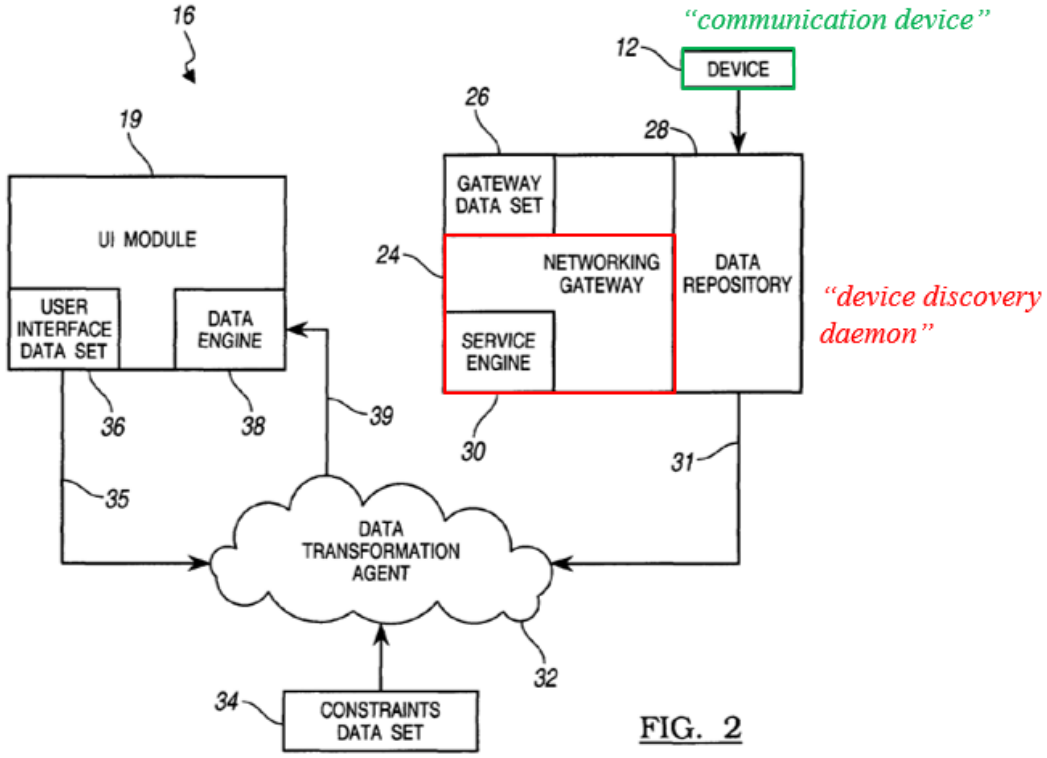
431. Rasin further discloses that the service engine 30 "generate[s] a corresponding data set in a desired format that describes the available services" "[b]ased on the data available from gateway data set 26 and data repository 28." (Rasin, Ex. 1015, 3:41-44; 3:60-62.) Accordingly, the data set generated by the

networking gateway 24 is indicative of the "*device information and capabilities*" of the "*communication device*."

432. With reference to Figure 2, Rasin discloses communication between the electronic device 12 ("*communication device*") and the networking gateway 24 and service engine 30 ("*device discovery* [computer program]") within the user interface system 16 to obtain available device services ("*capabilities*"):

> Referring to FIG. 2, a block diagram of user interface system 16 in communication with electronic device 12 is illustrated. As shown, device 12 communicates with user interface system 16 in a manner so as to enable a user to access available services. User interface system 16 is capable of accessing the services available through device 12 by receiving and processing data sets from device 12. In the illustrated embodiment, user interface system 16 includes user interface module 19, a networking gateway 24, and a data transformation agent 32. It is recognized, however, that alternative embodiments, may have multiple user interface modules 19. For example, a vehicle may include a first user interface module located the vehicle instrument panel and a second user interface module located in a rear seat entertainment unit.

(Rasin, Ex. 1015, 3:18-32.)



Rasin, Ex. 1015, Fig. 2 (Annotated)

433. Rasin further discloses that the user interface system generates data sets based on the available device services, stores the data sets ("*populating*"), and later "obtains data that indicates the services" ("*capabilities*") that are "available through the electronic device":

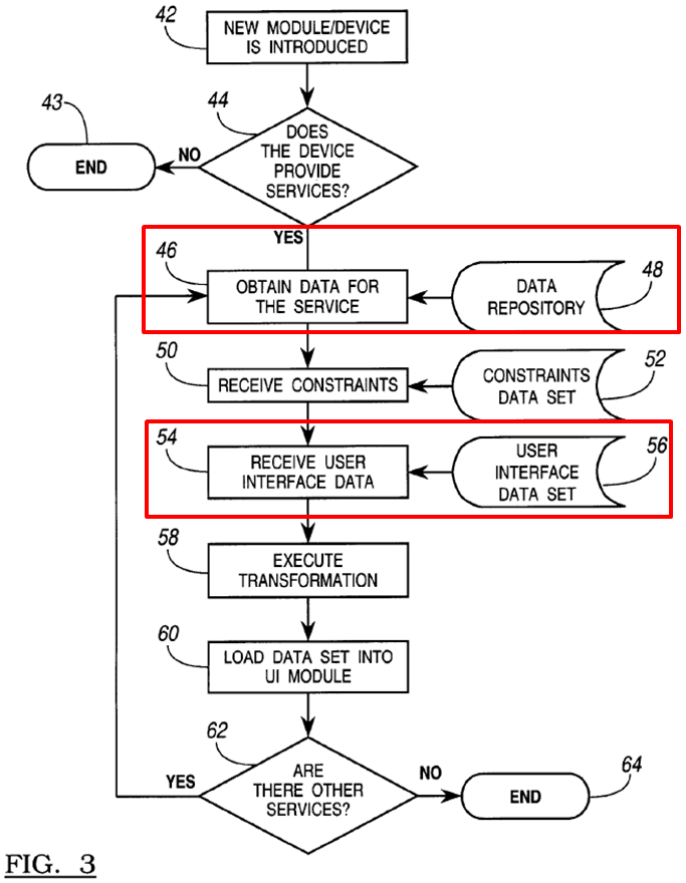
> Now, referring to FIG. 3, a flow chart illustrates a method for accessing services available through the electronic device. Block 42 illustrates a step wherein the electronic device is introduced or acknowledged. Block 44 illustrates a step wherein the user interface system, through the use of the networking gateway determines whether the electronic device offers any services (also referred to as

service discovery). If the electronic device does not offer any services, the method terminates as indicated at block 43. If the device does offer services, a block 46 occurs. At block 46, in response to data provided by the data repository (block 48), the user interface system obtains data that indicates the services available through the electronic device. As described above, the step of obtaining the data may occur through the use of the networking gateway (FIG. 2).

(Rasin, Ex. 1015, 4:50-64.)

As depicted by block 54, the user interface data is received via the data transformation agent. Block 56 depicts the user interface data set which includes data that describes the appearance and functions of the user interface module. Block 58 depicts a step wherein the data transformation agent executes a transformation of the data sets that are received from the user interface data set, the constraints data set, and the data set signal generated by the networking gateway. This transformation, in one embodiment, results in the generation of a VUML type data set, that is compatible with the user interface module. Accordingly, block 60 depicts a step wherein the processed or transformed data sets are loaded into the user interface module. Block 62 includes the step of determining whether additional services are available via the electronic device. If additional services are available, the method returns to block 46 where the foregoing method if repeated. If there exists no additional services, the method terminates at block 64.

(Rasin, Ex. 1015, 5:6-23.)



Rasin, Ex. 1015, Fig. 3 (Annotated)

434. Thus, the combination of Rasin and Bosch teaches "*for each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery* [computer program], *system data with device information and capabilities* [available services of electronic device 12]."

> … ***[1c] refreshing, by the microprocessor executing a microprocessor executable desktop manager, graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.***

435. Rasin discloses a display unit 18 ("*graphical display*") that can

display information accessible through the electronic device 12 ("*graphical elements*") that is controlled by a user interface module 19 "having a controller that is capable of processing and storing data in memory":

> Display unit 18 is adapted to display information such as maps generated by a navigation system, audio system information, climate information, and services/applications that are accessible through the use of electronic device 12. Furthermore, display unit 18 may be configured to receive inputs from a user. Selection devices 20 may be buttons or keys that are designated to effect certain functions by user interface system 16 and electronic device 12. It is recognized that in alternative embodiments selection devices 20 may be embodied as "soft keys" that appear on the display of display unit 18. User interface system 16 also includes a user interface module 19 having a controller that is capable of processing and storing data in memory. The controller of user interface module 19 may have stored therein at least one data set, which may describe default functions and capabilities of user interface system 16 including display unit 18, user interface module 19, and selection devices 20.

(Rasin, Ex. 1015, 2:45-61.)

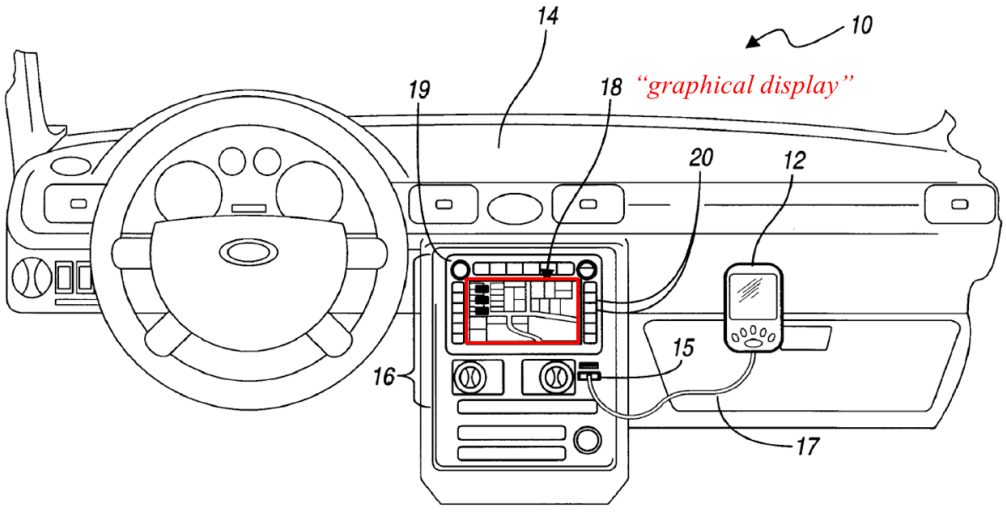


FIG. 1

Rasin, Ex. 1015, Fig. 1 (Annotated)

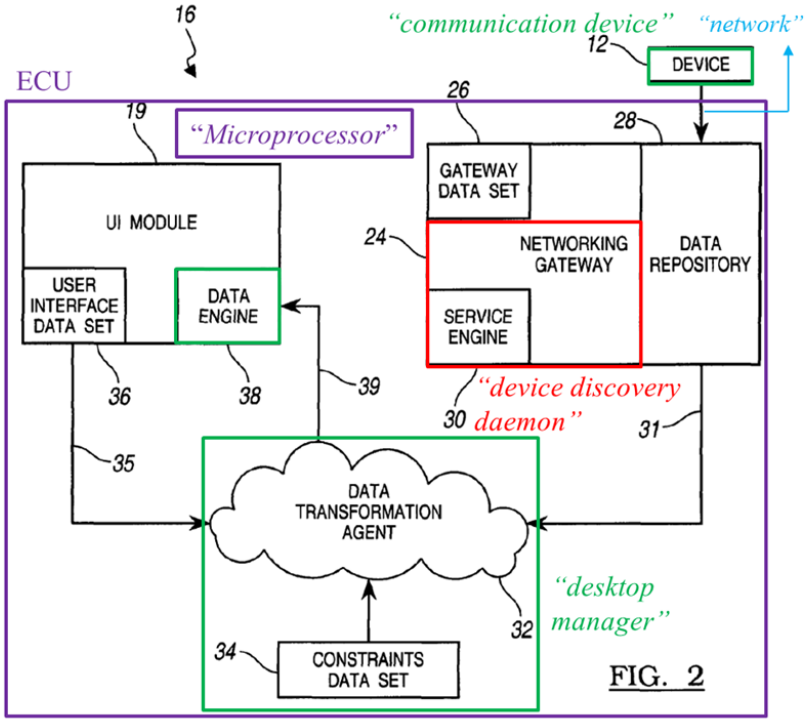
436. Rasin discloses controlling the appearance of information displayed on the display unit 18 based on the data processed from the electronics device 12 by the data transformation agent 32 and constraint data set 34 ("*desktop manager*"):

> Data transformation agent 32 may be embodied as a software program or data set containing a set of predetermined rules by which received data sets are processed. Accordingly, a constraints data set 34 may contain a plurality of constraints by which these rules are based. In one embodiment, the rules by which data sets are processed are implemented in an XML based vehicle constraints markup language (VCML). **These constraints may be used to control the appearance of information displayed by the user interface system display unit (FIG. 1)** and ensure that proper functionality and service behavior by user interface system 16 occurs. As such, the constraints data set 34

> may contain certain data that ensures various performance parameters including, but not limited to, safety, security, regulatory, and vehicle design. The data of constraints data set 34 may include static and dynamic data, which may be loaded into the vehicle at any time. For example, in one embodiment, the data transformation agent having data from constraints data set 34 may be loaded into the user interface system simultaneously with data to be stored within data repository 28.

(Rasin, Ex. 1015, 3:65-4:17.)

437. Rasin further discloses that along with the data transformation agent 32 and the constraints data set 34, the "[d]ata engine 38 is responsible for generic interaction with the user and may contain a specification in electronic form that also controls the appearance and/or function of the user interface module display" ("*desktop manager*"). (Rasin, Ex. 1015, 4:39-42.) It would have been obvious to a POSA to combine Rasin's "controller" with Bosch's ECU so that the "*microprocessor*" controls the data transformation agent 32 and the data engine 38.



Rasin, Ex. 1015, Fig. 2 (Annotated)

438. Rasin discloses that "user interface system 16 is capable of automatic programming, reprogramming and/or synchronization with devices, such as electronic device 12, to enable access to services available through the devices." (Rasin, Ex. 1015, 3:13-17.) Rasin further discloses that "[t]he data of constraints data set 34 may include static and dynamic data, which may be loaded into the vehicle at any time." (Rasin, Ex. 1015, 4:12-14.)

439. A POSA would have understood that Rasin's disclosure of the user interface system 16 being able to automatically reprogram or synchronize data, indicates that the user interface system 16 "*refreshes*" the data that can be

displayed to reflect the discovered communication device. A POSA would have further understood that Rasin's disclosure of loading data into the vehicle at various times teaches that the microprocessor may update or "*refresh*" the data being displayed on display unit 18 based on new data received from the electronic device 12. For example, Rasin discloses a process where the data transformation agent updates or refreshes data corresponding to the graphical elements (e.g., buttons and keys) on the vehicle's display based on the discovery of a new mobile device. First, the user interface system 16 receives a data set from a new device 12:

> In either embodiment, upon connection of device 12 to the vehicle (either by-wire or wirelessly), device 12 transmits a data set to user interface system 16. Reception of the data set may be referred to as service discovery, wherein services available through device 12 are acknowledged by user interface system 16.

(Rasin, Ex. 1015, 3:33-38.)

440. Next the data is analyzed and the data transformation agent 32 generates a data set 39 for use by the user interface module 19:

> Accordingly, when data transformation agent 32 receives data sets 31 and 35, a data set 39 is generated. Data set 39 includes data that has been certified by data transformation agent 32 for use by user interface module 19.

(Rasin, Ex. 1015, 4:33-38.)

441. Then the data engine 38 updates or "*refreshes*" the buttons or keys on

the user interface module ("*graphical elements*") to achieve the desired effect:

> Data engine 38 is responsible for generic interaction with the user and may contain a specification in electronic form that also controls the appearance and/or function of the user interface module display. The specification, which may include XML based data, may be used by data engine 38 to ensure that buttons or keys on the user interface module effect desired user interface system functions operations.

(Rasin, Ex. 1015, 4:39-45.)

442. Thus, the combination of Rasin and Bosch teaches "*refreshing, by the microprocessor executing a microprocessor executable desktop manager* [data transformation agent 32, constraints data set 34, and data engine 38]*, graphical elements* [information accessible through the electronic device 12] *of a graphical display* [display unit 18] *of the vehicle to reflect the discovered one or more communication devices*."

3. Dependent Claims 3 and 11

a. Claim 3

443. Claim 3 depends from claim 1, which I understand means that claim 3 requires all of the limitations of claim 1 in addition to its additional limitations.

444. The combination of Rasin and Bosch teaches all of the limitations of claim 1 as described above. (*See* ¶¶ 408-442.)

[3] The method of claim 1, wherein the device discovery daemon determines capabilities of the one or more communication devices

based on which open port the one or more communication devices exposes to the device discovery daemon.

445. Rasin discloses that the networking gateway 24 within the user interface system 16 "receives the data set" from the device 12; and "includes a data repository 28, a gateway data set 26, and a service engine 30." (Rasin, Ex. 1015, 3:39-41.) The "[d]ata repository 28 provides a plurality of default software constructs that describes communication parameters, features of device 12, and services that may be available via device 12." (Rasin, Ex. 1015, 3:52-55.) Rasin further discloses that the service engine 30 "generate[s] a corresponding data set in a desired format that describes the available services" "[b]ased on the data available from gateway data set 26 and data repository 28." (Rasin, Ex. 1015, 3:39-44; 3:60-62.) Accordingly, the data set generated by the networking gateway 24 is indicative of the "*device information and capabilities*" of the "*communication device*."

446. Rasin further discloses that the electronic device 12 ("*communication device*") can connect to the user interface 16 (and therefore to the networking gateway 24) "through the use of a port 15, which includes universal serial bus (USB) ports" or "via a wireless protocol including, but not limited to Bluetooth, wi-fi, and the like." (Rasin, Ex. 1015, 3:4-17.)

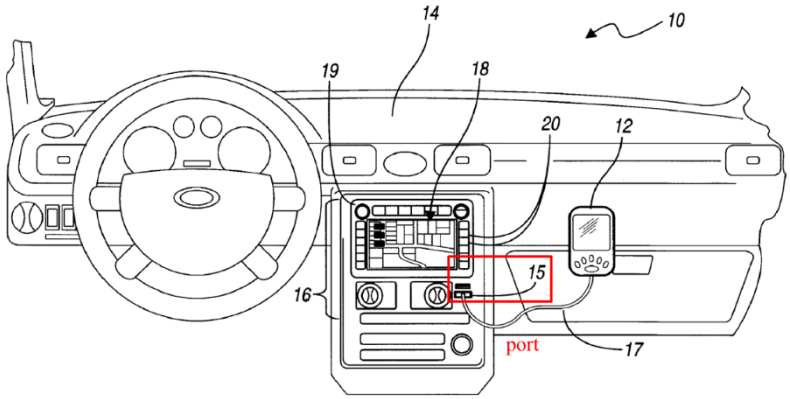


FIG. 1

Ex. 1015,Fig.1 (Annotated)

447. A POSA would have understood that by connecting to the networking gateway 24 with a Bluetooth, Wi-Fi or USB connection, the "*communication device*" is "*expos[ing]*" its open ports, and based on which open ports are exposed, the vehicle head unit software can determine the connectivity capabilities and services of the device. (USB 3 Spec., Ex. 1066, 1-3, 3-12, 4-2, 8-6, 8-7, 8-25, 8-26, 9-6, 9-8; Bluetooth Spec. V1B, Ex. 1067, 272, 370, 373, 395-396, 1012.)

448. Thus, the combination of Rasin and Bosch teaches "*wherein the device discovery* [computer program] *determines capabilities of the one or more communication devices based on which open port the one or more communication devices exposes to the device discovery* [computer program]."

b. Claim 11

449. Claim 11 depends from claim 1, which I understand means that claim 11 requires all of the limitations of claim 1 in addition to its additional limitations.

450. The combination of Rasin and Bosch teaches all of the limitations of claim 1 as described above. (See ¶¶ 408-442.)

[11] A non-transitory and tangible computer readable medium comprising processor executable instructions that, when executed, perform the steps of claim 1.

451. Rasin discloses that the "[n]etworking gateway 24 includes a data repository 28, a gateway data set 26":

> The networking gateway 24 initially receives the data set. Networking gateway 24 includes a data repository 28, a gateway data set 26, and a service engine 30. Service engine 30 is configured to establish communications with devices such as device 12 and to generate a corresponding data set in a desired format that describes the available services.

(Rasin, Ex. 1015, 3:39-44.)

452. A POSA would have understood that a transitory medium is temporary, such as a signal, whereas a non-transitory medium is a physical object where data can be stored, like a hard drive, Random Access Memory (RAM), Read-Only Memory (ROM), CD-ROM storage, or memory card; and that semiconductor memories are divided into two main categories: volatile (short-term) memory (e.g., (RAM)) and non-volatile (long-term) memory (e.g., (ROM). (Bosch, Ex. 1050, pp. 94-95; IEEE Dictionary, Ex. 1051, p. 152.) Rasin's disclosure that the networking gateway 24 includes "a data repository 28" and "a

gateway data set 26" demonstrates that structured data and software constructs are stored in memory. Additionally, Rasin explains that the data repository 28 includes "default software constructs" (Rasin, Ex. 1015, 3:52-53), which indicates that the gateway is implemented with storage for executable instructions and data. A POSA would have understood that these features imply a non-transitory, tangible computer-readable medium within the networking gateway 24 and service engine 30 to store and execute the instructions needed to establish communications.

453. Therefore, the combination of Rasin and Bosch teaches "[*a*] *non-transitory and tangible computer readable medium including microprocessor executable instructions . . . .*"

4. Independent Claim 12

454. Independent claim 12 is largely duplicative of independent claim 1. To illustrate, the table below shows a side-by-side comparison of claims 1 and 12. Claim 12 is "marked up" to show the minor differences.

'153 Claim 1	**'153 Claim 12**
1[pre]. A method, comprising:	12[pre]. A vehicle, comprising:
[1a] discovering, by a microprocessor executing a microprocessor executable device	[12a] a microprocessor; [12b] a network and/or communication subsystem of a

discovery daemon, one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle;	vehicle; [12c] a microprocessor executable device discovery daemon stored in a computer readable medium and configured to discover one or more communication devices connected wirelessly to the network and/or communication subsystem of a vehicle and,
[1b] for each of the discovered one or more communication devices, populating, by the microprocessor executing the device discovery daemon, system data with device information and capabilities; and	[12d] for each of the discovered one or more communication device, populate [] system data with device information and capabilities; and
[1c] refreshing, by the microprocessor executing a microprocessor executable desktop	[12e] a microprocessor executable desktop manager stored in the computer readable medium and

manager, graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.	configured to refresh graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

… ***12[pre]. A vehicle, comprising:***

455. Rasin discloses a vehicle 10 with reference to Figure 1:

> Referring to FIG. 1, a vehicle 10 is illustrated that is configured to communicate and enable access to electronic devices including services and/or applications (collectively referred to as services) available via the electronic devices.

(Rasin, Ex. 1015, 2:27-30.)

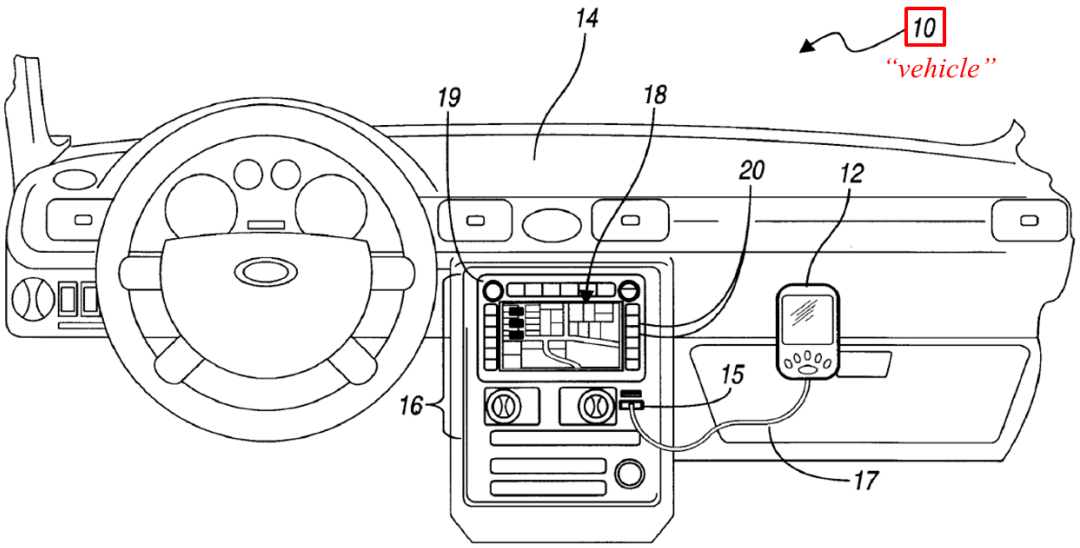


FIG. 1

Rasin, Ex. 1015, Fig. 1 (Annotated)

456. Thus, the combination of Rasin and Bosch teaches "*a vehicle*."

[12a] a microprocessor;

[12b] a network and/or communication subsystem of a vehicle;

[12c] a microprocessor executable device discovery daemon stored in a computer readable medium and configured to discover one or more communication devices connected wirelessly to the network and/or communication subsystem of a vehicle and,

[12d] for each of the discovered one or more communication device, populate system data with device information and capabilities; and

457. Claim limitations [12a]-[12d] are substantially similar to limitations [1a] and [1b] of claim 1. However, claim 12 requires a "*computer readable medium*," whereas claim 1 does not.

458. Rasin discloses that the vehicle 10 includes a user interface system 16 ("*device discovery* [computer program]") that "provides vehicle occupants information/data pertaining to vehicle 10, its systems, and devices, including services available through an electronic device 12." (Rasin, Ex. 1015, 2:40-42.)

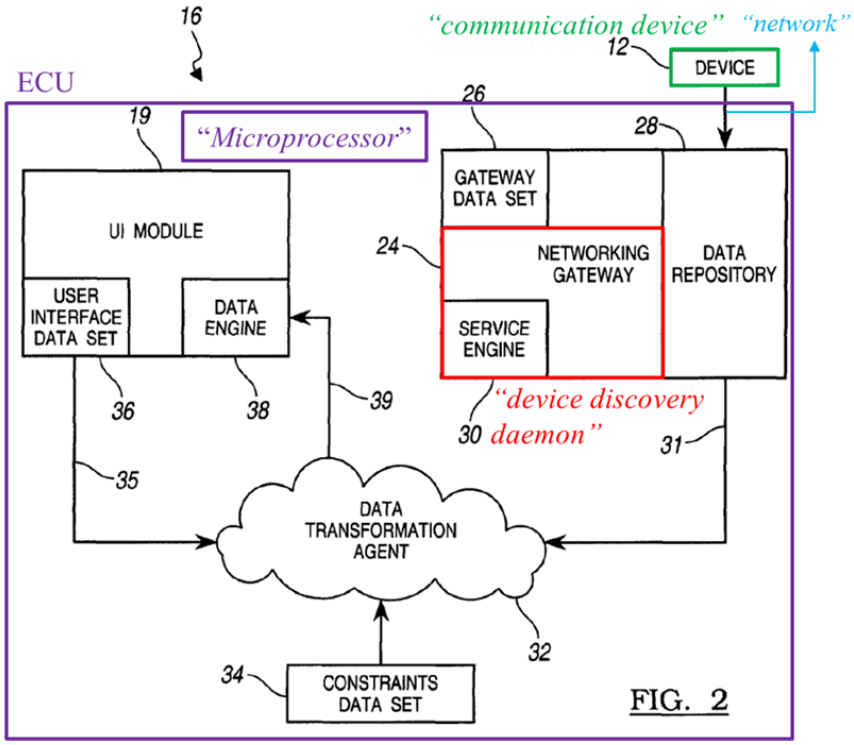
459. Rasin discloses that the controller of user interface module 19 can process and store data in memory, indicating physical hardware that stores executable data or instructions ("*non-transitory and tangible computer readable medium*"):

> Display unit 18 is adapted to display information such as maps generated by a navigation system, audio system information, climate information, and services/applications that are accessible through the use of electronic device 12. Furthermore, display unit 18 may be configured to receive inputs from a user. Selection devices 20 may be buttons or keys that are designated to effect certain functions by user interface system 16 and electronic device 12. It is recognized that in alternative embodiments selection devices 20 may be embodied as "soft keys" that appear on the display of display unit 18. User interface system 16 also includes a user interface module 19 having a controller that is capable of processing and storing data in memory. The controller of user interface module 19 may have stored therein at least one data set, which may describe default functions and capabilities of user interface system 16 including display unit 18, user interface module 19, and selection devices 20.

(Rasin, Ex. 1015, 2:45-61.)

460. Thus, the combination of Rasin and Bosch teaches "*a microprocessor executable device discovery* [computer program] *stored in a computer readable medium . . .* ;"

461. The remaining elements of limitations [12a]-[12d] recite the same elements as limitations [1a] and 1[b], except they are rearranged or in a different order, as illustrated in the table above. For example, limitations [12a] and [12c] require "*a microprocessor*," and "*a network and/or communication subsystem of a vehicle*." While limitation [1a] requires "*discovering, by a microprocessor executing a microprocessor executable device discovery* [computer program]*, one or more communication devices connected wirelessly to a network and/or communication subsystem of a vehicle*." Limitation [1a] is essentially the combination of limitations [12a] and [12b]. The remaining differences between the claim limitations are of the same form and do not alter the meaning of the claim, therefore, I refer back to my analysis of limitations [1a] and [1b] of claim 1 to establish that these limitations are met by the combination of Rasin and Bosch as illustrated in the figure below:



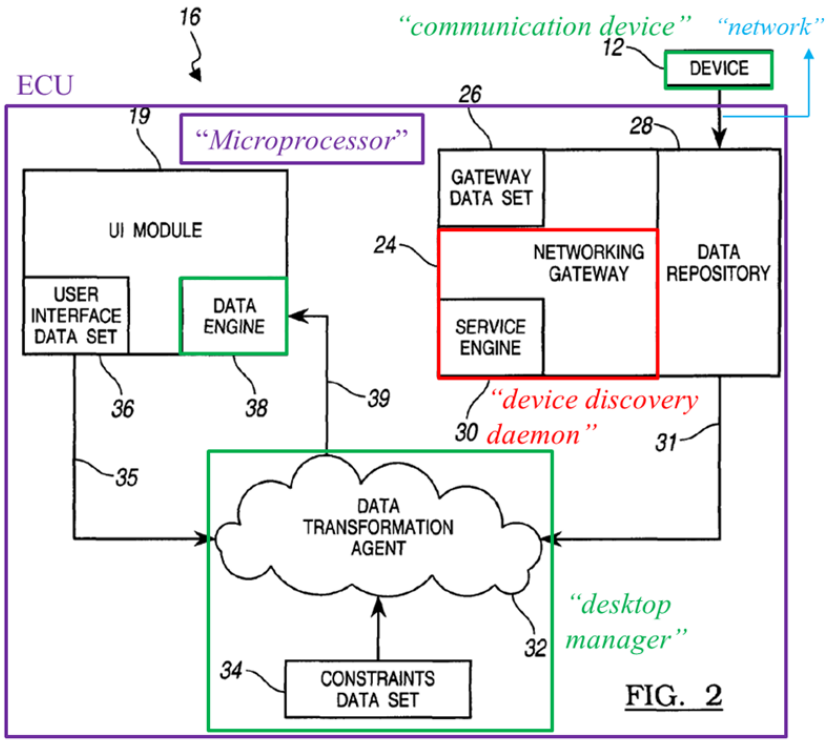
Rasin, Ex. 1015, Fig. 2 (Annotated)

[12e] a microprocessor executable desktop manager stored in the computer readable medium and configured to refresh graphical elements of a graphical display of the vehicle to reflect the discovered one or more communication devices.

462. Claim limitation [12e] is substantially similar to limitation [1c] of claim 1; however, limitation [12e] also requires that the "*desktop manager* [is] *stored in the computer readable medium,*" whereas limitation [1c] does not require a computer readable medium. I refer back to my analysis of limitations [12a]-[12c] to establish that the combination of Rasin and Bosch teaches a "*computer readable medium*."

463. The remainder of limitation [12e] is identical to limitation [1c],

therefore, I refer back to my analysis of this limitation of claim 1 to establish that this is met by the combination of Rasin and Bosch as illustrated in the figure below:



Rasin, Ex. 1015, Fig. 2 (Annotated)

5. Dependent Claim 14

a. Claim 14

464. Claim 14 depends from claim 12, therefore I understand that claim 14 includes all the limitations of claim 12.

465. Claim 14 is largely duplicative of claim 3. To illustrate, the table below shows a side-by-side comparison of claims 3 and 14. Claim 14 is "marked

up" to show the minor differences.

'153 Patent Claim 3	**'153 Patent Claim 14**
[3] The method of claim 1,	**[14]** The vehicle of claim 12,
wherein the device discovery daemon determines capabilities of the one or more communication devices based on which open port the one or more communication devices exposes to the device discovery daemon.	wherein the device discovery daemon determines capabilities of the one or more communication devices based on which open port the one or more communication devices exposes to the device discovery daemon.

[14] The vehicle of claim 12, wherein the device discovery daemon determines capabilities of the one or more communication devices based on which open port the one or more communication devices exposes to the device discovery daemon.

466. As the differences between claims 3 and 14 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 3 to establish that these limitations are met by the combination of Rasin and Bosch.

D. Ground 4 – The Combination of Rasin, Bosch, and Clement Teaches all of the Limitations of Claims 4-5, 7-10, 15-16, and 18-21

1. Rationale to Combine

467. It would have been obvious to a POSA at the time of the invention to combine the vehicle user interface system disclosed in the combination of Rasin and Bosch with the location-based permission management system and known technique of device discovery as disclosed in Clement to provide additional functionality and to improve security. A POSA would have understood that Rasin, Bosch, and Clement are complementary technologies that are combinable, for example, Rasin discloses that:

> As required, detailed embodiments of the present invention are disclosed herein. However, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale, and some features may be exaggerated or minimized to show details of particular proponents. Therefore, specific functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for the claims and/or as a representative basis for teaching one skilled in the art to variously employ in the present invention.

(Rasin, Ex. 1015, 2:16-26.)

> While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will

> recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

(Rasin, Ex. 1015, 5:24-28.)

a. Analogous Art

468. Rasin, Bosch, and Clement are from the same field – communication between a vehicle system and one or more electronic devices:

> The present invention relates generally to a user interface system for a vehicle that enables access to an electronic device.

(Rasin, Ex. 1015, 1:5-7.)

> Various sound and information sources, and communication installations can form a common mobile driver-information system consisting of radio, cassette player, CD player, phone, navigation and traffic telematics equipment, and even computer, video player, and TV.

(Bosch, Ex. 1050, p. 1118.)

> In one aspect, a vehicle is provided that is configured to receive user input for controlling the vehicle. The user input may be entered via a control device, such as a portable computing device. Examples of such devices may include a cell phone, a tablet, a laptop, or a portable gaming device. By way of example, the user input may specify a control action for the vehicle to perform.

(Clement, Ex. 1010, 4:42-48.)

> The vehicle control unit 320 may be coupled to the control device 230 via a wireless or wired connection and it may be operable to receive instructions from the control device 230 to change the state of one or more of the vehicle systems 310*a-f*.

(Clement, Ex. 1010, 7:8-11.)

b. Motivation to Combine

469. Rasin discloses a vehicle user interface system for discovering services on connected devices, transforming service data into a standardized format, and presenting it to the user:

> The present invention relates generally to a user interface system for a vehicle that enables access to an electronic device.

(Rasin, Ex. 1015, 1:5-7.)

> Referring to FIG. 2, a block diagram of user interface system 16 in communication with electronic device 12 is illustrated. As shown, device 12 communicates with user interface system 16 in a manner so as to enable a user to access available services. User interface system 16 is capable of accessing the services available through device 12 by receiving and processing data sets from device 12. In the illustrated embodiment, user interface system 16 includes user interface module 19, a networking gateway 24, and a data transformation agent 32.

(Rasin, Ex. 1015, 3:18-27.)

> The networking gateway 24 initially receives the data set. Networking gateway 24 includes a data repository 28, a gateway data set 26, and a

> service engine 30. Service engine 30 is configured to establish communications with devices such as device 12 and to generate a corresponding data set in a desired format that describes the available services.

(Rasin, Ex. 1015, 3:39-44.)

> Data transformation agent 32 may be embodied as a software program or data set containing a set of predetermined rules by which received data sets are processed. Accordingly, a constraints data set 34 may contain a plurality of constraints by which these rules are based. In one embodiment, the rules by which data sets are processed are implemented in an XML based vehicle constraints markup language (VCML). These constraints may be used to control the appearance of information displayed by the user interface system display unit (FIG. 1) and ensure that proper functionality and service behavior by user interface system 16 occurs.

(Rasin, Ex. 1015, 3:65-4:8.)

470. However, the Rasin/Bosch combination does not disclose a location-based vehicle permission system based on the location of a portable device.

(1) Control of Vehicle System Functionality from a Portable Device

471. Clement discloses a location-based permission control system for controlling vehicle system functions from a portable device to increase vehicle safety:

> Having a permission management system is important with respect to ensuring the safety of the vehicle. For instance, it is unsafe for a 5-year old sitting in the rear seat of the vehicle to be allowed to steer the vehicle, via the control device, should he or she manage somehow to grab the control device and bring it in the backseat. To increase the vehicle's safety, the location of the control device inside the vehicle may be monitored and a determination may be made as to what region of the vehicle's cab the control device is located in. Possible regions may include a region where the driver's seat is located, a region where the front passenger's seat is located, and a region where the backseats are located.
>
> In one example, the control device may be permitted to perform safety-critical actions, such as steering or applying the brakes, only if it is located in the region where the driver seat is located. In this regard, the ability to perform safety-critical actions may be denied when the control device is located elsewhere in the vehicle's cab. This ensures that only the person in the driver's seat retains control over aspects of the operation of the vehicle that are important with respect to safety. Nevertheless, the control device may be permitted to control non-safety critical aspects of the operation of the vehicle when it is located in other parts of the vehicle, like the backseat. For example, the control device may be permitted to perform actions from the backseat, such as activating an air-conditioner, rolling down a window, or changing the station playing on the vehicle's radio.

(Clement, Ex. 1010, 5:6-32.)

472. Clement discloses a "vehicle control unit 320 . . . coupled to the control device 230 . . . may be operable to receive instructions from the control device 230 to change the state of one or more . . . vehicle systems 310*a-f*." (Clement, Ex. 1010, 7:8-11.) Clement further discloses that the vehicle control unit 320 can "identify[] a current location of the portable control device [230] within a passenger compartment of the vehicle, and depending on the current location of the portable control device [230]," allow or not allow certain vehicle functions. (Clement, Ex. 1010, 1:43-46, *see also*, 7:40-50, Fig. 8.)

473. Clement discloses that "[a]t task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230" and if so "task 885 is executed" i.e., the vehicle control unit 320 "Execute[s] the Instruction;" otherwise, "task 895 is performed":

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device

230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

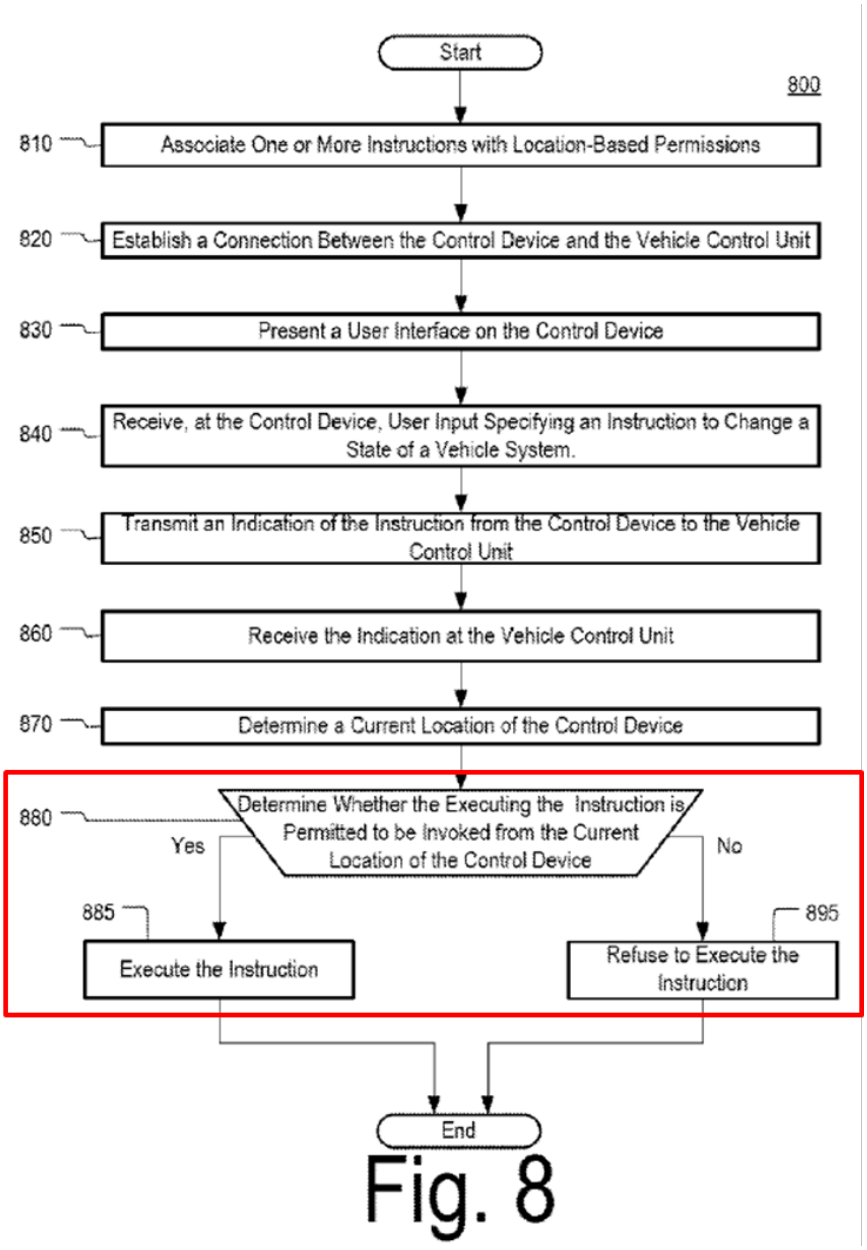


Fig. 8

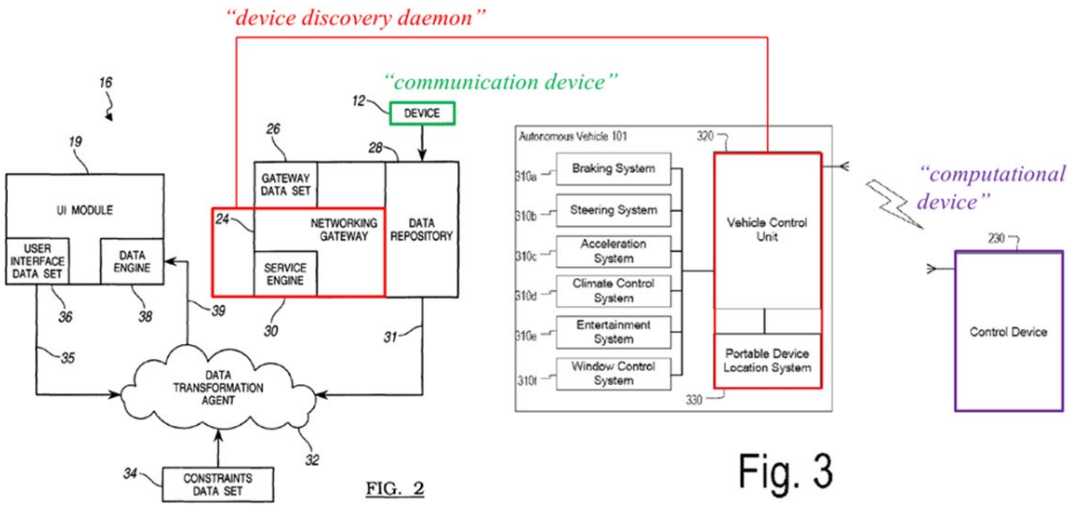
Clement, Ex. 1010, Fig. 8 (Annotated)

474. A POSA would have been motivated to combine the vehicle user interface system disclosed in the Rasin/Bosch combination with the location-based

permission control system disclosed in Clement, to expand the functionality of the Rasin/Bosch system to also control vehicle system functionality, by being able to determine the specific location of a portable/mobile device and restrict access to vehicle systems based on that location. The ability to restrict access to applications and vehicle system functionality based on the location of a portable device provides additional safety measures, e.g., limiting the control of safety critical features to the driver. Additionally, allowing passengers to control other vehicle system functionality, e.g., audio and climate controls from a portable device, may limit driver distraction.

c. A POSA Would Have Understood how to Combine Rasin and Clement

475. A POSA would have understood how to combine Rasin, Bosch, and Clement with a reasonable expectation of success. In terms of hardware modifications, a POSA would have modified the Rasin/Bosch vehicle user interface system to include Clement's vehicle control unit 320, the location system 330 including receivers 610*a-d*, and the control device 230. As illustrated in the figure below, a POSA would have understood that due to the complementary nature of the systems, Rasin's user interface system 16, with networking gateway 24 and service engine 30, and Clement's vehicle control unit 320 would have been combined to share hardware and software:



Rasin, Ex. 1015, Fig. 2 (Annotated); Clement, Ex. 1010, Fig. 3 (Annotated)

476. The combined Rasin, Bosch, and Clement system includes Clement's control device 230 and the location system 330 including receivers 610*a-d* for determining the position of the control device 230 within the vehicle.

> The vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230.

(Clement, Ex. 1010, 7:40-42.)

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610*a-b* [sic 610*a-d*] may take measurements of the strength of radio signal(s)

> transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

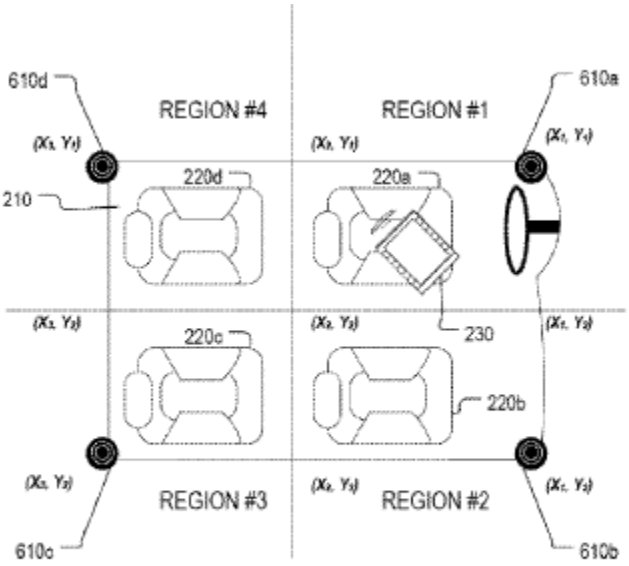


Fig. 6

Clement, Ex. 1010, Fig. 6

477. In addition to the elements discussed above, a POSA would have modified Rasin's vehicle user interface system to include the associated software needed to operate Clement's vehicle control unit 320 and the location system 330, to enable determining the position of a mobile device within the vehicle.

478. Clement discloses that the vehicle control unit 320 includes a processor 410 and executable code 440 that is executed by the processor 410:

> FIG. 4 depicts a schematic diagram of the vehicle control unit 320 in accordance with aspects of the disclosure. As illustrated, the vehicle control unit 320 may include a processor 410 and memory 420. Memory 420 of vehicle control unit 320 may store information accessible by processor 410, including executable code 440 that may be executed by the processor 410.

(Clement, Ex. 1010, 7:51-57.)

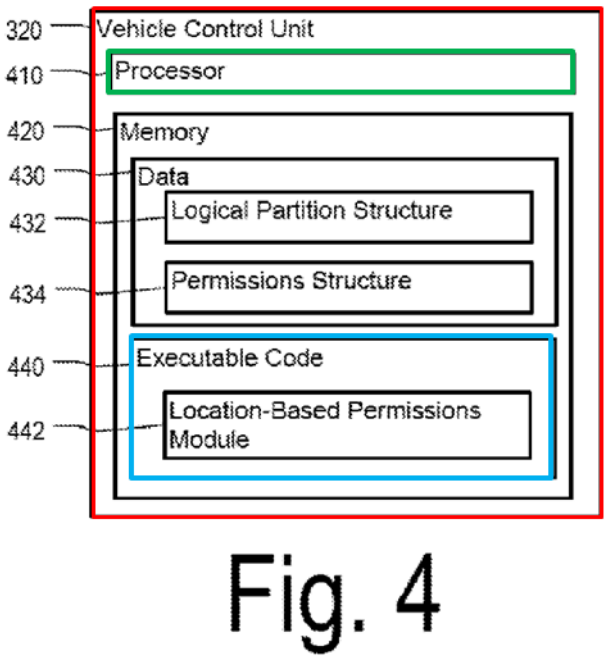


Fig. 4

Clement, Ex. 1010, Fig. 4 (Annotated)

479. Clement further discloses that the executable code 440 of the vehicle control unit 320 includes a location-based permissions module 442 that is configured to enforce location-based restriction policies, such as those described with reference to Figure 8:

> The executable code 440 may perform at least some of the tasks of the process 800 depicted in FIG. 8. For example, the executable code 440 may include a location-based permissions module 442 that is configured to enforce location-based restriction policies.

(Clement, Ex. 1010, 8:13-17, Fig. 8.)

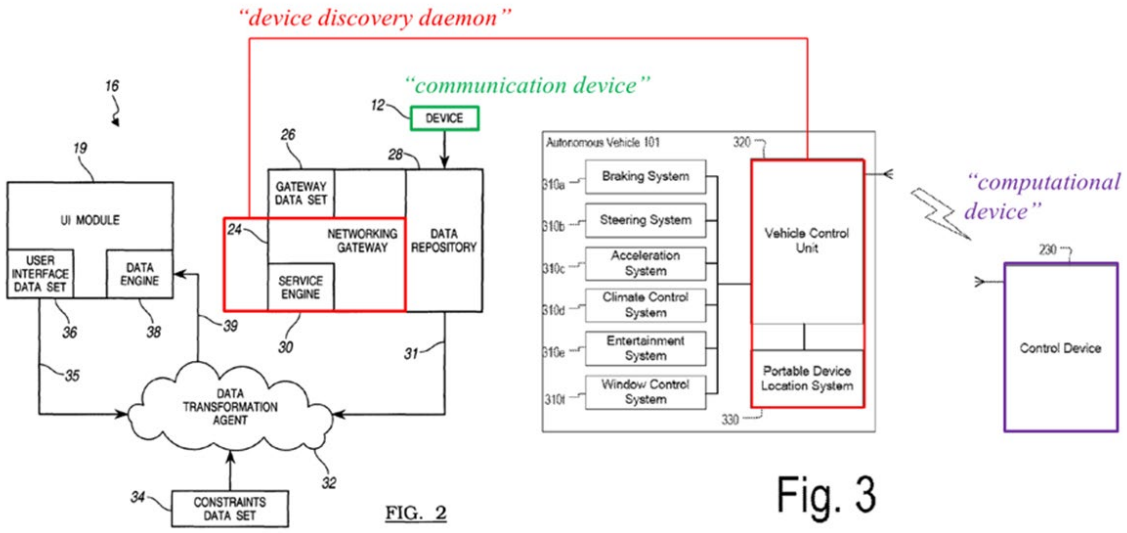
480. Clement further discloses that the location system 330 includes software for determining the location of device 230:

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

481. The combination of Rasin's vehicle user interface system and Clement's control device 230, vehicle control unit 320, location system 330, including receivers 610*a-d*, and its associated software, would allow vehicle systems to be accessed by a device in various locations within a vehicle, increasing ease of use and functionality, while ensuring that access is only given when the

device is physically inside the vehicle, thereby increasing safety and security.



Rasin, Ex. 1015, Fig. 2 (Annotated); Clement, Ex. 1010, Fig. 3 (Annotated)

482. These modifications would have been a straightforward and well-known combination of known elements in the prior art, e.g., receivers and corresponding software for detecting the location of a portable electronic device within a vehicle limiting access to vehicle system functionality based on the location of the portable electronic device, yielding the predictable result of reducing driver distractions and increasing user convenience.

2. Dependent Claims 4-5, 7-10

a. Claim 4

483. Claim 4 depends from claim 1, which I understand means that claim 4 requires all of the limitations of claim 1 in addition to its additional limitations.

484. The combination of Rasin and Bosch teaches all of the limitations of claim 1 as described above. (*See* ¶¶ 408-442.)

[4a] The method of claim 1, further comprising: determining, by the microprocessor executable device discovery daemon, that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle;

485. In my analysis I apply the proposed construction of the term "*daemon*" as a computer program. (*See* ¶¶ 83-85.)

486. I understand that claim 4 is referring to the same network, communication subsystem, and vehicle as those recited in claim 1 despite claim 4 reciting "*a network*" and "*a vehicle*" rather than "the" network and "the" vehicle.

487. It is therefore my understanding that claim [4a] should be interpreted as "*determining, by the microprocessor executable device discovery* [computer program], *that a computational device is connected to or attempting to connect to* [the] *network and/or communication subsystem of* [the] *vehicle*."

488. As explained for limitation [1a], Rasin's disclosure of the user interface system 16 establishing a connection with the electronic device 12 through "wireless protocol including, but not limited to bluetooth," (Rasin, Ex. 1015, 3:12-13) indicates that the user interface 16 and its associated software (networking gateway 24 and service engine 30 – "*device discovery* [computer program]") – is discovering and wirelessly connecting the electronic device 12 ("*communication*

device") to the vehicle network. (*See* ¶¶ 412-428.)

489. Clement discloses that its vehicle control unit 320 software performs similar device discovery procedure. As explained in the rationale to combine section, the combination of Rasin, Bosch, and Clement collectively teach the "*device discovery* [computer program]" limitations of Ground 4.

490. Clement discloses a vehicle 101 that includes a vehicle control unit 320 and a portable device location system 330:

> FIG. 3 depicts a schematic diagram of the vehicle 101 in accordance with aspects of the disclosure. As illustrated, vehicle 101 includes vehicle systems 310*a-f*, a vehicle control unit 320, and a portable device location system 330.

(Clement, Ex. 1010, 6:27-30.)

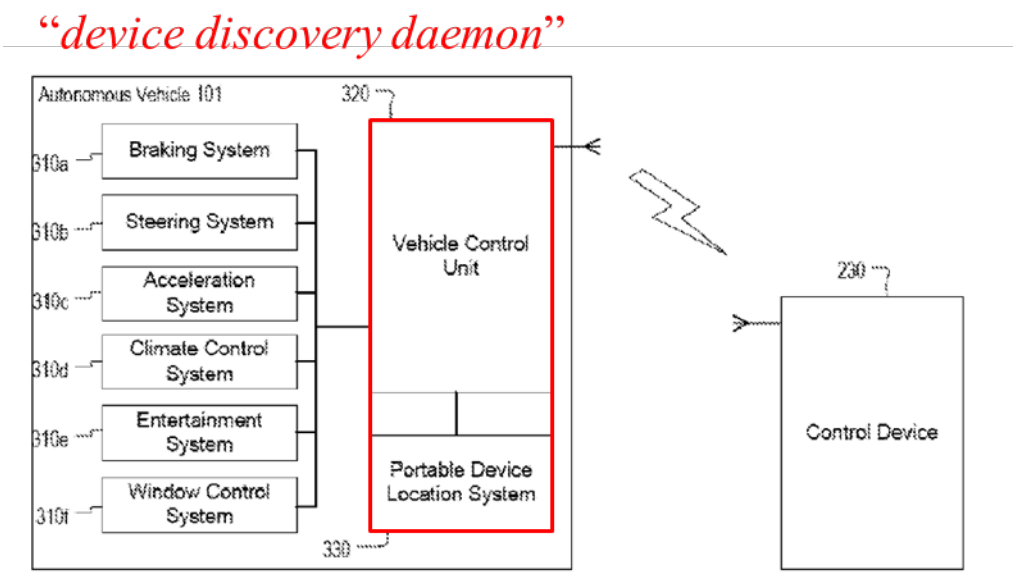


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

491. Clement further discloses that the vehicle control unit 320 may be integrated with the location system 330:

> Although in this example, the location system 330 and the vehicle control unit 320 are depicted as separate blocks, in some instances, they may be (completely or partially) integrated together.

(Clement, Ex. 1010, 7:32-36.)

492. With reference to Figure 3, the "[v]ehicle control unit 320 may also be operatively connected to one or more of the vehicle systems 310*a-f* and it may be operable to change the state of any one of these systems." (Clement, Ex. 1010, 6:63-66.) A POSA would have understood that the vehicle control unit 320 and the vehicle systems 310 would have been connected to each other over a wired

connection, i.e., a vehicle communication network ("*network and/or communication subsystem of a vehicle*") to facilitate the vehicle control unit 320 controlling, or changing the state of, the vehicle systems 310*a-f*.

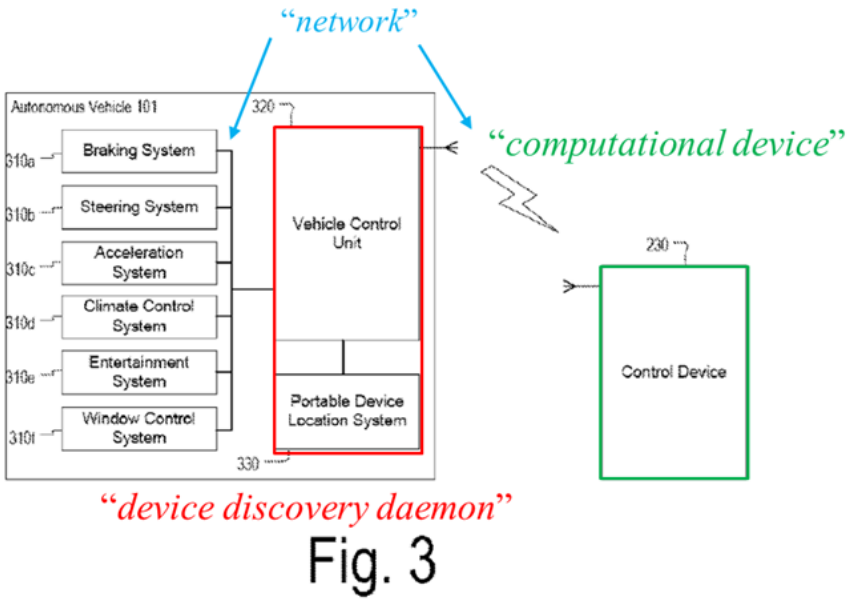


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

493. Clement also discloses that the vehicle control unit 320 includes a processor 410 and executable code 440 that is executed by the processor 410:

> FIG. 4 depicts a schematic diagram of the vehicle control unit 320 in accordance with aspects of the disclosure. As illustrated, the vehicle control unit 320 may include a processor 410 and memory 420. Memory 420 of vehicle control unit 320 may store information accessible by processor 410, including executable code 440 that may be executed by the processor 410.

(Clement, Ex. 1010, 7:51-57.)

494. Clement further discloses that the executable code 440 of the vehicle

control unit 320 includes a location-based permissions module 442 that is configured to enforce location-based restriction policies, such as those described with reference to Figure 8:

> The executable code 440 may perform at least some of the tasks of the process 800 depicted in FIG. 8. For example, the executable code 440 may include a location-based permissions module 442 that is configured to enforce location-based restriction policies.

(Clement, Ex. 1010, 8:13-17, Fig. 8.)

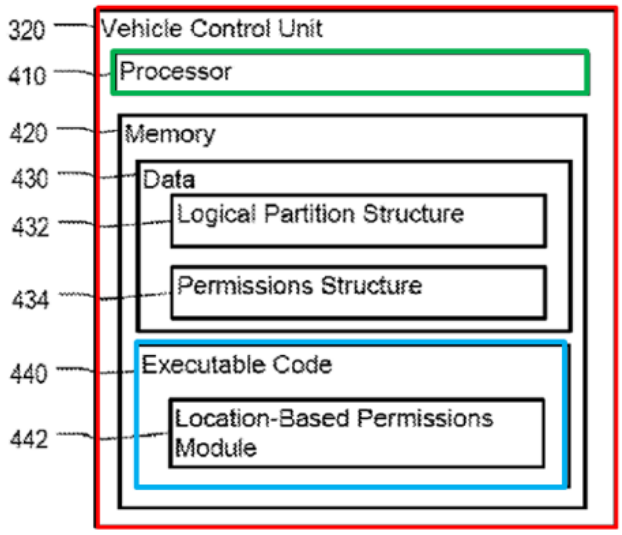


Fig. 4

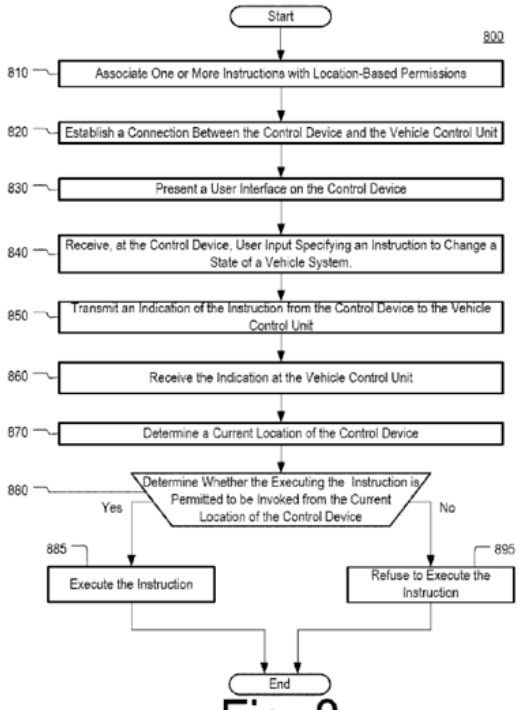
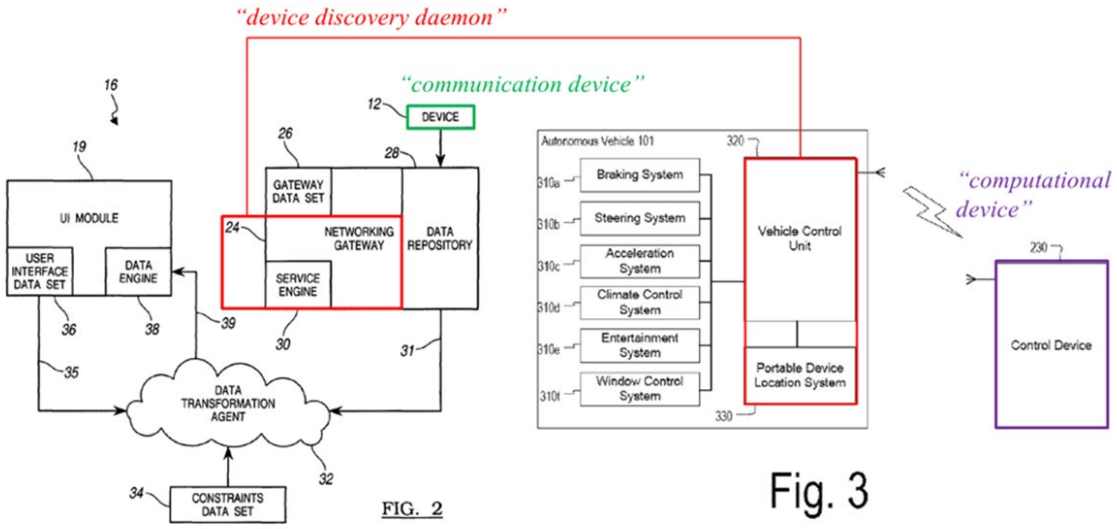


Fig. 8

Clement, Ex. 1010, Figs. 4, 8 (Annotated)

495. Rasin's networking gateway 24 and service engine 30, combined with Clement's executable code 440, including the location-based permissions module

442 of the vehicle control unit 320 combined with the portable device location system 330, collectively provide a "*microprocessor executable device discovery* [computer program]."



Rasin, Ex. 1015, Fig. 2 (Annotated); Clement, Ex. 1010, Fig. 3 (Annotated)

496. Figure 8 "depicts a schematic diagram of a process associated with controlling of the vehicle of FIG. 1 by the vehicle control unit of FIG. 4." (Clement, Ex. 1010, 4:27-29.) At task 820, the vehicle control unit 320 establishes a connection with the control device 230 utilizing "any communication[] protocol" such as "Bluetooth":

> At task 820, a connection between the control device 230 and the vehicle control unit 320 is established. The connection may be either wired or wireless. To establish the connection, any communications

protocol may be utilized, such as TCP/IP, Bluetooth, USB, wireless USB, WiFi, or a custom communications protocol.

(Clement, Ex. 1010, 9:45-50.)

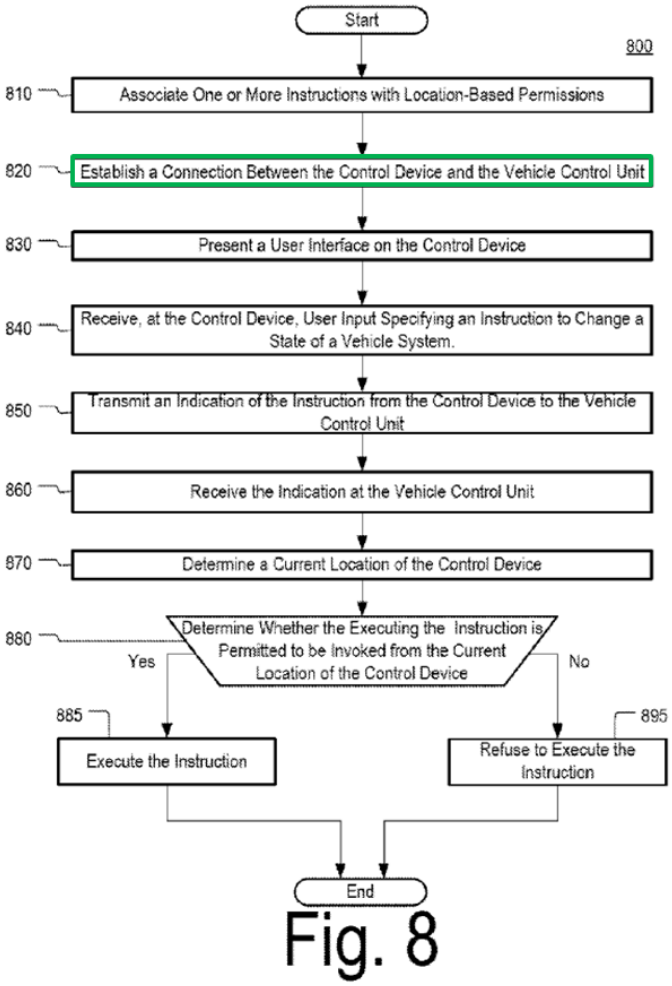


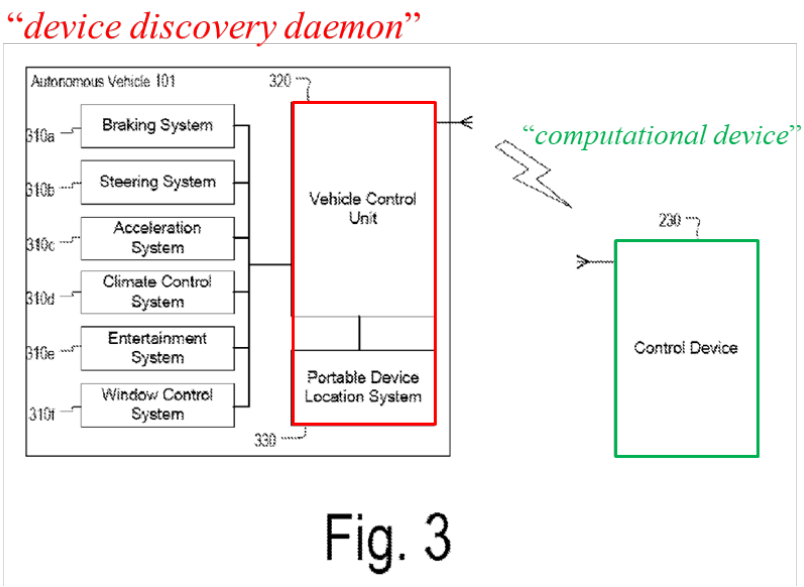
Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

497. Clement discloses that the vehicle control unit 320 communicates with the control device 230 ("*computational device*") to receive instructions and its executable code 440 controls, or changes the state of, vehicle systems 310*a-f* based on the instructions:

The vehicle control unit 320 may be coupled to the control device 230 via a wireless or wired connection and it may be operable to receive instructions from the control device 230 to change the state of one or more of the vehicle systems 310*a-f*.

(Clement, Ex. 1010, 7:8-11.)



Clement, Ex. 1010, Fig. 3 (Annotated)

The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

498. A POSA would have understood that Clement's disclosure of the vehicle control unit 320 "chang[ing] the state of one or more of the vehicle systems 310*a-f*" and the lines connecting the corresponding boxes in Figure 3, indicates that vehicle control unit 320 communicates with the vehicle systems 310*a-f* f over a vehicle network ("*network*"). (Clement, Ex. 1010, 7:8-11.) A POSA would have further understood that by establishing a connection with, and receiving instructions from, the control device 230, the vehicle control unit 320 "*determines*" that the control device 230 is connected to the vehicle network.

499. Accordingly, the combination of Rasin, Bosch, and Clement teaches "*determining, by a microprocessor executable device discovery* [computer program], *that a computational device* [control device 230] *is connected to or attempting to connect to a network and/or communication subsystem of a vehicle*."

[4b] in response, determining, by the device discovery daemon, whether the computational device is located within a predetermined area and/or zone of the vehicle; and

500. Clement discloses that after establishing a connection at task 820 (annotated in green below), "the vehicle control unit 320 determines the current location of the control device 230" "[a]t task 870" (annotated in red below):

> At task 870, the vehicle control unit 320 determines the current location of the control device 230. Without limitation, the current

location of the control device 230 may be the location where the control device is located when task 870 is executed, the location where the control device is located when task 860 is executed, or the location of the control device 230 at another time instant that is substantially cotemporaneous with the time instant when either one of task 860 or task 870 is executed.

(Clement, Ex. 1010, 10:37-45.)

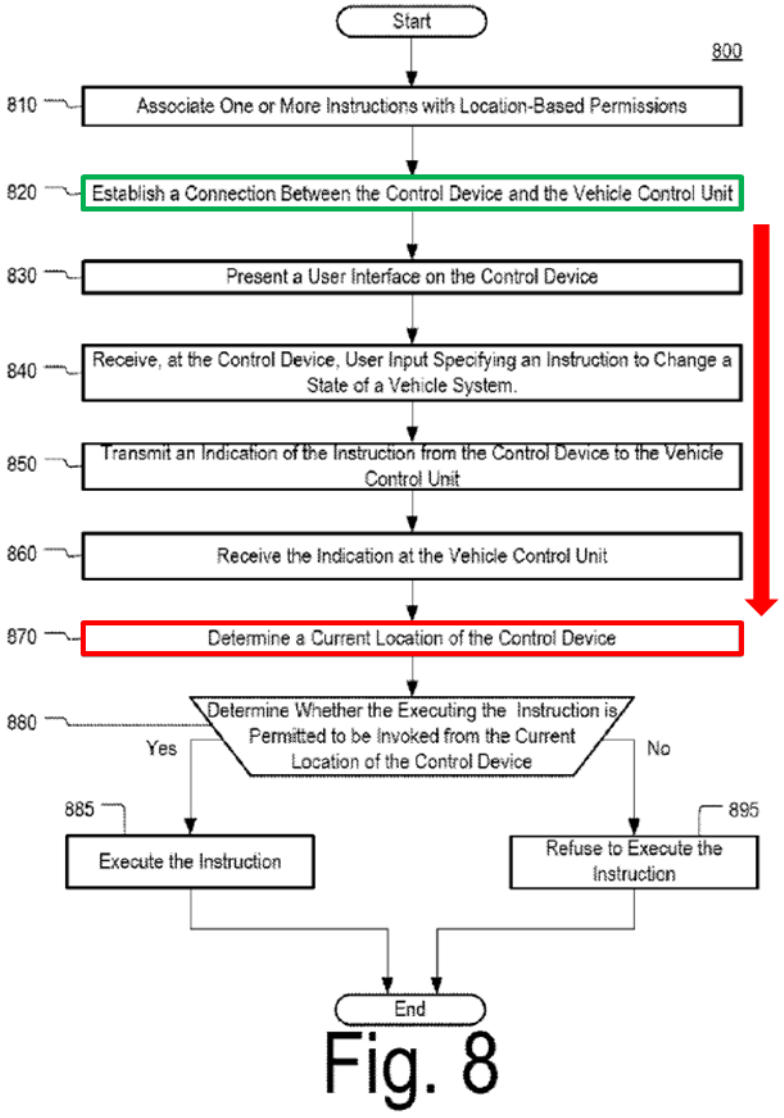


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

501. Clement discloses that the location system 330 software, which may be incorporated with the vehicle control unit 320, determines the location of the control device 230 ("*computational device*") within the passenger compartment 210 of the vehicle using multiple approaches, including triangulation based the strength of the radio signal(s) transmitted by the control device 230:

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

502. Clement further discloses that the location of the control device 230 refers to the specific region (e.g., Regions 1-4) of the vehicle that the control device 230 is located in:

> The executable code 440 may perform at least some of the tasks of the process 800 depicted in FIG. 8. For example, the executable code 440 may include a location-based permissions module 442 that is configured to enforce location-based restriction policies. That is, when

an instruction is received from the control device 230, the module 432 may determine the current location of the control device 230 in the passenger compartment 210 and execute the instruction only if the control device 230 is located in a region of the passenger compartment 210 where the instruction is permitted to be invoked from.

(Clement, Ex. 1010, 8:14-24.)

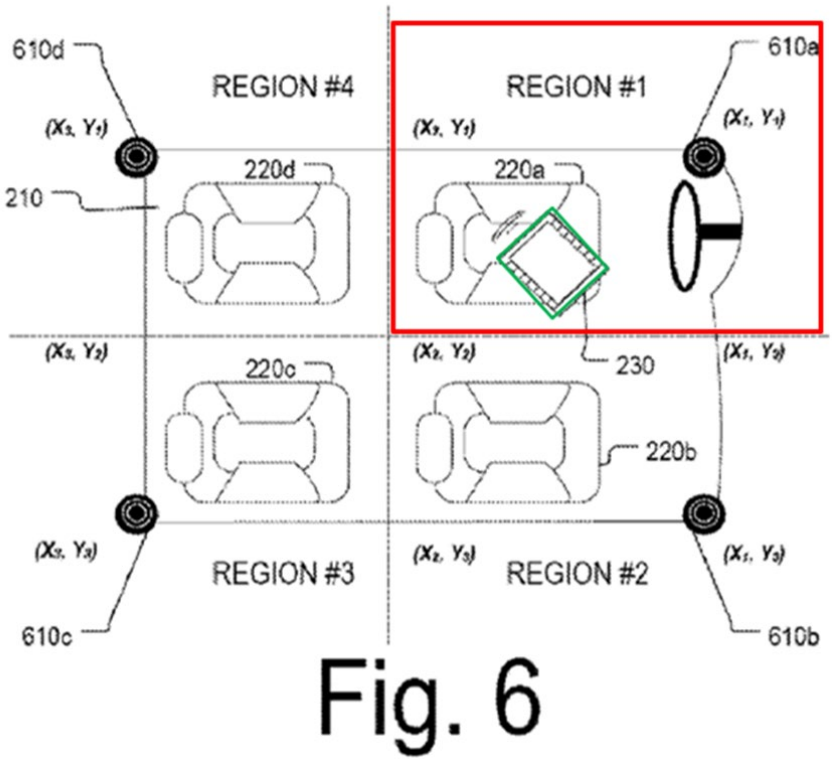


Fig. 6

Clement, Ex. 1010, Fig. 6 (Annotated)

503. As I explained above with reference to the rationale to combine section, the combination of Rasin, Bosch, and Clement includes Clement's location system 330 with receivers 610*a-d* to provide a determination of a device's location within a predetermined area.

504. Thus, the combination of Rasin, Bosch, and Clement teaches "*in response, determining, by the device discovery* [computer program], *whether the computational device is located within a predetermined area and/or zone of the vehicle* [Regions 1-4]."

[4c] applying, by the device discovery daemon, at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access the vehicle network and/or communication subsystem; and

505. Clement discloses that the vehicle control unit 320 makes a "determin[ation]" whether an instruction is "permitted" at task 880, (Clement, Ex. 1010, 10:55-57) as shown in Figure 8 (annotated in green below) which a POSA would have understood to be applying rules:

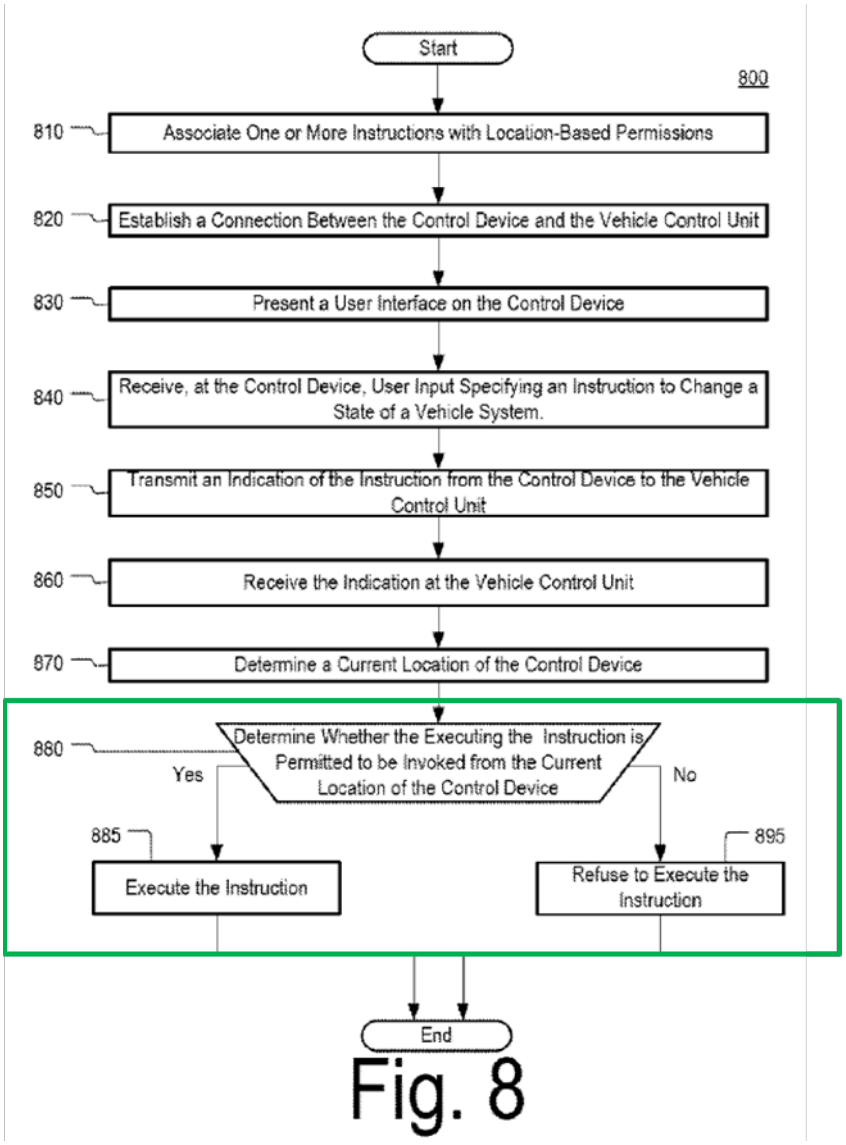


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

506. In my analysis I apply the proposed construction of the term "*access or attempt to access the vehicle network and/or communication subsystem*" as "access or attempt to access functionality of the vehicle network and/or communication subsystem." (*See* ¶¶ 86-89.)

507. It is therefore my understanding that claim [4c] should be interpreted

as "*when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access* [functionality of] *the vehicle network and/or communication subsystem*."

508. Clement discloses that the "vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230":

> The vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230. As discussed above, some instructions, such as steering the vehicle 101, may be invoked only when the control device 230 is located in the area of the driver seat 220a. Thus, before executing an instruction invoked using the control device 230, the vehicle control unit 320 may determine the current location of the control device 230 in the passenger compartment 210 and execute the instruction only if that instruction is permitted to be invoked from the control device's current location.

(Clement, Ex. 1010, 7:40-50.)

509. With reference to Figure 8, Clement discloses that "[a]t task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230" and if so "task 885 is executed" i.e., the vehicle control unit 320 "Execute[s] the Instruction":

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

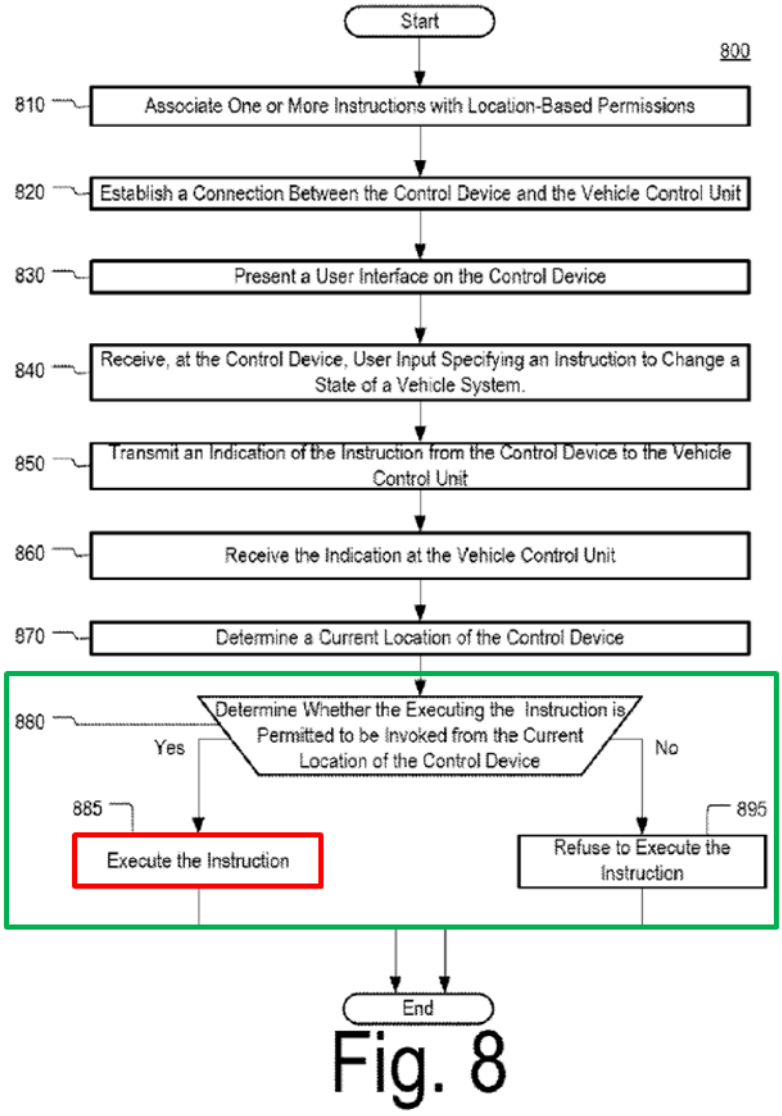


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

510. Clement discloses an example of such a task, e.g., "some instructions, such as steering the vehicle 101, may be invoked only when the control device 230 is located in the area of the driver seat 220*a*." (Clement, Ex. 1010, 7:42-45.) A POSA would have understood that the control device 230 connects to the vehicle network, through the vehicle control unit 320, to control the steering system 310b.

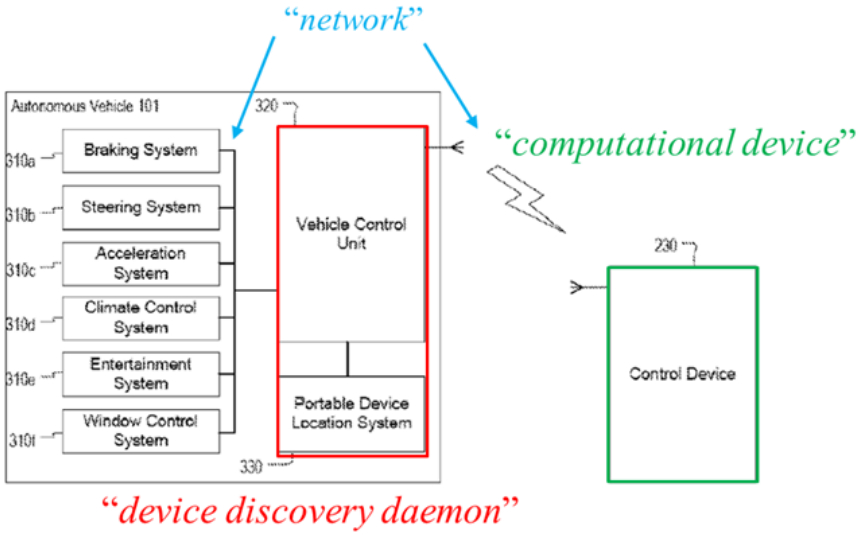


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

511. Clement also discloses that the user interface of control device 230 displays "buttons" 910*a-j* (mislabeled as 900*a-j* in the figures) that allow the user to control different aspects or features:

> As illustrated in FIG. 9A, the user interface 900A may provide buttons 910*a-j* that enable control over different aspects of the operation of the vehicle 101. For example, clicking on the button 910a may lead users to a menu that enables the steering, stopping, or acceleration of the vehicle 101.

(Clement, Ex. 1010, 9:55-60.)

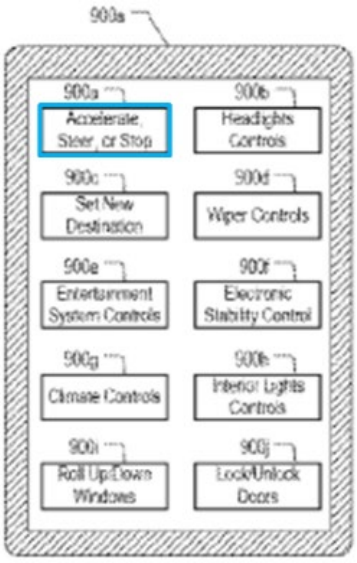


Fig. 9A

Clement, Ex. 1010, Fig. 9A (Annotated)

512. Clement also discloses varying the menu of available input components displayed on the user interface of control device 230 based on its location, e.g., only displaying "buttons" for safety-critical features like steering (annotated in blue above) if the control device 230 is located in the area of the driver seat, i.e., region 1:

> In some aspects, the user interface presented by the control device 230 may be varied in dependence upon the location of the control device 230 in the vehicle cab 210. For example, only if the control device 230 is located in region #1, the menu 900A may be displayed. By contrast, when the control device 230 is located in regions #2-3, the menu 900B may be displayed. As illustrated in this example, the interface 900A may include input components (e.g., buttons, text

> input field, sliders, check boxes, etc.) for safety-critical aspects of the operation of the vehicle 101, such as accelerating, **steering**, and braking, whereas the interface 900B may lack such input components for controlling safety-critical aspects of the operation of the vehicle 101.

(Clement, Ex. 1010, 10:14-26.)

513. Thus, the combination of Rasin, Bosch, and Clement teaches "*(c) applying, by the device discovery [computer program], at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle* [e.g., in the driver seat area of Region 1], *permitting the computational device to access or attempt to access [functionality of] the vehicle network and/or communication subsystem* [e.g., to control safety critical systems, e.g., the steering system]."

> ***[4d] (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle, not permitting the computational device to access or attempt to access the vehicle network and/or communication subsystem.***

514. In my analysis I apply the proposed construction of the term "*access or attempt to access the vehicle network and/or communication subsystem*" as "access or attempt to access functionality of the vehicle network and/or communication subsystem." (*See* ¶¶ 86-89.)

515. It is therefore my understanding that claim [4d] should be interpreted

as "*when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access [functionality of] the vehicle network and/or communication subsystem*."

516. Clement further discloses that "[a]t task 880" "if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed" and as illustrated in Figure 8 below, the vehicle control unit 320 "Refuse[s] to Execute the Instruction" at task 895.

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

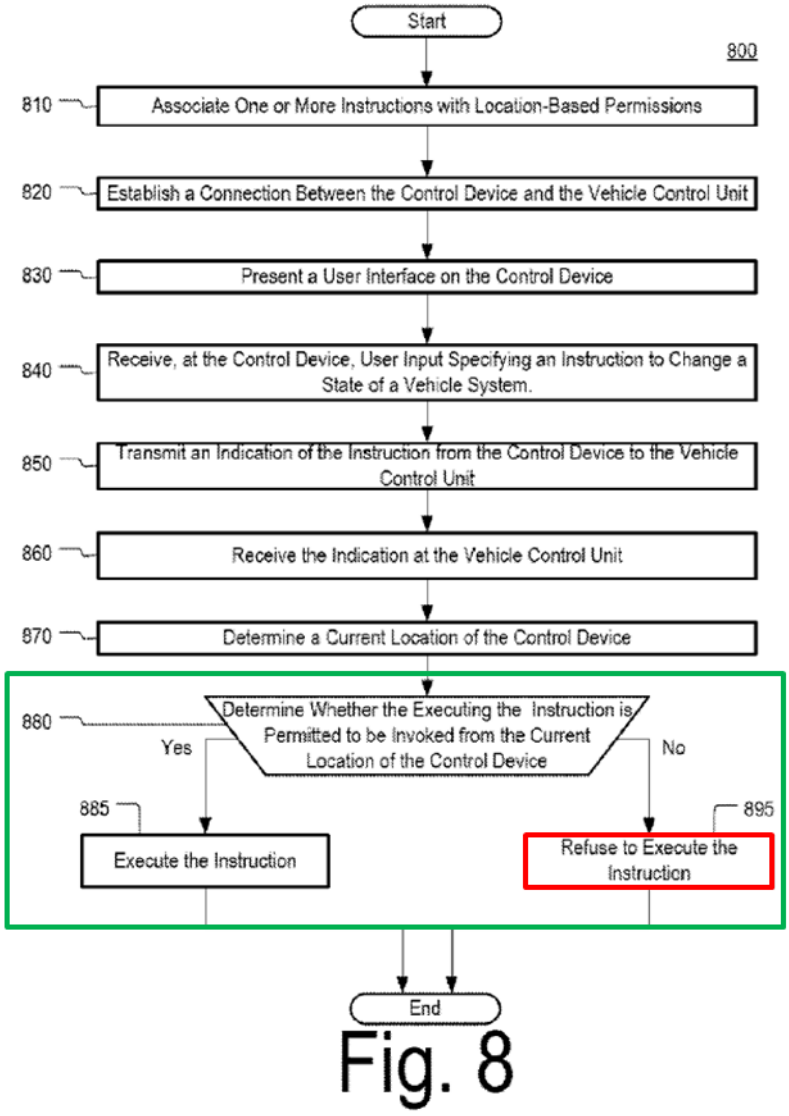


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

517. Clement discloses that "some instructions, such as steering the vehicle 101, may be invoked only when the control device 230 is located in the area of the driver seat 220*a*." (Clement, Ex. 1010, 7:42-45.) Steering button 900a is not displayed on the user interface 900b when the user is located in a passenger seat (Fig. 9B), however the steering button 900a (annotated in blue) is displayed on the

user interface 900a when the user is located in the driver seat (Fig. 9A), as illustrated by a comparison of Figures 9A and 9B below:

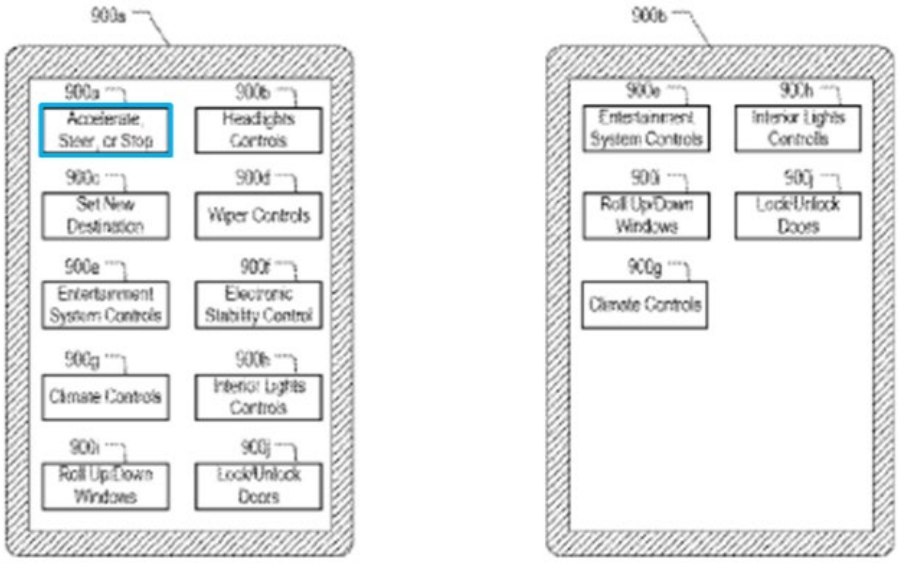


Fig. 9A Fig. 9B

Clement, Ex. 1010, Fig. 9A (Annotated) and Fig. 9B

518. Thus, the combination of Rasin, Bosch, and Clement teaches "*applying, by the device discovery [computer program], at least the following rules: . . . (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle* [e.g., not located in the driver seat area of Region 1], *not permitting the computational device to access or attempt to access* [functionality of] *the vehicle network and/or communication subsystem* [e.g., prevent control of safety critical systems, e.g., the steering system]."

b. Claim 5

519. Claim 5 depends from claim 4, which I understand means that claim 5

requires all of the limitations of claim 4 in addition to its additional limitations.

520. The combination of Rasin, Bosch, and Clement teaches all of the limitations of claim 4 as described above. (*See* ¶¶ 483-518.)

[5a] The method of claim 4, wherein a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality of predetermined areas and/or zones, to be used in applying the rules,

521. As I explained for claim [4b], the vehicle control unit 320 and location system 330 execute code to determine the location of the control device 230, e.g., using triangulation of the signal strength measurements. (Clement, Ex. 1010, 7:23-32.) Clement also discloses that the control device 230 may determine its own location:

> In other examples, the control device 230 may determine its location and communicate it to the vehicle control unit 230 [*sic* 320].

(Clement, Ex. 1010, 10:48-49.)

> FIG. 11 depicts a flowchart of a process 1100 that is associated with the operation of the control device 230. Tasks in the process 1100 may be performed by the control device 230 or by both the control device 230 and the vehicle control unit 320. At task 1110, the current location of the control device 230 within the passenger compartment 230 is determined. <u>As noted, the control device 230 may determine the current location by itself</u>, or alternatively, it may receive an indication of the current location from the vehicle control unit 230 [*sic*

> 320]. At task 1120, one of a plurality of user interfaces (or user interface components) is selected based on the location of the control device 230.

(Clement, Ex. 1010, 12:14-25.)

522. Clement further discloses that for such an embodiment, the vehicle may include transmitters instead of receivers, and "the control device 230 may triangulate signal strength measurements from those transmitters to independently determine its location within the passenger compartment 210":

> As discussed above, the current location of the control device 230 may be determined using the radio receivers 610*a-d*. In other examples, the control device 230 may determine its location and communicate it to the vehicle control unit 230 [*sic* 320]. For example, instead of the radio receivers 610*a-d*, transmitters may be positioned at various locations in the vehicle 101 and the control device 230 may triangulate signal strength measurements from those transmitters to independently determine its location within the passenger compartment 210.

(Clement, Ex. 1010, 10:46-54.)

523. As discussed above, Clement expressly teaches that transmitters can be included in the vehicle and have the control device 230 determine its own location. A POSA would have understood that this modification of shifting processing from the vehicle control unit 320 to the control device 230 is just a

simple substitution of one known element for another and can be accomplished to obtain predictable results, e.g., less power consumption by the vehicle system, because it will be performed only when the control device is in the vehicle.

524. Clement further discloses determining the location of control device 230 within a specific region of the passenger compartment:

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within **one or more regions in the passenger compartment 210** where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

525. Clement illustrates Regions 1-4 in Figure 6:

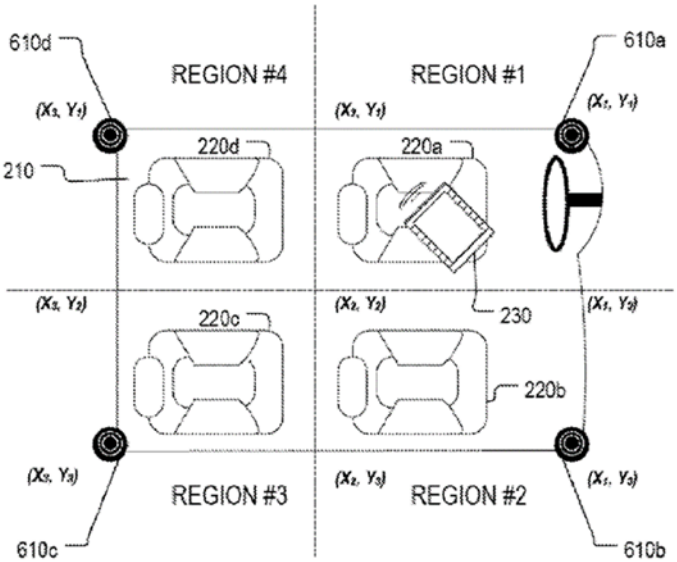


Fig. 6

Clement, Ex. 1010, Fig. 6

526. Thus, the combination of Rasin, Bosch, and Clement teaches "*a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality of predetermined areas and/or zones* [e.g., within Region 1 of Regions 1-4], *to be used in applying the rules*."

[5b] wherein the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant, and

527. Clement discloses that the control device ("*computational device*") could be a tablet computer, laptop, smart phone, and/or personal digital assistant:

> The control device 230 may be a tablet, a smart phone, a laptop, or another type of portable computing device.

(Clement, Ex. 1010, 6:9-10.)

528. Thus, the combination of Rasin, Bosch, and Clement teaches that the

"*the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant*."

[5c] wherein the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment.

529. Clement further discloses that the "*predetermined area and/or zone*" may include the passenger compartment 210 of the vehicle:

> As discussed above, the current location of the control device 230 may be determined using the radio receivers 610*a-d*. In other examples, the control device 230 may determine its location and communicate it to the vehicle control unit 230 [*sic* 320]. For example, instead of the radio receivers 610*a-d*, transmitters may be positioned at various locations in the vehicle 101 and the control device 230 may triangulate signal strength measurements from those transmitters to independently **determine its location within the passenger compartment 210.**

(Clement, Ex. 1010, 10:46-54.)

530. Clement further discloses determining the location of the control device within a specific region of the passenger compartment:

> The method further includes identifying a current location of the portable control device within a passenger compartment of the vehicle, and depending on the current location of the portable control device, performing one of the following tasks: executing the instruction when it is determined that the portable control device is

located in a first region in the passenger compartment of the vehicle, or refusing to execute the instruction when it is determined that the portable control device is located in a second region in the passenger compartment of the vehicle.

(Clement, Ex. 1010, 1:42-51.)

531. Clement illustrates Regions 1-4 in Figure 6:

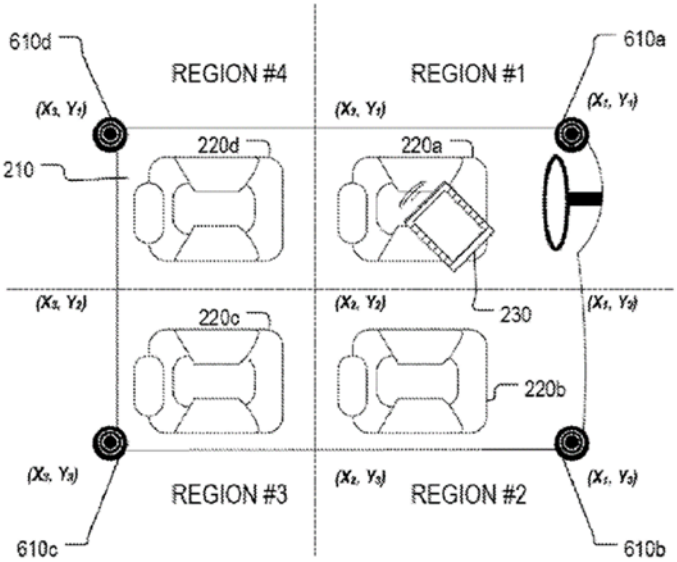


Fig. 6

Clement, Ex. 1010, Fig. 6

532. Clement further discloses permitting different functionality depending on the specific location of the control device within the passenger compartment, and a POSA would have understood that this teaching is also applicable to the embodiment in which the control device 230 determines its own location.

> The operational capabilities of the control device 230 may vary with the control device's location in the **passenger compartment 210**. If the control device 230, for example, is held by the driver occupying seat 220*a* as shown in FIG. 2, the portable device may be capable of steering or accelerating the vehicle 101. If, however, the portable device 230 is held by a passenger occupying the seat 220*b*, the portable device may be permitted to control the vehicle's entertainment system, but not steer or apply the brakes of the vehicle.

(Clement, Ex. 1010, 5:59-67.)

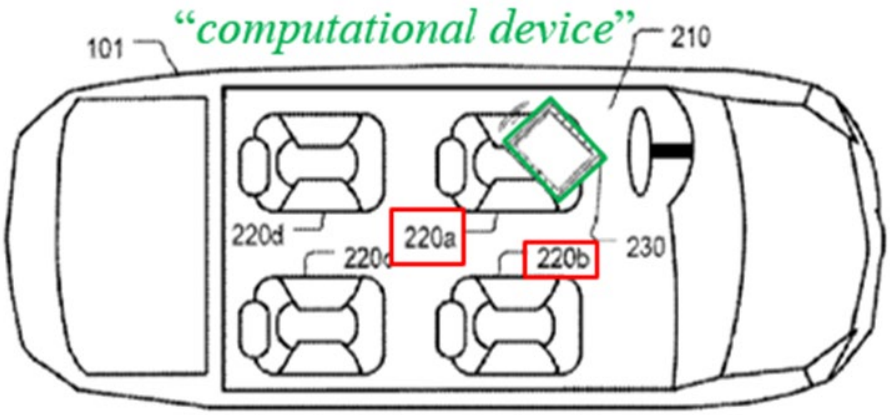


Fig. 2

Clement, Ex. 1010, Fig. 2 (Annotated)

533. Thus, the combination of Rasin, Bosch, and Clement teaches that "*the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment*."

c. Claim 7

534. Claim 7 depends from claim 4, which I understand means that claim 7 requires all of the limitations of claim 4 in addition to its additional limitations.

535. The combination of Rasin, Bosch, and Clement teaches all of the limitations of claim 4 as described above. (*See* ¶¶ 483-518.)

[7] The method of claim 4, wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

536. Claim [7] depends from claim 4, but claim 4 does not recite a

"*determining step (b)*". The reference to "*step(b)*" in claim 7 appears to be referring to the determining step of claim [4b]: "*determining, by the device discovery* [computer program]*, whether the computational device is located within a predetermined area and/or zone of the vehicle;*. . . ."

537. I understand that since claim 7 requires "*wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle* on one or more of . . . ." followed by a long list of localization options, a reference need only disclose one of the recited localization options to meet the claim.

538. Clement describes the method illustrated in Figure 8 as including a series of "tasks", e.g., "[a]t task 870, the vehicle control unit 320 determines the current location of the control device 230." (Clement, Ex. 1010, 10:37-38.) A POSA would have understood that a task and a step are synonymous terms used in describing a method.

539. Clement discloses determining the location of the control device 230 based on triangulating the radio signals:

> The radio receivers may measure the power of radio signals emitted by the control device 230 and triangulate the signals to determine the location of the control device 230.

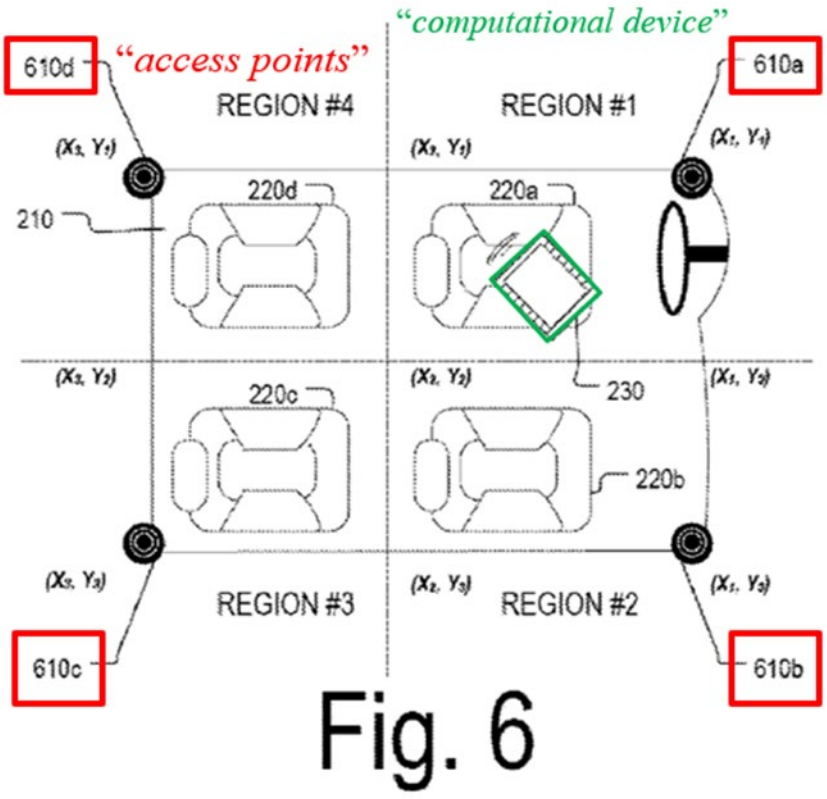
(Clement, Ex. 1010, 8:43-46.)

540. Clement discloses that the location system 330, which as described above may be incorporated with the vehicle control unit 320, ("*device discovery* [computer program]") determines the location of the control device 230 ("*computational device*") within the passenger compartment 210 of the vehicle using triangulation based on the strength of the radio signal(s) that are transmitted by the control device 230 and received by receivers 610*a-d* of the vehicle ("*multiple access points of the vehicle*"):

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes **receivers 610*a-d*** (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. **The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230**.

(Clement, Ex. 1010, 7:23-32.)

541. Clement illustrates Regions 1-4 of the passenger compartment 210 in Figure 6:



Clement, Ex. 1010, Fig. 6 (Annotated)

542. A POSA would have understood that Clement teaches determining the location of the portable control device within the vehicle using at least triangulation of the measurements of signal strength because the system includes multiple receivers positioned within the vehicle that take measurements of the radio signals transmitted by the control device 230 and the system can calculate and compare the signal strength values from the different receivers and sends those measurements to the vehicle control unit 320 to estimate the device's location; which is an established triangulation technique.

543. As I explained above in the rationale to combine, the combination of

Rasin, Bosch, and Clement includes Clement's vehicle control unit 320 with location system 330 and receivers 610*a-d*, providing the ability to perform triangulation to determine the location of a device.

544. Accordingly, the combination of Rasin, Bosch, and Clement teaches "*wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle* [e.g., Regions 1-4] *on* <u>*one or more*</u> *of. . . triangulation based on relative received signal strengths of a signal from the computational device* [control device 230] *as received by multiple access points* [radio receivers 610*a-d*] *of the vehicle . . .*"

d. Claim 8

545. Claim 8 depends from claim 7, which I understand means that claim 8 requires all of the limitations of claim 7 in addition to its additional limitations.

546. The combination of Rasin, Bosch, and Clement teaches all of the limitations of claim 7 as described above. (*See* ¶¶ 534-544.)

[8a] The method of claim 7, ~~wherein the~~ wherein the computational device determined to be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and

547. I understand the additional "*wherein the*" phrase at the beginning of claim [8a] to be a typographical error, so I have shown it with strikethrough text

above.

548. Claim [8a] is largely duplicative of claim [4c]. To illustrate, the table below shows a side-by-side comparison of claims [4c] and [8a].

'153 Patent Claim [4c]	**'153 Patent Claim [8a]**
[4c] applying, by the device discovery daemon, at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access the vehicle network and/or communication subsystem; and	**[8a]** The method of claim 7, ~~wherein the~~ wherein the computational device [ ] determined to be located within the predetermined area and/or zone of the vehicle and is permitted [ ] to access or attempt to access the vehicle network and/or communication subsystem and

549. Due to the similarities in the claims, I refer back to my analysis of this limitation in claim [4c] to establish that it is met by the combination of Rasin, Bosch, and Clement.

[8b] wherein the device discovery daemon determines a set of tasks, functions, and/or operations that can be performed and a set of

tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device.

550. Clement discloses that "[t]he vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230." (Clement, Ex. 1010, 7:40-42.) With reference to Figure 8, Clement discloses that:

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 [*sic* control device 230] is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67.)

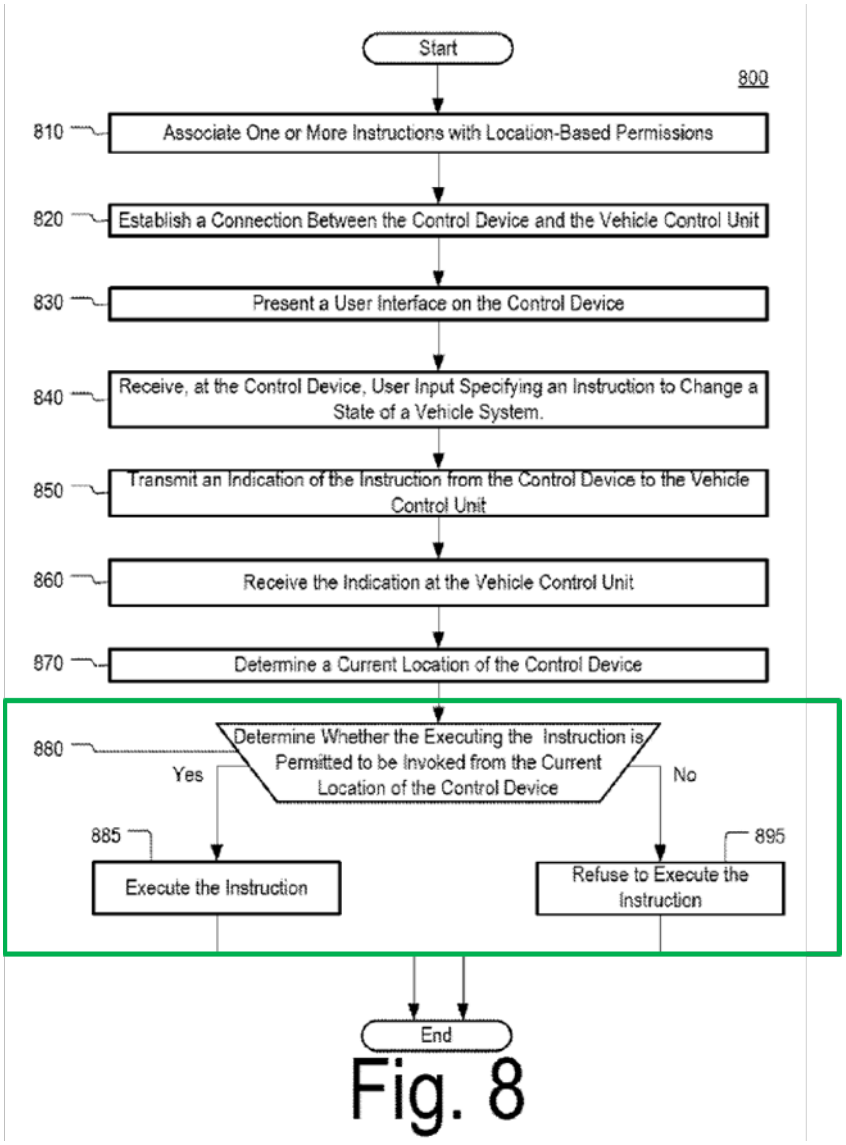


Fig. 8

Clement, Ex. 1010, Fig. 8 (Annotated)

551. For example, Clement discloses that if the control device 230 is located in a passenger seat of the vehicle, then the passenger will be able to control the vehicle entertainment system using the control device 230, but not "steer or apply the brakes of the vehicle":

> The operational capabilities of the control device 230 may vary with the control device's location in the passenger compartment 210. If the

> control device 230, for example, is held by the driver occupying seat 220*a* as shown in FIG. 2, the portable device may be capable of steering or accelerating the vehicle 101. If, however, the portable device 230 is held by a passenger occupying the seat 220*b*, the portable device may be permitted to control the vehicle's entertainment system, but not steer or apply the brakes of the vehicle.

(Clement, Ex. 1010, 5:59-67.)

552. Clement also discloses varying the menu of buttons corresponding to available input components ("*set of tasks . . . that can be performed*") displayed on the user interface of control device 230 based on its location, e.g., only displaying inputs for operations that are available based on the current location. For example, Figure 9B below depicts buttons for a set of available operations, e.g., entertainment system controls 900e, when the control device 230 is located in passenger Regions #2-3, but lacks buttons for controlling a set of safety-critical aspects of the operation of the vehicle 101 that are only available to the driver located in Region 1:

> In some aspects, the user interface presented by the control device 230 may be varied in dependence upon the location of the control device 230 in the vehicle cab 210. For example, only if the control device 230 is located in region #1, the menu 900A may be displayed. By contrast, when the control device 230 is located in regions #2-3, the menu 900B may be displayed. As illustrated in this example, the interface 900A may include input components (e.g., buttons, text

input field, sliders, check boxes, etc.) for safety-critical aspects of the operation of the vehicle 101, such as accelerating, steering, and braking, whereas the interface 900B may lack such input components for controlling safety-critical aspects of the operation of the vehicle 101.

(Clement, Ex. 1010, 10:14-26.)

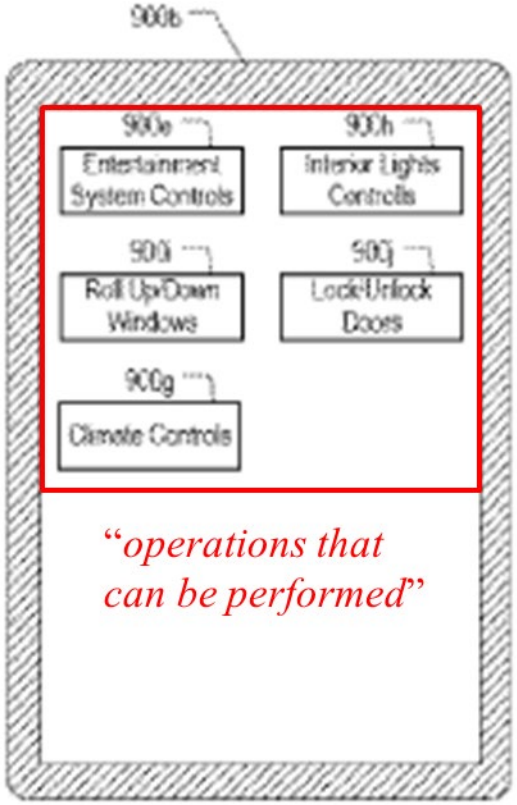


Fig. 9B

Clement, Ex. 1010, Fig. 9B (Annotated)

553. Thus, the combination of Rasin, Bosch, and Clement teaches "*wherein the computational device determined to be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the*

vehicle network and/or communication subsystem and wherein the device discovery [computer program] *determines a set of tasks, functions, and/or operations that can be performed* [e.g., input components displayed in menu 900B when the control device 230 is located in Regions #2-3] *and a set of tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device* [e.g., input components NOT displayed in menu 900B (e.g., steering and braking input components) when the control device 230 is located in Regions #2-3]."

e. Claim 9

554. Claim 9 depends from claim 7, which I understand means that claim 9 requires all of the limitations of claim 7 in addition to its additional limitations.

555. The combination of Rasin, Bosch, and Clement teaches all of the limitations of claim 7 as described above. (*See* ¶¶ 534-544.)

[9] The method of claim 7, wherein the device discovery daemon uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the

computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

556. I understand that since claim 9 requires "*wherein the device discovery* [computer program] *uses multiple of the one or more of . . .*" followed by a long list of localization options, a reference need only disclose two of the recited localization options to meet the claim.

557. As illustrated below, claim 9 includes the same list of localization options as claim 7.

'153 Patent Claim [7]	**'153 Patent Claim [9]**
[7] The method of claim 4, wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on	**[9]** The method of claim 7, wherein the device discovery daemon uses multiple of the

one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard	one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard

wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.	wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

558. As I explained above with reference to claim 7, Clement discloses determining the location of the control device ("*computational device*") based on triangulation.

559. Clement also discloses determining location of the control device 230 ("*computational device*") based on radio signal strength:

> The location of the portable control device may further be determined based on a radio signal transmitted by the portable control device.

(Clement, Ex. 1010, 3:13-15.)

> The location of the control device 230, as discussed, may be determined using radio receivers 610*a-d.*

(Clement, Ex. 1010, 8:42-43.)

560. Clement further discloses using a simple coordinate-based model to define a region:

> As illustrated in FIG. 5, the different regions of passenger compartment 210 may be represented as sets of coordinates. In one alternative example however, each region may be presented as a single coordinate and a radius.

(Clement, Ex. 1010, 8:47-50.)

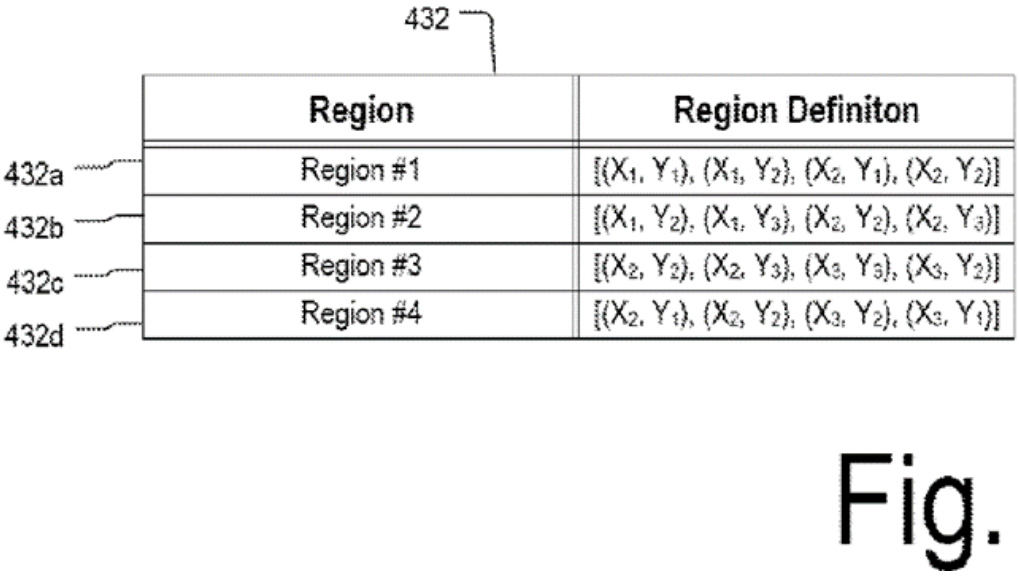


Fig. 5

Clement, Ex. 1010, Fig. 5

561. A POSA would have understood that Clement's disclosure that each region may be represented as a "single coordinate and a radius" (Clement, Ex. 1010, 8:47-50) to indicate a range of signal strength values, and thus a single

access point can be used to determine whether the device is located within that region, as this reflects a simplified method of localization.

562. Clement further discloses defining each region (i.e., Regions 1-4) using 4-tupples of signal strength ranges:

> As illustrated in FIG. 5, the different regions of passenger compartment 210 may be represented as sets of coordinates. . . .In another alternative example, however, regions #1-4 may be represented by 4-tupples of signal strength ranges (e.g., sets of signal strength ranges that are expected to be measured by each of the receivers 610*a-d* when the control device 230 is in a given region). Stated succinctly, the indications of regions of the logical partition structure 432 may include any type of information capable of being used to distinguish from one another different portions of the passenger compartment 210.

(Clement, Ex. 1010, 8:47-58.)

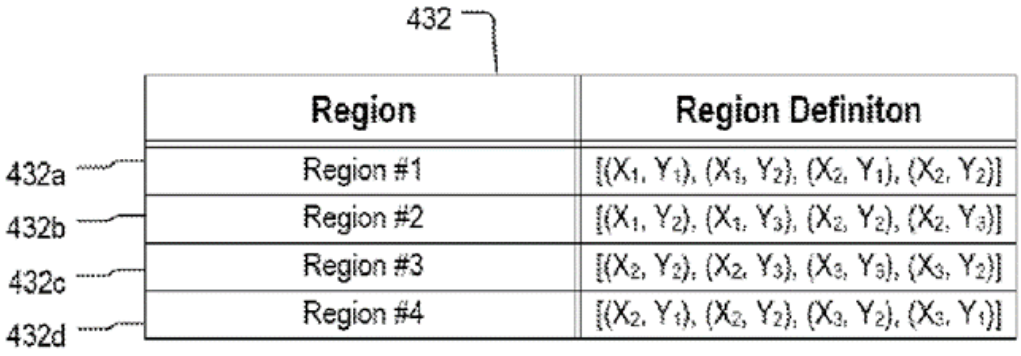
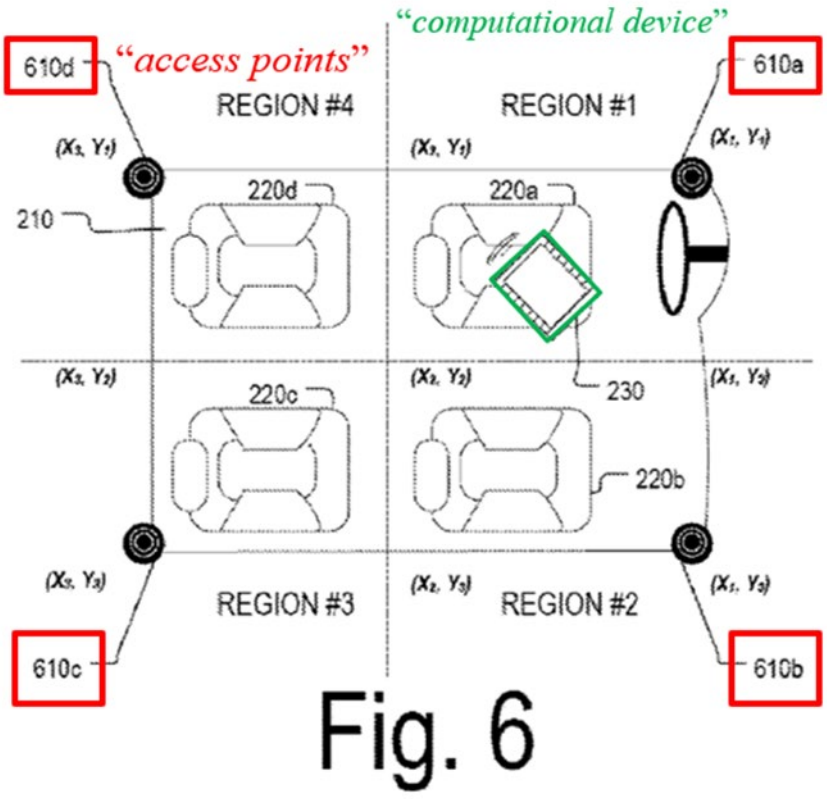


Fig. 5

Clement, Ex. 1010, Fig. 5

563. A POSA would have also understood that each of Clement's radio receivers 610*a-d* is an "*access point*" as each receiver 610*a-d* receives signals from the device for localization purposes.

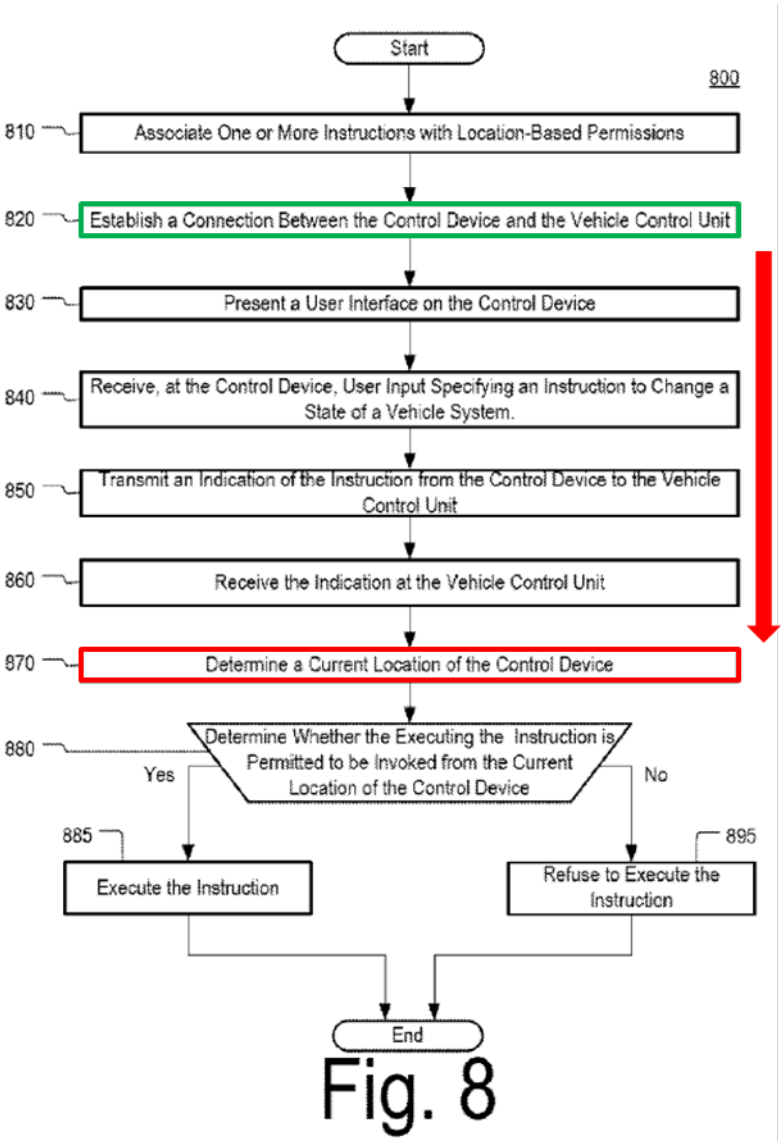


Clement, Ex. 1010, Fig. 6 (Annotated)

564. In regards to the 4-tupples approach, a POSA would have understood that if a transmitted signal can be received and measured by each of the receivers 610*a-d* at all four access points, this indicates that each receiver 610*a-d* is independently capable of detecting and measuring the signal strength of that same transmission. Thus, a POSA would have understood that a single receiver (i.e. a single access point) is used to measure the signal strength and signal strength information from four access points is used to determine the location of the control device.

565. A POSA would have understood that Clement's disclosure of

determining the location of the portable control device 230 based on a "radio signal" indicates determining location based on the signal strength of a radio signal from the portable control device as received by an access point of the vehicle because Clement describes using a receiver within the vehicle to measure the signals strength emitted by the control device and using the signal strength to determine the device's location; which is an approach consistent with well-known methods of using RSSI for localization.



Clement, Ex. 1010, Fig. 8 (Annotated)

566. Therefore, the combination of Rasin, Bosch, and Clement teaches "*wherein the device discovery* [computer program] *uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the vehicle* [e.g., as a single coordinate and a radius or as sets of signal strength ranges that are measured by each receiver 610*a-d* and represented

as a 4-tupple of signal strength ranges] , . . . [and] *triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle* [as explained for claim 7]."

f. Claim 10

567. Claim 10 depends from claim 9, which I understand means that claim 10 requires all of the limitations of claim 9 in addition to its additional limitations.

568. The combination of Rasin, Bosch, and Clement teaches all of the limitations of claim 9 as described above. (*See* ¶¶ 554-566.)

[10] The method of claim 9, wherein the device discovery daemon determines a level of confidence that the computational device is located within the predetermined area and/or zone and wherein the device discovery daemon determines that the computational device is located within the predetermined area and/or zone when the level of confidence has at least a threshold value.

569. Clement discloses that "[t]he receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the signal strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230." (Clement, Ex. 1010, 7:28-32.)

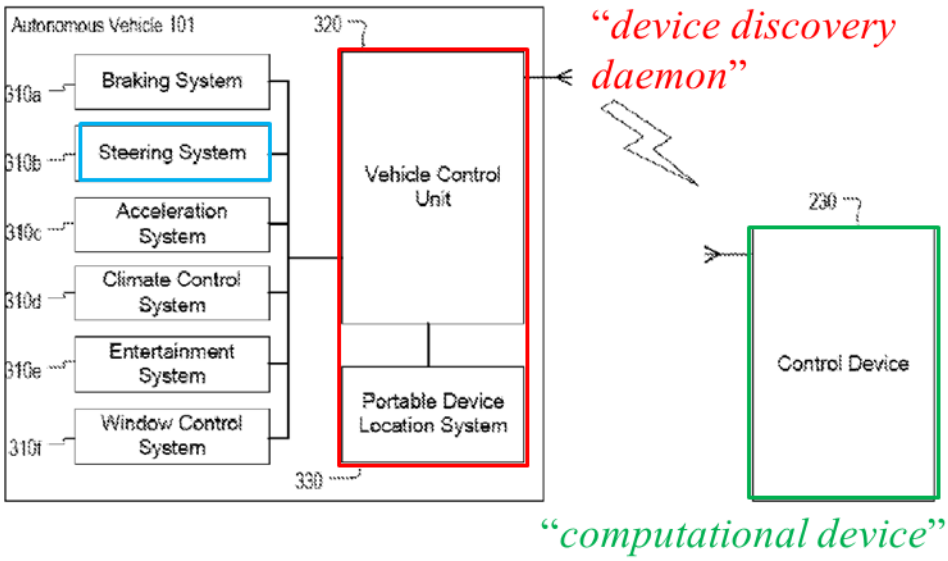


Fig. 3

Clement, Ex. 1010, Fig. 3 (Annotated)

570. Clement further discloses that the passenger compartment 210 may be divided into regions, where each region is associated with a particular signal strength range. The vehicle control unit 320 measures the signal strength transmitted by the control device 230 and determines the location of control device 230 by where in the range the measured signal strength falls:

> As illustrated in FIG. 6, region #1 is collocated with the driver seat 220*a*, region #2 is collocated with the front passenger seat 220*b*, and regions #3 and #4 are collocated with the rear passenger seats 220*c-d*. The location of the control device 230, as discussed, may be determined using radio receivers 610*a-d*. The radio receivers may measure the power of radio signals emitted by the control device 230

and triangulate the signals to determine the location of the control device 230.

As illustrated in Figure 5, the different regions of passenger compartment 210 may be represented as sets of coordinates. In one alternative example however, each region may be presented as a single coordinate and a radius. In another alternative example, however, regions #1-4 may be represented by **4-tupples** of signal strength ranges (e.g., sets of signal strength ranges that are expected to be measured by each of the receivers 610*a-d* when the control device 230 is in a given region).

(Clement, Ex. 1010, 8:38-55.)

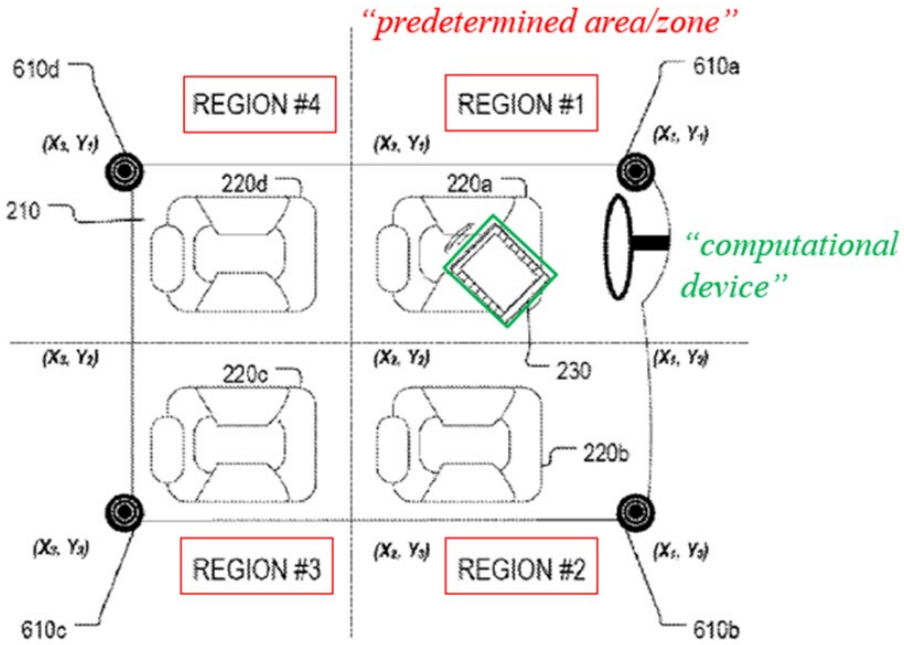


Fig. 6

Clement, Ex. 1010, Fig. 6 (Annotated)

571. Clement further discloses:

> Stated succinctly, the indications of regions of the logical partition structure 432 may include any type of information capable of being used to distinguish from one another different portions of the passenger compartment 210.

(Clement, Ex. 1010, 8:55-58.)

572. A POSA would have understood that the 4-tupple structure disclosed in Clement reflects a "*level of confidence*" in determining the location of the portable control device 230. Each 4-tupple represents a set of expected signal strength ranges corresponding to the receivers positioned within the vehicle, with each set associated with a specific region, and the limits of each range representing a "*threshold*." When the system receives signal strength measurements from the receivers, it compares those values to the expected or predefined signal strength measurements for each region. The degree to which the measured values match a given 4-tupple determines the level of confidence with which the system can identify the device's location. Generally, the closer the measured signal is to the middle of the range for a given region, the more likely it is that the device is located in that region, supporting a high-confidence determination. The farther away the measured signal is from the middle of the range (but still within the range), the less likely it is that the device is located in that region, indicating a low-confidence determination. A POSA would have understood that the structure and use of the 4-tupples teaches a signal-based framework through which a relative

level of confidence in location estimation can be derived.

573. A POSA would have also understood that Clement's use of 4-tupples indicates the use of a threshold value to determine whether the measured signal strengths match a given region. Each signal strength range defines upper and lower bounds, i.e., "*thresholds*" and the system determines whether the received signal measurement falls within those bounds. A POSA would have understood that this process involves comparing the measured values against these predetermined threshold values to assess whether a receiver's signal is strong enough, or weak enough, to be consistent with a specific region's profile.

574. Therefore, the combination of Rasin, Bosch, and Clement teaches "*wherein the device discovery* [computer program] *determines a level of confidence that the computational device is located within the predetermined area and/or zone and wherein the device discovery* [computer program] *determines that the computational device is located within the predetermined area and/or zone when the level of confidence has at least a threshold value* [e.g., when the measured value is within the predetermined range]."

3. Dependent Claims 15-16, 18-21

a. Claim 15

[15a] The vehicle of claim 12, wherein the device discovery daemon is further configured to: determine that a computational device is

connected to or attempting to connect to a network and/or communication subsystem of a vehicle;

[15b] in response, determine whether the computational device is located within a predetermined area and/or zone of the vehicle; and

[15c] apply at least the following rules: (C1) when the computational device is located within the predetermined area and/or zone of the vehicle, permit the computational device to access or attempt to access the vehicle network and/or communication subsystem; and

[15d] (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle, not permit the computational device to access or attempt to access the vehicle network and/or communication subsystem.

575. Claim 15 depends from claim 12, which I understand means that claim 15 requires all the limitations of claim 12 in addition to its own limitations. The combination of Rasin and Bosch teaches all of the limitations of claim 12 as described above. (*See* ¶¶ 454-463.)

576. Claim limitations [15a]-[15d] are largely duplicative of claim limitations [4a]-[4d]. To illustrate, the table below shows a side-by-side comparison of claims 4 and 15. Claim 15 is "marked up" to show the minor differences.

’153 Patent Claim 4	’153 Patent Claim 15
[4a] The method of claim 1, further comprising: determining, by the microprocessor executable device discovery daemon,	**[15a]** The vehicle of claim 12, wherein the device discovery daemon is further configured to: determine
that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle;	that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle;
[4b] in response, determining, by the device discovery daemon, whether the computational device is located within a predetermined area and/or zone of the vehicle; and	**[15b]** in response, determine [ ] whether the computational device is located within a predetermined area and/or zone of the vehicle; and
[4c] applying, by the device discovery daemon, at least the following rules: (C1)	**[15c]** apply [ ] at least the following rules: (C1)

when the computational device is located within the predetermined area and/or zone of the vehicle, permitting the computational device to access or attempt to access the vehicle network and/or communication subsystem; and	when the computational device is located within the predetermined area and/or zone of the vehicle, permit the computational device to access or attempt to access the vehicle network and/or communication subsystem; and
[4d] (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle, not permitting the computational device to access or attempt to access the vehicle network and/or communication subsystem.	**[15d]** (C2) when the computational device is not located within the predetermined area and/or zone of the vehicle, not permit the computational device to access or attempt to access the vehicle network and/or communication subsystem.

577. As the differences between claims 4 and 15 are not substantial and do not change the meaning of the claim, I refer back to my analysis of claim 4 to establish that these limitations are met by the combination of Rasin, Bosch, and Clement.

b. Claim 16

[16a] The vehicle of claim 15, wherein a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality of predetermined areas and/or zones, to be used in applying the rules,

[16b] wherein the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant, and

[16c] wherein the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment.

578. Claim 16 depends from claim 15, therefore I understand that claim 16 includes all of the limitations of claim 15, in addition to the limitations of claim 12.

579. Claim limitations [16a]-[16c] are largely duplicative of claim limitations [5a]-[5c]. To illustrate, the table below shows a side-by-side comparison of claims 5 and 16. Claim 16 is "marked up" to show the minor differences.

'153 Patent Claim 5	**'153 Patent Claim 16**
[5a] The method of claim 4, wherein a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality	**[16a]** The vehicle of claim 15, wherein a type of the computational device determines a specific predetermined area and/or zone of the vehicle, from among a plurality

of predetermined areas and/or zones, to be used in applying the rules,	of predetermined areas and/or zones, to be used in applying the rules,
[5b] wherein the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant, and	**[16b]** wherein the computational device is one or more of a tablet computer, laptop, smart phone, and personal digital assistant, and
[5c] wherein the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment.	**[16c]** wherein the specific predetermined area and/or zone of the vehicle is at least part of the passenger compartment.

580. As the differences between claims 5 and 16 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 5 to establish that these limitations are met by the combination of Rasin, Bosch, and Clement.

c. Claim 18

[18] The vehicle of claim 15, wherein the determining step (b) bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on one or more of signal strength of a signal from the computational device as

received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

581. Claim 18 depends from claim 15, therefore I understand that claim 18 includes all of the limitations of claim 15, in addition to the limitations of claim 12.

582. Claim 18 is largely duplicative of claim 7. To illustrate, the table below shows a side-by-side comparison of claims 7 and 18. Claim 18 is "marked up" to show the minor differences.

'153 Patent Claim 7	**'153 Patent Claim 18**
[7] The method of claim 4,	**[18]** The vehicle of claim 15,
wherein the determining step (b)	wherein the determining step (b)

bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the	bases the determination on whether the computational device is located within the predetermined area and/or zone of the vehicle on one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the

computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.	computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

583. As the differences between claims 7 and 18 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 7 to establish that these limitations are met by the combination of Rasin, Bosch, and Clement.

d. Claim 19

[19a] The vehicle of claim 15, wherein the wherein the computational device determined to be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and

[19b] wherein the device discovery daemon determines a set of tasks, functions, and/or operations that can be performed and a set of tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device.

584. Claim 19 depends from claim 15, therefore I understand that claim 19 includes all the limitations of claim 15, in addition to the limitations of claim 12. (*See* ¶¶ 454-463, 575-577.)

585. Claim limitations [19a] and [19b] are largely duplicative of claim limitations [8a] and [8b]. To illustrate, the table below shows a side-by-side comparison of claims 8 and 19. Claim 19 is "marked up" to show the minor differences.

'153 Patent Claim 8	**'153 Patent Claim 19**
[8a] The method of claim 7, wherein the wherein the computational device determined to	**[19a]** The vehicle of claim 15, wherein the wherein the computational device determined to

be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and	be located within the predetermined area and/or zone of the vehicle and is permitted to access or attempt to access the vehicle network and/or communication subsystem and
[8b] wherein the device discovery daemon determines a set of tasks, functions, and/or operations that can be performed and a set of tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device.	**[19b]** wherein the device discovery daemon determines a set of tasks, functions, and/or operations that can be performed and a set of tasks, functions, and/or operations that cannot be performed based on the determined location of the computational device.

586. As the differences between claims 8 and 19 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 8 to establish that these limitations are met by the combination of Rasin, Bosch, and Clement.

e. Claim 20

[20] The vehicle of claim 15, wherein the device discovery daemon uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

587. Claim 20 depends from claim 15, therefore I understand that claim 20 includes all of the limitations of claim 15, in addition to the limitations of claim 12. (*See* ¶¶ 454-463, 575-577.)

588. Claim 20 is largely duplicative of claim 9. To illustrate, the table below shows a side-by-side comparison of claims 9 and 20. Claim 20 is "marked up" to show the minor differences.

’153 Patent Claim 9	’153 Patent Claim 20
[9] The method of claim 7,	**[20]** The vehicle of claim 15,
wherein the device discovery daemon uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the	wherein the device discovery daemon uses multiple of the one or more of signal strength of a signal from the computational device as received by an access point of the vehicle, a received satellite-based position of the computational device, triangulation based on relative received signal strengths of a signal from the computational device as received by multiple access points of the vehicle, image processing of images of the predetermined area and/or zone, occupant presence and/or location information received by an on board vehicle sensor, whether the

computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.	computational device is attempting to connect to the network and/or communication subsystem wirelessly or by hard wire connection, whether the computational device has moved relative to a selected access point during a defined time interval, whether the received signal strength of signaling from the computational device at a selected access point varies temporally, a type or service of the computational device, and input received from a user of the computational device.

589. As the differences between claims 9 and 20 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 9 to establish that these limitations are met by the combination of Rasin, Bosch, and Clement.

f. Claim 21

[21] The vehicle of claim 20, wherein the device discovery daemon determines a level of confidence that the computational device is located within the predetermined area and/or zone and wherein the device discovery daemon determines that the computational device is located within the predetermined area and/or zone when the level of confidence has at least a threshold value.

590. Claim 21 depends from claim 20, therefore I understand that claim 21 includes all of the limitations of claim 20, in addition to the limitations of claim 15 and claim 12. (*See* ¶¶ 454-463, 575-577, 587-589.)

591. Claim 21 is largely duplicative of claim 10. To illustrate, the table below shows a side-by-side comparison of claims 10 and 21. Claim 21 is "marked up" to show the minor differences.

'153 Patent Claim 10	**'153 Patent Claim 21**
[7] The method of claim 9,	**[21]** The vehicle of claim 20,
wherein the device discovery daemon determines a level of confidence that the computational device is located within the predetermined area and/or zone and	wherein the device discovery daemon determines a level of confidence that the computational device is located within the predetermined area and/or zone and

wherein the device discovery daemon determines that the computational device is located within the predetermined area and/or zone when the level of confidence has at least a threshold value.	wherein the device discovery daemon determines that the computational device is located within the predetermined area and/or zone when the level of confidence has at least a threshold value.

592. As the differences between claims 10 and 21 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 10 to establish that these limitations are met by the combination of Rasin, Bosch, and Clement.

E. Ground 5 – The Combination of Rasin, Bosch, and Ghabra Teaches all of the Limitations of Claims 2 and 13

1. Rationale to Combine

593. It would have been obvious to a POSA at the time of the invention to combine the vehicle user interface system disclosed in the combination of Rasin and Bosch with the known technique of device discovery and positioning (localization) as disclosed in Ghabra to provide additional functionality and user convenience improvements, such as passive control, increased vehicle

communication responsiveness, and conservation of battery life. A POSA would have understood that Rasin, Bosch, and Ghabra are complementary technologies that are combinable, for example, Rasin discloses that:

> As required, detailed embodiments of the present invention are disclosed herein. However, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale, and some features may be exaggerated or minimized to show details of particular proponents. Therefore, specific functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for the claims and/or as a representative basis for teaching one skilled in the art to variously employ in the present invention.

(Rasin, Ex. 1015, 2:16-26.)

> While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

(Rasin, Ex. 1015, 5:24-28.)

a. Analogous Art

594. Rasin, Bosch, and Ghabra are from the same field – communication between a vehicle system and one or more electronic devices:

> The present invention relates generally to a user interface system for a vehicle that enables access to an electronic device.

(Rasin, Ex. 1015, 1:5-7.)

> Various sound and information sources, and communication installations can form a common mobile driver-information system consisting of radio, cassette player, CD player, phone, navigation and traffic telematics equipment, and even computer, video player, and TV.

(Bosch, Ex. 1050, p. 1118.)

> The present invention relates in general to remote convenience and security systems for automotive vehicles, and, more specifically, to a wireless communication system for integrating functions of a two-way remote keyless entry system and a passive entry system.

(Ghabra, Ex. 1011, 1:16-20.)

b. Motivation to Combine

595. Rasin discloses a vehicle user interface system for discovering services on connected devices, transforming service data into a standardized format, and presenting it to the user:

> The present invention relates generally to a user interface system for a vehicle that enables access to an electronic device.

(Rasin, Ex. 1015, 1:5-7.)

> Referring to FIG. 2, a block diagram of user interface system 16 in communication with electronic device 12 is illustrated. As shown,

> device 12 communicates with user interface system 16 in a manner so as to enable a user to access available services. User interface system 16 is capable of accessing the services available through device 12 by receiving and processing data sets from device 12. In the illustrated embodiment, user interface system 16 includes user interface module 19, a networking gateway 24, and a data transformation agent 32.

(Rasin, Ex. 1015, 3:18-27.)

> Data transformation agent 32 may be embodied as a software program or data set containing a set of predetermined rules by which received data sets are processed. Accordingly, a constraints data set 34 may contain a plurality of constraints by which these rules are based. In one embodiment, the rules by which data sets are processed are implemented in an XML based vehicle constraints markup language (VCML). These constraints may be used to control the appearance of information displayed by the user interface system display unit (FIG. 1) and ensure that proper functionality and service behavior by user interface system 16 occurs.

(Rasin, Ex. 1015, 3:65-4:8.)

596. However, the Rasin/Bosch combination does not disclose an event-based system for initiating discovery or communication with external devices.

(1) Passive Control

597. Ghabra discloses a vehicle system that determines the location of a key fob ("localizing a fob") for passive entry and passive start vehicle functionality:

> [A] first preferred embodiment for **localizing a fob** in a passive entry sequence wherein it is desired to determine whether the fob is outside the vehicle in the vicinity of a particular door (i.e., when a door unlock request is initiated by a trigger signal from the lifting of a door handle) or inside the vehicle (i.e., a passive engine start sequence is triggered by a user pressing an engine start switch inside the vehicle).

(Ghabra, Ex. 1011, 4:57-63.)

598. Early vehicles required manual actuation of a key to enter and start a vehicle, i.e., by inserting the key into a lock or ignition switch.

599. Ghabra discloses prior art remote-keyless entry (RKE) systems that require manual actuation of a button on a key fob, and recognizes that such manual actuation is disadvantageous:

> Typical RKE systems utilize a key fob with a radiofrequency (RF) transmitter which transmits to a base station in the vehicle. When the user is within range, the user actuates a corresponding button on the key fob to send a lock, unlock, or engine start command[.]

(Ghabra, Ex. 1011, 1:28-32.)

> One disadvantage of this type of system is that the user must manually actuate the key fob to achieve the desired results. In an attempt to eliminate this disadvantage, passive entry systems, which operate in a hands-free manner, are being introduced. In order to avoid excessive battery consumption by periodic radio transmission from the fob, the approach of the user to the vehicle is usually sensed by the vehicle,

> which then wakes up the fob to perform a security check before actuating a passive entry function.

(Ghabra, Ex. 1011, 1:40-46.)

600. Such prior art passive entry systems typically operated in the background and discovered the fob so that it can sense the user's approach to the vehicle. (*See* ¶ 114.)

601. Ghabra discloses a passive entry sequence, and a passive engine start sequence:

> [A] first preferred embodiment for localizing a fob in a passive entry sequence wherein it is desired to determine whether the fob is outside the vehicle in the vicinity of a particular door (i.e., when a door unlock request is initiated by a trigger signal from the lifting of a door handle) or inside the vehicle (i.e., a passive engine start sequence is triggered by a user pressing an engine start switch inside the vehicle).

(Ghabra, Ex. 1011, 4:57-63.)

602. Ghabra discloses that the "passive entry system[], [] operate[s] in a hands-free manner." (Ghabra, Ex. 1011, 1:42-43.) Ghabra further discloses that a passive entry system "has [the] advantages of added convenience, [and] faster response times," each of which is an improvement over the vehicle user interface system disclosed in Rasin. (Ghabra, Ex. 1011, 2:13-14.)

603. A POSA at the time of the alleged invention would have been

motivated to combine the vehicle user interface system disclosed in the Rasin/Bosch combination with the passive entry and passive start systems disclosed in Ghabra to expand the functionality of the electronic device outside the vehicle and be able to interact with their vehicle in a "hands-free" manner, thereby eliminating the need for manual actuation for certain functionality, like entering and starting the vehicle. Removing the need for manual actuation provides users with the additional ease and convenience of interacting with their vehicle, which is a clear benefit and improvement over the Rasin/Bosch disclosure alone.

604. A POSA would have understood that the combination of Rasin, Bosch, and Ghabra would allow a user to keep their portable device in their pocket/bag and would not have to take it out to unlock the vehicle door or start the vehicle, thereby increasing user convenience.

(2) Improved Security with Faster Response Time

605. The addition of Ghabra's passive entry system to the Rasin/Bosch vehicle user interface system also provides the added benefit of improved security with faster response time. Prior art passive entry systems were susceptible to thieves intercepting wireless communication in "relay attacks." (Ghabra, Ex. 1011, 1:64-67.) Ghabra's system provides improved security, e.g., "resistance to relay attacks" with faster response time by authenticating or authorizing a fob

before allowing it to access the vehicle network by using unique identifier numbers or security codes sent using an ultra high frequency (UHF) signal. (Ghabra, Ex, 1011, 3:57-67, 4:8-29, 4:30-40, 6:55-58.)

606. Ghabra discloses that determining whether a fob is authorized or not is based on unique identifier numbers or security codes. Ghabra explains that after the LF wakeup signal is sent, "RF transmitter 16 in base station 11 is used to broadcast a UHF challenge signal including [a] random number [to fob 12]." (Ghabra, Ex. 1011, 4:8-29.) Ghabra further explains that the fob 12 "passe[d] the random number through [a] known mathematical transformation. The resulting transformed number is included in [the] response data" sent back to the vehicle. (Ghabra, Ex. 1011, 4:8-29.) Then, the "microcontroller 13 checks the transformed number as received from the fob 12 with its own results of the transformation and determines the UHF response signal to be valid if the transformed numbers match." (Ghabra, Ex. 1011, 4:8-29.)

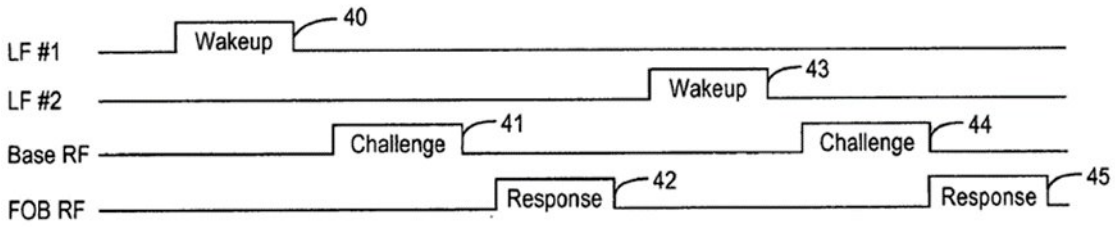


FIG.2

Ghabra, Ex. 1011, Fig. 2

607. "The UHF challenge and response signals are sent with a much

shorter time delay than if they were sent at the low frequency" which reduces the time delay in authenticating a fob common with prior art systems utilizing LF signals. (Ghabra, Ex. 1011, 4:19-21, *see also* 2:4-9.)

(3) Conservation of Battery Life

608. Ghabra also discloses that by sending a wakeup signal in response to a trigger event, its passive entry system aids in "avoid[ing] excessive battery consumption by periodic radio transmission from the fob, [where] the approach of the user to the vehicle is usually sensed by the vehicle, which then wakes up the fob to perform a security check before actuating a passive entry function." (Ghabra, Ex. 1011, 1:44-48.) Further, "[p]assive entry communication operates over a much shorter range than RKE communication," therefore, "an LF signal . . . is used for passive entry while a much higher frequency RF signal . . . is used for RKE." (Ghabra, Ex. 1011, 1:54-58.)

c. A POSA Would Have Understood how to Combine the Combination of Rasin and Bosch with Ghabra

609. A POSA would have understood how to combine Rasin, Bosch and Ghabra with a reasonable expectation of success. In terms of hardware modifications, a POSA would have modified the Rasin/Bosch vehicle user interface system to include at least one LF transmitter and LF antenna to enable wake-up signaling and zone-specific localization, as used in Ghabra's passive

entry/passive start system. A POSA would have further modified the Rasin/Bosch vehicle user interface system to include at least one RF (or UHF) receiver and transmitter to enable the two-way communication model utilized in Ghabra.

610. Ghabra discloses that the fob includes an LF receiver and LF antenna:

> An LF receiver 37 is coupled to microcontroller 30 and to an LF antenna 38 for detecting wakeup signals broadcast from vehicle 10.

(Ghabra, Ex. 1011, 3:43-45.)

611. Ghabra discloses that the base station 11 of the vehicle 10 includes "a microcontroller 13 coupled to an LF transmitter 14, an RF receiver 15, and an RF transmitter 16." (Ghabra, Ex. 1011, 2:63-67.) Ghabra further discloses that the LF transmitter 14 "may also use a plurality of LF antennas at respective locations within the vehicle such as an LF antenna 20 deployed in base station 11 . . . . " (Ghabra, Ex. 1011, 3:5-10.)

612. Ghabra further discloses communication using an RF receiver and transmitter:

> Referring to FIG. 1, a vehicle 10 includes a base station or vehicle communication module 11 for communicating with a remote portable fob 12. Base station 11 includes a microcontroller 13 coupled to an LF transmitter 14, an RF receiver 15, and an RF transmitter 16.

(Ghabra, Ex. 1011, 2:63-67.)

613. Ghabra further discloses that the "RF transmitter 16 in base station 11

is used [to] broadcast a UHF challenge signal . . . .” (Ghabra, Ex. 1011, 4:11-12.) “The UHF challenge and response signals are sent with a much shorter time delay than if they were sent at the low frequency” which reduces the time delay in authenticating a fob common with prior art systems utilizing LF signals. (Ghabra, Ex. 1011, 4:19-21; *see also* 2:4-9.)

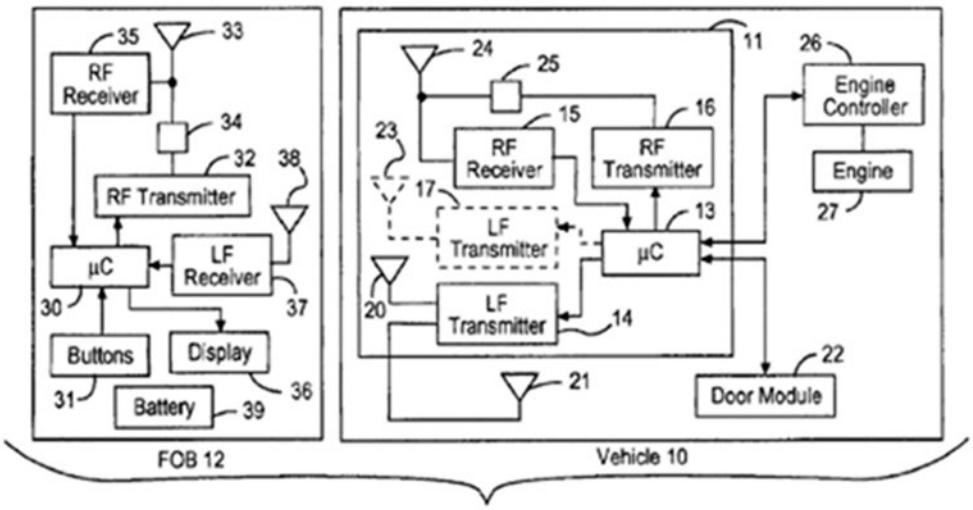


FIG.1

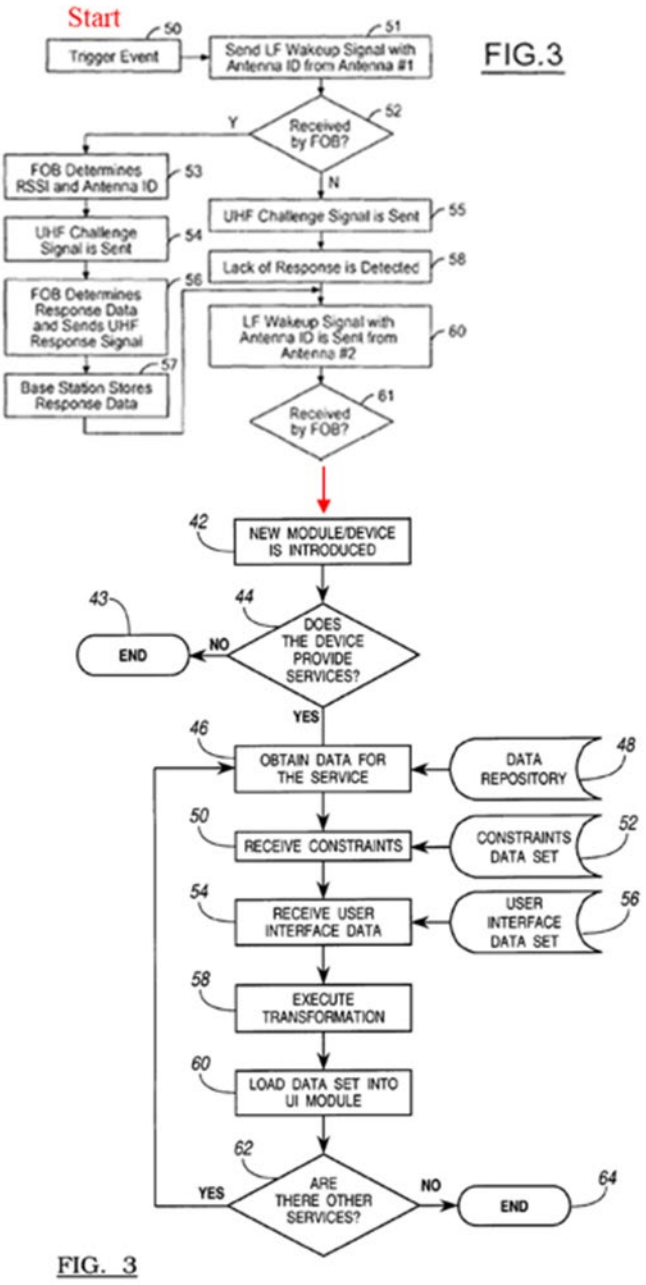
Ghabra, Ex. 1011, Fig. 1

614. The combination of Rasin, Bosch, and Ghabra also includes the addition of sensors that provide a trigger signal in response to a trigger event, e.g., lifting a door handle or pressing an engine start switch, such as those disclosed by Ghabra. (Ghabra, Ex. 1011, 3:10-15, 4:57-63, 5:22-24.)

615. A POSA would have been motivated to combine Ghabra’s additional receivers, transmitters, and vehicle sensors with Rasin’s vehicle user interface system to yield predictable results, e.g., two-way communication and trigger signal

generation to facilitate passive entry and passive start functionality.

616. Regarding software, a POSA would have been motivated to modify the Rasin/Bosch vehicle user interface system to include Ghabra's device discovery technique in response to a triggering event as shown in the image below:



Rasin, Ex. 1015, Fig. 3 (Annotated); Ghabra, Ex. 1011, Fig. 3 (Annotated)

617. These modifications would have been a straightforward and well-known combination of known elements in the prior art, e.g., door sensors and engine start buttons/sensors and corresponding software, yielding the predictable

result of determining whether a new device signal was received by the vehicle user interface system.

618. Accordingly, a POSA would have been motivated to modify the Rasin/Bosch combination to include Ghabra's device discovery technique. This modification would have been a simple combination of known elements in the prior art, e.g., Ghabra's vehicle sensors for providing a trigger signal in response to door handle and start button activation, and transmitters/receivers, along with associated software.

2. Dependent Claim 2

a. Claim 2

[2] The method of claim 1, wherein the device discovery daemon pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes.

619. Claim 2 depends from claim 1, which I understand means that claim 2 requires all of the limitations of claim 1 in addition to its additional limitations.

620. The combination of Rasin and Bosch teaches all of the limitations of claim 1 as described above. (*See* ¶¶ 408-442.)

621. In my analysis I apply the proposed construction of the term "*daemon*" as a computer program. (*See* ¶¶ 83-85.)

622. It is therefore my understanding that claim [2] should be interpreted as

"*wherein the device discovery* [computer program] *pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes*."

623. As explained for limitation [1a], Rasin discloses a user interface system 16 that includes a networking gateway 24 and a service engine 30 to enable detection of devices and process subsequent data received by the devices. (Rasin, Ex. 1015, 3:39-43.) Rasin further discloses that the connection between electronic device 12 and the user interface system 16 (with the network gateway 24 and service engine 30), could be wired or wireless communication:

> In either embodiment, electronic device 12 may be connected to user interface system 16 through the use of a port 15, which includes universal serial bus (USB) ports and the like. However, although electronic device 12 is physically connected to user interface 16 through the use of a cable 17, it is recognized that communications may occur wirelessly. For instance, it is contemplated by the present invention that electronic device 12 may communicate with user interface system 16 via a wireless protocol including, but not limited to bluetooth, wi-fi, and the like. As described above, unlike conventional systems, user interface system 16 is capable of automatic programming, reprogramming and/or synchronization with devices, such as electronic device 12, to enable access to services available through the devices.

(Rasin, Ex. 1015, 3:4-17.)

624. Ghabra discloses a passive entry passive start system. As explained in the rationale to combine section, the combination of Rasin, Bosch, and Ghabra collectively teach the "*device discovery* [computer program]" limitations of Ground 5.

625. Ghabra discloses passive entry and passive start systems that involve wireless communication between a vehicle base station 11 and a key fob 12.

> Referring to FIG. 1, a vehicle 10 includes a base station or vehicle communication module 11 for communicating with a remote portable fob 12. Base station 11 includes a microcontroller 13 coupled to an LF transmitter 14, an RF receiver 15, and an RF transmitter 16.

(Ghabra, Ex. 1011, 2:63-67.)

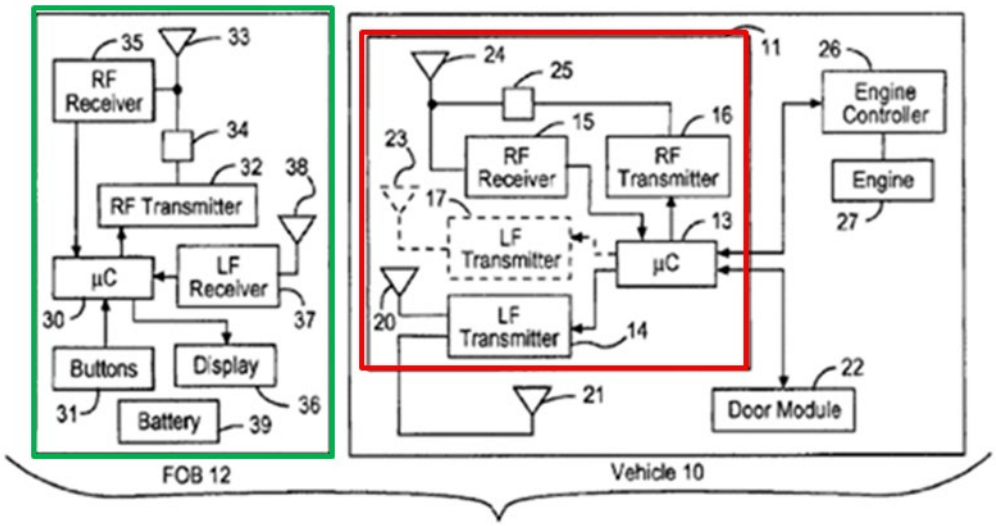


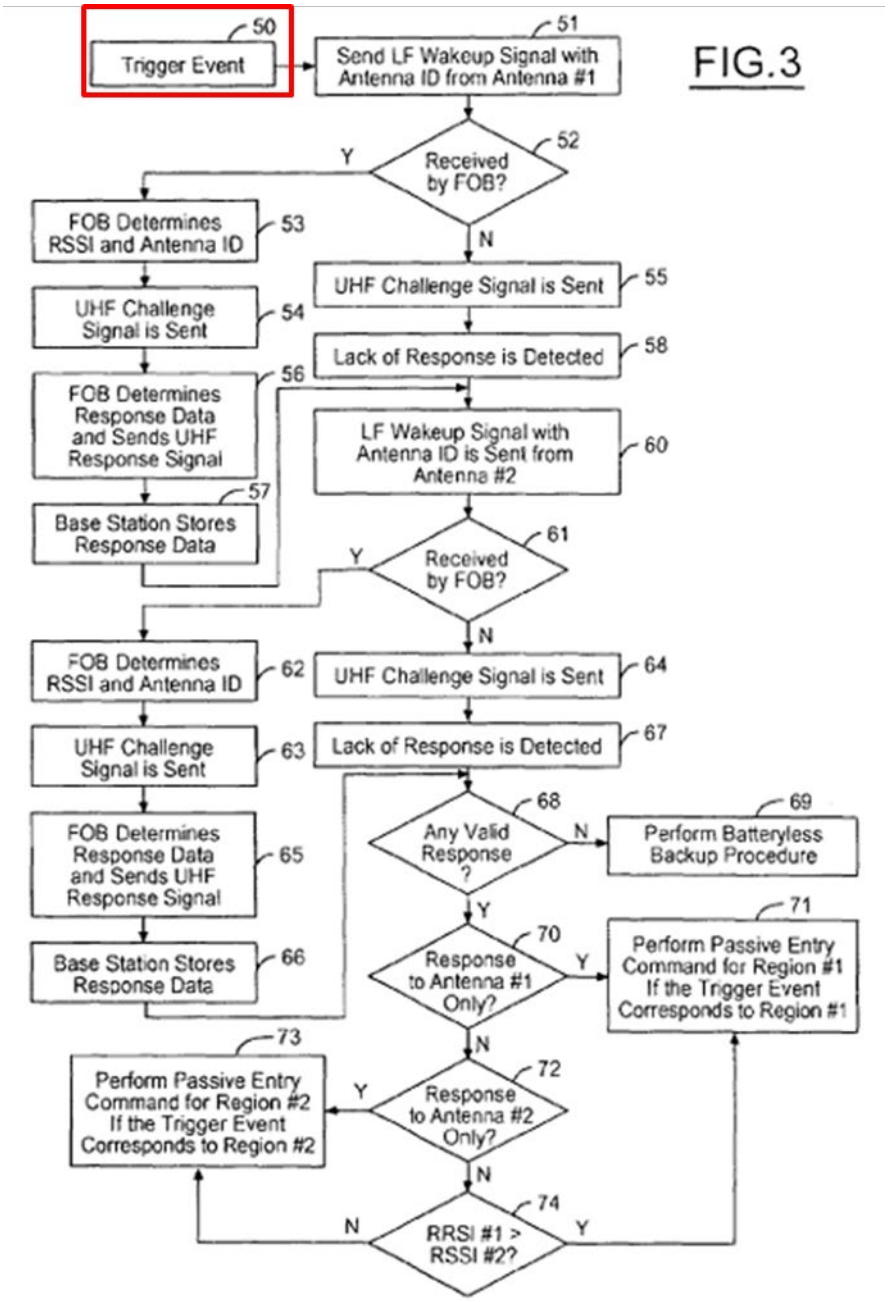
FIG.1

Ghabra, Ex. 1011, Fig. 1 (Annotated)

626. With reference to Figure 3, Ghabra discloses initiating wireless communication in response to a "trigger event" ("*predetermined event*"):

In step 50, a trigger event is generated indicating a request for a passive entry function (e.g. lifting a door handle or pressing a start button inside the vehicle).

(Ghabra, Ex. 1011, 5:22-25.)



Ghabra, Ex. 1011, Fig. 3 (Annotated)

627. Ghabra discloses an embodiment in which the trigger event occurs in response to a user lifting a door handle or pressing an engine start switch ("*starting the vehicle*") which in turn provides a trigger signal ("*ping*"):

> FIG. 2 shows a first preferred embodiment for localizing a fob in a passive entry sequence wherein it is desired to determine whether the fob is outside the vehicle in the vicinity of a particular door (i.e., when a door unlock request is initiated by **a trigger signal** from the lifting of a door handle) or inside the vehicle (i.e., a passive engine start sequence is triggered by a user pressing an **engine start switch** inside the vehicle). A first LF wakeup signal 40 is generated from a first antenna preferentially transmitting to a first area with respect to the vehicle (e.g., outside the vehicle adjacent to a particular door or other closure such as a trunk).

(Ghabra, Ex. 1011, 4:57-63.)

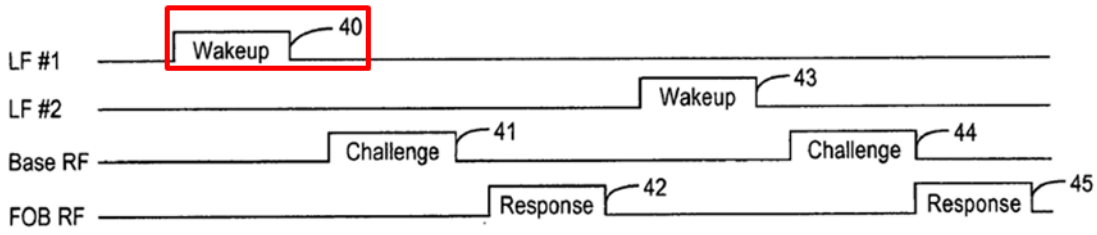


FIG.2

Ghabra, Ex. 1011, Fig. 2 (Annotated)

628. A POSA would have understood that Ghabra's disclosure of "a trigger signal" causing "a first LF wakeup signal [to be] generated," teaches that some communication was transmitted to the vehicle network by the trigger signal after

the engine start switch was pressed or a door handle was lifted resulting in a vehicle door opening.

629. Thus, the combination of Rasin, Bosch, and Ghabra teaches "*wherein the device discovery* [computer program] *pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes*."

3. Dependent Claim 13

a. Claim 13

[13] The vehicle of claim 12, wherein the device discovery daemon pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes.

630. Claim 13 depends from claim 12, therefore I understand that claim 13 includes all the limitations of claim 12. The combination of Rasin and Bosch teaches all of the limitations of claim 12 as discussed above. (*See* ¶¶ 454-463.)

631. Claim 13 is largely duplicative of claim 2. To illustrate, the table below shows a side-by-side comparison of claims 2 and 13. Claim 13 is "marked up" to show the minor differences.

'153 Patent Claim 2	**'153 Patent Claim 13**
[2] The method of claim 1,	**[13]** The vehicle of claim 12,

wherein the device discovery daemon pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes.	wherein the device discovery daemon pings the network and/or communication subsystem when a predetermined event occurs, the predetermined event being one or more starting the vehicle and a vehicle door opens or closes.

632. As the differences between claims 2 and 13 are not substantial and they contain identical language other than the claims they depend from, I refer back to my analysis of claim 2 to establish that these limitations are met by the combination of Rasin, Bosch, and Ghabra.

F. Ground 6 – The Combination of Rasin, Bosch, Clement, and Ghabra Teaches all of the Limitations for Claims 6 and 17

1. Rationale to Combine

633. It would have been obvious to a POSA at the time of the invention to combine the vehicle user interface system disclosed in the combination of Rasin and Bosch with the known technique of device discovery as disclosed in Clement and Ghabra, along with Clement's location-based permission management system and Ghabra's positioning (localization) system to provide additional functionality

and user convenience improvements such as passive control, improved security, increased vehicle communication responsiveness, and conservation of battery life. A POSA would have understood that Rasin, Bosch, Clement, and Ghabra are complementary technologies that are combinable, for example, Rasin discloses that:

> As required, detailed embodiments of the present invention are disclosed herein. However, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale, and some features may be exaggerated or minimized to show details of particular proponents. Therefore, specific functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for the claims and/or as a representative basis for teaching one skilled in the art to variously employ in the present invention.

(Rasin, Ex. 1015, 2:16-26.)

> While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

(Rasin, Ex. 1015, 5:24-28.)

a. Analogous Art

634. Rasin, Bosch, Clement, and Ghabra are from the same field –

communication between a vehicle system and one or more electronic devices:

> The present invention relates generally to a user interface system for a vehicle that enables access to an electronic device.

(Rasin, Ex. 1015, 1:5-7.)

> Various sound and information sources, and communication installations can form a common mobile driver-information system consisting of radio, cassette player, CD player, phone, navigation and traffic telematics equipment, and even computer, video player, and TV.

(Bosch, Ex. 1050, p. 1118.)

> In one aspect, a vehicle is provided that is configured to receive user input for controlling the vehicle. The user input may be entered via a control device, such as a portable computing device. Examples of such devices may include a cell phone, a tablet, a laptop, or a portable gaming device. By way of example, the user input may specify a control action for the vehicle to perform.

(Clement, Ex. 1010, 4:41-48.)

> The vehicle control unit 320 may be coupled to the control device 230 via a wireless or wired connection and it may be operable to receive instructions from the control device 230 to change the state of one or more of the vehicle systems 310*a-f*.

(Clement, Ex. 1010, 7:8-11.)

> The present invention relates in general to remote convenience and security systems for automotive vehicles, and, more specifically, to a

> wireless communication system for integrating functions of a two-way remote keyless entry system and a passive entry system.

(Ghabra, Ex. 1011, 1:16-20.)

b. Motivation to Combine

635. Rasin discloses a vehicle user interface system for discovering services on connected devices, transforming service data into a standardized format, and presenting it to the user:

> The present invention relates generally to a user interface system for a vehicle that enables access to an electronic device.

(Rasin, Ex. 1015, 1:5-7.)

> Referring to FIG. 2, a block diagram of user interface system 16 in communication with electronic device 12 is illustrated. As shown, device 12 communicates with user interface system 16 in a manner so as to enable a user to access available services. User interface system 16 is capable of accessing the services available through device 12 by receiving and processing data sets from device 12. In the illustrated embodiment, user interface system 16 includes user interface module 19, a networking gateway 24, and a data transformation agent 32.

(Rasin, Ex. 1015, 3:18-27.)

> Data transformation agent 32 may be embodied as a software program or data set containing a set of predetermined rules by which received data sets are processed. Accordingly, a constraints data set 34 may contain a plurality of constraints by which these rules are based. In

> one embodiment, the rules by which data sets are processed are implemented in an XML based vehicle constraints markup language (VCML). These constraints may be used to control the appearance of information displayed by the user interface system display unit (FIG. 1) and ensure that proper functionality and service behavior by user interface system 16 occurs.

(Rasin, Ex. 1015, 3:65-4:8.)

636. Clement discloses a complementary system to control vehicle system functionality, by being able to determine the specific location of a portable/mobile device and restrict access to vehicle systems based on that location, thereby adding additional safety measures, e.g., limiting the control of safety critical features to the driver. (Clement, Ex. 1010, Abstract, 5:6-32.)

637. Clement discloses a "vehicle control unit 320 . . . coupled to the control device 230 . . . operable to receive instructions from the control device 230 to change the state of one or more [ ] vehicle systems [ ] ." (Clement, Ex. 1010, 7:8-11.) Clement further discloses that the vehicle control unit 320 can "identify[ ] a current location of the portable control device [230] within a passenger compartment of the vehicle, and depending on the current location of the portable control device [230]" allow or not allow certain vehicle functions. (Clement, Ex. 1010, 1:43-46, *see also*, 7:40-50, Fig. 8.)

638. Clement discloses that "[a]t task 880, the vehicle control unit 320

determines whether the instruction is permitted to be invoked from the current location of the control device 230" and if so "task 885 is executed" i.e., the vehicle control unit 320 "Execute(s) the Instruction;" otherwise, "task 895 is performed":

> At task 880, the vehicle control unit 320 determines whether the instruction is permitted to be invoked from the current location of the control device 230. The determination may be based on the permissions structure 434 or another similar data structure. The determination may involve finding out whether the current location of the vehicle 101 is within one or more regions in the passenger compartment 210 where the instruction is permitted to be invoked from. If the current location of the control device 230 is within one of the regions where the instruction is permitted to be invoked from, task 885 is executed. Otherwise, if the control device 230 is outside of any regions where the instruction is permitted to be invoked from, task 895 is performed.

(Clement, Ex. 1010, 10:55-67, 11:1-11.)

> Having a permission management system is important with respect to ensuring the safety of the vehicle. For instance, it is unsafe for a 5-year old sitting in the rear seat of the vehicle to be allowed to steer the vehicle, via the control device, should he or she manage somehow to grab the control device and bring it in the backseat. To increase the vehicle's safety, the location of the control device inside the vehicle may be monitored and a determination may be made as to what region of the vehicle's cab the control device is located in. Possible regions may include a region where the driver's seat is located, a region where

> the front passenger's seat is located, and a region where the backseats are located. In one example, the control device may be permitted to perform safety-critical actions, such as steering or applying the brakes, only if it is located in the region where the driver seat is located. In this regard, the ability to perform safety-critical actions may be denied when the control device is located elsewhere in the vehicle's cab. This ensures that only the person in the driver's seat retains control over aspects of the operation of the vehicle that are important with respect to safety. Nevertheless, the control device may be permitted to control non-safety critical aspects of the operation of the vehicle when it is located in other parts of the vehicle, like the backseat. For example, the control device may be permitted to perform actions from the backseat, such as activating an air-conditioner, rolling down a window, or changing the station playing on the vehicle's radio.

(Clement, Ex. 1010, 5:6-32.)

639. However, the combination of Rasin, Bosch, and Clement does not disclose an event-based system for initiating discovery or communication with external devices. Ghabra addresses this by enabling a passive entry/passive start system that can detect devices based on a trigger event, such as lifting a door handle or pressing the engine start switch inside the vehicle. (Ghabra, Ex. 1011, 4:57-63, 5:22-25.)

(1) Passive Control

640. Ghabra discloses a vehicle system that determines the location of a key fob ("localizing a fob") for passive entry and passive start vehicle functionality:

> [A] first preferred embodiment for **localizing a fob** in a passive entry sequence wherein it is desired to determine whether the fob is outside the vehicle in the vicinity of a particular door (i.e., when a door unlock request is initiated by a trigger signal from the lifting of a door handle) or inside the vehicle (i.e., a passive engine start sequence is triggered by a user pressing an engine start switch inside the vehicle).

(Ghabra, Ex. 1011, 4:57-63.)

641. Early vehicles required manual actuation of a key to enter and start a vehicle, i.e., by inserting the key into a lock or ignition switch.

642. Ghabra discloses prior art remote-keyless entry (RKE) systems that require manual actuation of a button on a key fob, and recognizes that such manual actuation is disadvantageous:

> Typical RKE systems utilize a key fob with a radiofrequency (RF) transmitter which transmits to a base station in the vehicle. When the user is within range, the user actuates a corresponding button on the key fob to send a lock, unlock, or engine start command.

(Ghabra, Ex. 1011, 1:28-32.)

> One disadvantage of this type of system is that the user must manually actuate the key fob to achieve the desired results. In an attempt to eliminate this disadvantage, passive entry systems, which operate in a hands-free manner, are being introduced. In order to avoid excessive battery consumption by periodic radio transmission from the fob, the approach of the user to the vehicle is usually sensed by the vehicle, which then wakes up the fob to perform a security check before actuating a passive entry function.

(Ghabra, Ex. 1011, 1:40-46.)

643. Such prior art passive entry systems typically operated in the background and discovered the fob so that it can sense the user's approach to the vehicle. (*See* ¶¶ 114.)

644. Ghabra discloses a passive entry sequence, and a passive engine start sequence:

> [A] first preferred embodiment for localizing a fob in a passive entry sequence wherein it is desired to determine whether the fob is outside the vehicle in the vicinity of a particular door (i.e., when a door unlock request is initiated by a trigger signal from the lifting of a door handle) or inside the vehicle (i.e., a passive engine start sequence is triggered by a user pressing an engine start switch inside the vehicle).

(Ghabra, Ex. 1011, 4:57-63.)

645. Ghabra discloses that the "passive entry system[], [] operate[s] in a hands-free manner[.]" (Ghabra, Ex. 1011, 1:42-43.) Ghabra further discloses that a

passive entry system "has [the] advantages of added convenience [and] faster response times," each of which is an improvement over the vehicle user interface systems disclosed in Rasin, Bosch, and Clement. (Ghabra, Ex. 1011, 2:13-14.)

646. A POSA would have been motivated to combine the vehicle systems disclosed in Rasin, Bosch, and Clement with the passive entry and passive start systems disclosed in Ghabra to expand the functionality of the electronic device outside the vehicle and be able to interact with their vehicle in a "hands-free" manner, thereby eliminating the need for manual actuation for certain functionality, like entering and starting the vehicle. Removing the need for manual actuation provides users with the additional ease and convenience of interacting with their vehicle, which is a clear benefit and improvement over the combination of Rasin, Bosch, and Clement alone.

647. A POSA would have understood that the combination of Rasin, Bosch, Clement, and Ghabra would allow a user to keep their portable device in their pocket/bag and would not have to take it out to unlock the vehicle door or start the vehicle, thereby increasing user convenience.

(2) Improved Security with Faster Response Time

648. The addition of Ghabra's passive entry system to the Rasin/Bosch/Clement combination also provides the added benefit of improved

security with faster response time. Prior art passive entry systems were susceptible to thieves intercepting wireless communication in a "relay attack." (Ghabra, Ex. 1011, 1:64-67.) Ghabra's system provides improved security, e.g., "resistance to relay attacks" with faster response time by authenticating or authorizing a fob before allowing it to access the vehicle network by using unique identifier numbers or security codes sent using an ultra high frequency (UHF) signal. (Ghabra, Ex, 1011, 3:57-67, 4:8-29, 4:30-40, 6:55-58.)

649. Ghabra discloses that determining whether a fob is authorized or not is based on unique identifier numbers or security codes. Ghabra explains that after the LF wakeup signal is sent "RF transmitter 16 in base station 11 is used [to] broadcast a UHF challenge signal including [a] random number [to fob 12]." (Ghabra, Ex. 1011, 4:8-29.) Ghabra further explains that the fob 12 "passes the random number through [a] known mathematical transformation. The resulting transformed number is included in [the] response data" sent back to the vehicle. (Ghabra, Ex. 1011, 4:8-29.) Then, the "microcontroller 13 checks the transformed number as received from the fob 12 with its own results of the transformation and determines the UHF response signal to be valid if the transformed numbers match." (Ghabra, Ex. 1011, 4:8-29.)

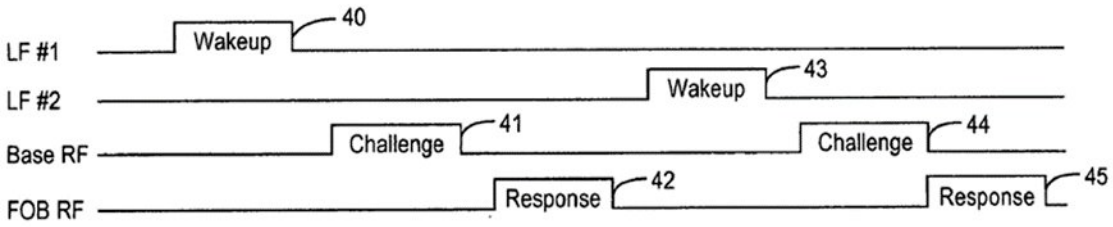


FIG.2

Ghabra, Ex. 1011, Figure 2

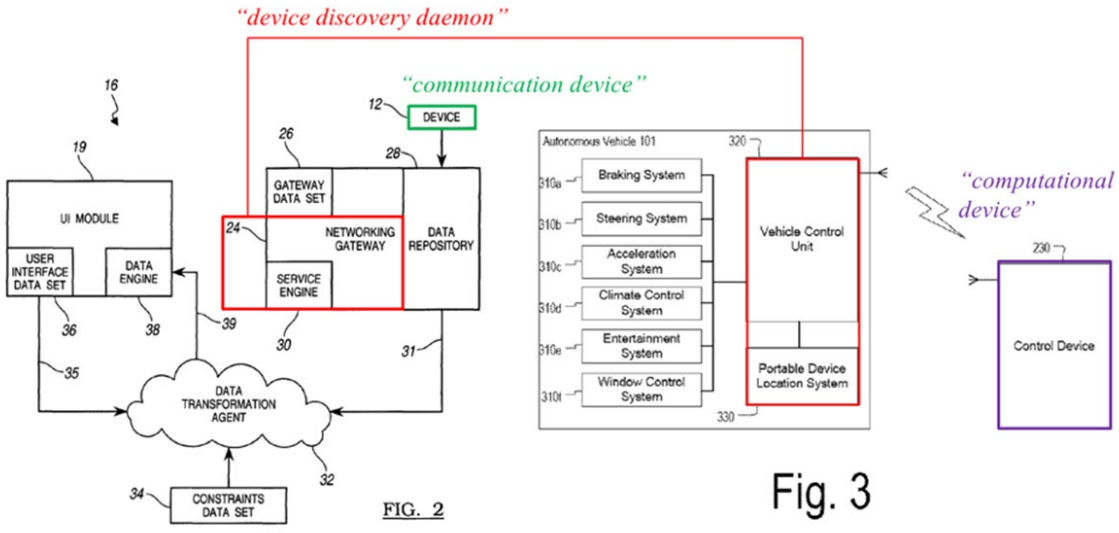
650. Ghabra further discloses that "[t]he UHF challenge and response signals are sent with a much shorter time delay than if they were sent at the low frequency" which reduces the time delay in authenticating a fob common with prior art systems utilizing LF signals. (Ghabra, Ex. 1011, 4:19-21, 2:4-9.)

(3) Conservation of Battery Life

651. Ghabra also discloses that by sending a wakeup signal in response to a trigger event, its passive entry system aids in "avoid[ing] excessive battery consumption by periodic radio transmission from the fob, [where] the approach of the user to the vehicle is usually sensed by the vehicle, which then wakes up the fob to perform a security check before actuating a passive entry function." (Ghabra, Ex. 1011, 1:44-48.) Further, "[p]assive entry communication operates over a much shorter range than RKE communication," therefore, "an LF signal…is used for passive entry while a much higher frequency RF signal . . . is used for RK . . . ." (Ghabra, Ex. 1011, 1:54-58.)

(4) A POSA Would Have Understood How to Combine Rasin, Bosch, Clement, and Ghabra

652. A POSA would have understood how to combine Rasin, Bosch, Clement, and Ghabra with a reasonable expectation of success. In terms of hardware modifications, a POSA would have first modified Rasin's vehicle user interface system to include Clement's vehicle control unit 320, the location system 330 including receivers 610*a-d*, and the control device 230. As illustrated in the figure below, a POSA would have understood that due to the complementary nature of the systems, Rasin's user interface system 16, with networking gateway 24 and service engine 30, and Clement's vehicle control unit 320 could have been combined to share hardware and software:



Rasin, Ex. 1015, Fig. 2 (Annotated); Clement, Ex. 1010, Fig. 3 (Annotated)

653. The combined Rasin/Bosch/Clement system includes Clement's control device 230 and the location system 330 including receivers 610*a-d* for determining the position of the control device 230 within the vehicle.

> The vehicle control unit 320 may use the location system 330 to enforce location-based permissions on instructions received from the control device 230.

(Clement, Ex. 1010, 7:40-42.)

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610*a-d* (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610*a-b* [*sic* 610*a-d*] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

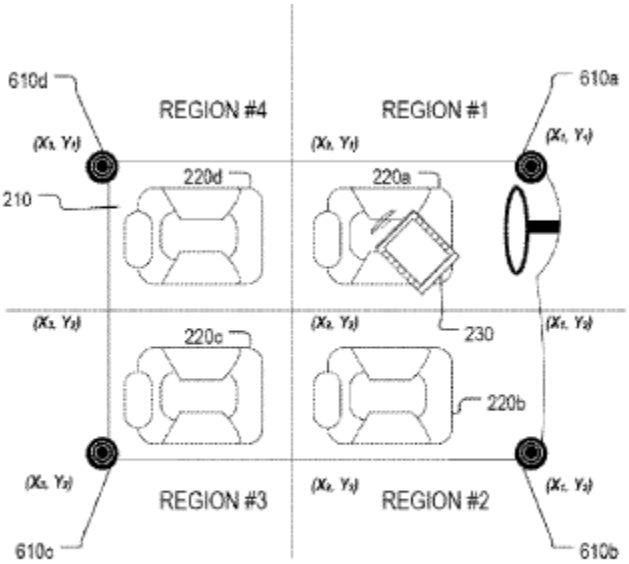


Fig. 6

Clement, Ex. 1010, Fig. 6

654. In addition to the elements discussed above, a POSA would have modified the combination Rasin/Bosch vehicle user interface system to include the associated software needed to operate Clement's vehicle control unit 320 and the location system 330, to enable determining the position of a mobile device within the vehicle.

655. Clement discloses that the vehicle control unit 320 includes a processor 410 and executable code 440 that is executed by the processor 410:

> FIG. 4 depicts a schematic diagram of the vehicle control unit 320 in accordance with aspects of the disclosure. As illustrated, the vehicle control unit 320 may include a processor 410 and memory 420. Memory 420 of vehicle control unit 320 may store information

accessible by processor 410, including executable code 440 that may be executed by the processor 410.

(Clement, Ex. 1010, 7:51-57.)

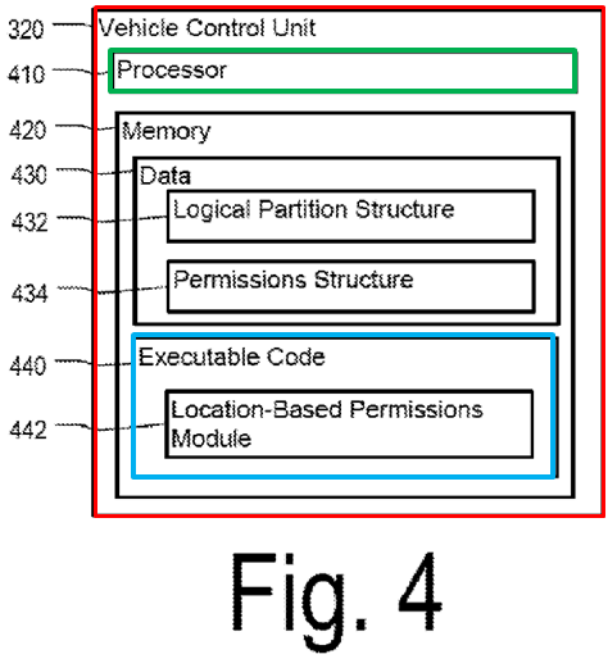


Fig. 4

Clement, Ex. 1010, Fig. 4 (Annotated)

656. Clement further discloses that the executable code 440 of the vehicle control unit 320 includes a location-based permissions module 442 that is configured to enforce location-based restriction policies, such as those described with reference to Figure 8:

The executable code 440 may perform at least some of the tasks of the process 800 depicted in FIG. 8. For example, the executable code 440 may include a location-based permissions module 442 that is configured to enforce location-based restriction policies.

(Clement, Ex. 1010, 8:13-17.)

657. Clement further discloses that the location system 330 includes software for determining the location of device 230:

> The location system 330 may include hardware and/or software for determining the location of the control device 230 within the passenger compartment 210. In this example, the location system 330 includes receivers 610a-d (depicted in FIG. 6) located in different parts of the of the passenger compartment 210. The receivers 610a-b [*sic* 610a-d] may take measurements of the strength of radio signal(s) transmitted by the control device 230 and forward those measurements to the vehicle control unit 320 where they are triangulated and used to determine the location of the control device 230.

(Clement, Ex. 1010, 7:23-32.)

658. The combination of the Rasin/Bosch vehicle user interface system and Clement's control device 230, vehicle control unit 320, location system 330, including receivers 610*a-d*, and its associated software, would allow vehicle systems to be accessed by a device in various locations within a vehicle, increasing ease of use and functionality, while ensuring that access is only given when the device is physically inside the vehicle, thereby increasing safety and security.

659. To add the additional functionality of an event-based system for initiating discovery or communication with external devices, a POSA would have further modified the Rasin/Bosch/Clement vehicle system to include at least one

LF transmitter and LF antenna to enable wake-up signaling and zone-specific localization, as used in Ghabra's passive entry/passive start system; as well as at least one RF (or UHF) receiver and transmitter to enable the two-way communication model utilized in Ghabra.

660. Ghabra discloses that the fob includes an LF receiver and LF antenna:

> An LF receiver 37 is coupled to microcontroller 30 and to LF antenna 38 for detecting wakeup signals broadcast from vehicle 10.

(Ghabra, Ex. 1011, 3:43-45.)

661. Ghabra discloses that the base station 11 of the vehicle 10 includes "a microcontroller 13 coupled to an LF transmitter 14, an RF receiver 15, and an RF transmitter 16." (Ghabra, Ex. 1011, 2:63-67.) Ghabra further discloses that the LF transmitter 14 "may also use a plurality of LF antennas at respective locations within the vehicle such as an LF antenna 20 deployed in base station 11 . . . ." (Ghabra, Ex. 1011, 3:5-8.)

662. Ghabra further discloses communication using an RF receiver and transmitter:

> Referring to FIG. 1, a vehicle 10 includes a base station or vehicle communication module 11 for communicating with a remote portable fob 12. Base station 11 includes a microcontroller 13 coupled to an LF transmitter 14, an RF receiver 15, and an RF transmitter 16.

(Ghabra, Ex. 1011, 2:63-67.)

663. Ghabra further discloses that the "RF transmitter 16 in base station 11 is used [to] broadcast a UHF challenge signal . . . ." (Ghabra, Ex. 1011, 4:11-12.) "The UHF challenge and response signals are sent with a much shorter time delay than if they were sent at the low frequency" which reduces the time delay in authenticating a fob common with prior art systems utilizing LF signals. (Ghabra, Ex. 1011, 4:19-21, *see also* 2:4-9.)

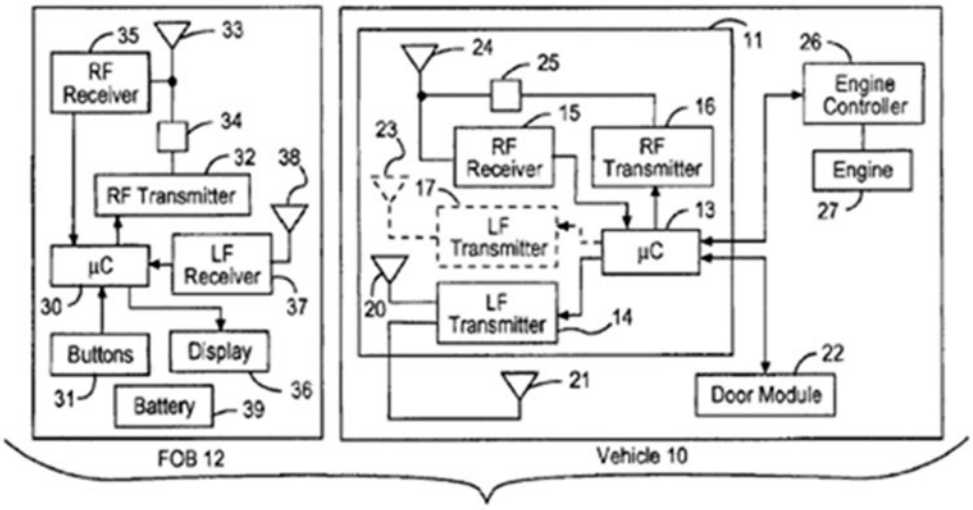


FIG.1

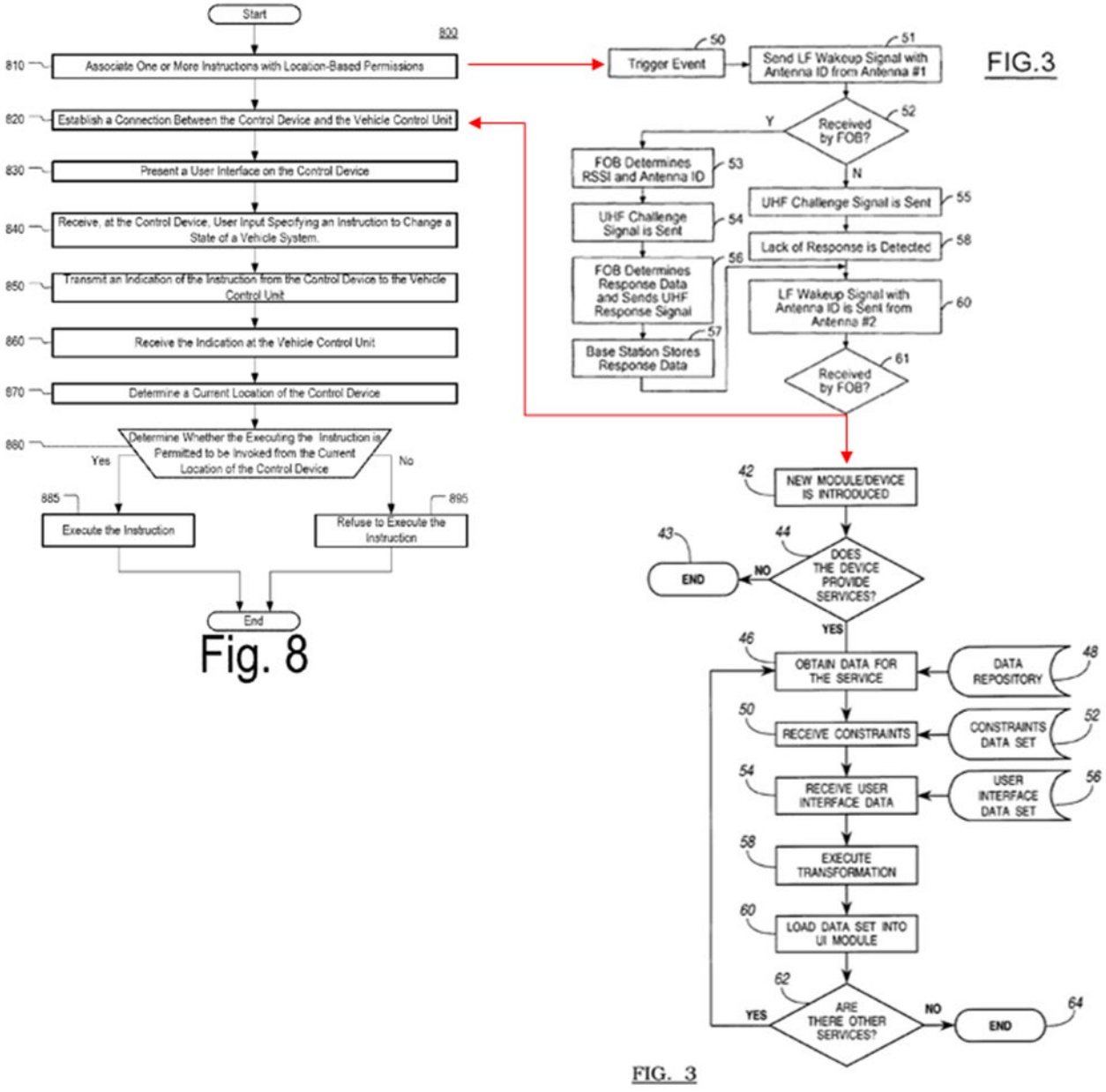
Ghabra, Ex. 1011, Fig. 1

664. The combination of Rasin, Bosch, Clement, and Ghabra also includes the addition of sensors that provide a trigger signal in response to a trigger event, e.g., lifting a door handle or pressing an engine start switch, such as those disclosed by Ghabra. (Ghabra, Ex. 1011, 3:10-15, 4:57-63, 5:22-24.)

665. A POSA would have been motivated to combine Ghabra's additional receivers, transmitters, and vehicle sensors with the Rasin/Bosch/Clement vehicle

system to yield predictable results, e.g., two-way communication and trigger signal generation to facilitate passive entry and passive start functionality.

666. Regarding additional software, a POSA would have been motivated to modify the Rasin/Bosch/Clement vehicle system to include Ghabra's device discovery technique in response to a triggering event as shown in the image below:



Rasin, Ex. 1015, Fig. 3 (Annotated); Clement, Ex. 1010, Fig. 8 (Annotated); Ghabra, Ex. 1011, Fig. 3 (Annotated)

667. A POSA would have understood that once the trigger event disclosed in Ghabra has been initiated, the vehicle system processes disclosed in Rasin, Bosch, and Clement could be executed in parallel, thereby enabling the combination of Rasin, Bosch, Clement, and Ghabra to initiate device discovery in

response to a triggering event, enable a location-based permission management system, and discover services on a connected device.

668. These modifications would have been a straightforward and well-known combination of known elements in the prior art, e.g., receivers and corresponding software for detecting the location of a portable electronic device within a vehicle limiting access to vehicle system functionality based on the location of the portable electronic device, along with door sensors and engine start buttons/sensors and corresponding software, yielding the predictable result of reducing driver distractions, increasing user convenience, and determining whether a new device signal was received by the vehicle user interface system.

2. Dependent Claim 6

a. Claim 6

669. Claim 6 depends from claim 4, which I understand means that claim 6 requires all of the limitations of claim 4 in addition to its additional limitations.

670. The combination of Rasin, Bosch, and Clement teaches all of the limitations of claim 4 as described above. (*See* ¶¶ 483-518.)

[6a] The method of claim 4, wherein step (a) comprises the substeps: receiving, by the device discovery daemon, information from an on board vehicle sensor that a new occupant has entered the vehicle;

671. Claim [6a] depends from claim 4, but claim 4 does not recite a "step (a)". The reference to "step(a)" in claim 6 appears to be referring to the

determining step of claim [4a]: "determining, by the microprocessor executable device discovery [computer program], that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle . . . ." As explained for limitation 1[pre], Rasin discloses, with reference to Figure 3, "a flow chart of a method for enabling access to electronics devices through the use of a user interface system in accordance with an embodiment of the present invention." (Rasin, Ex. 1015, 2:8-11.)

672. As explained for limitation [4a], which is referenced by "step (a)," Rasin's disclosure of the user interface system 16 establishing a connection with the electronic device 12 through "wireless protocol including, but not limited to bluetooth" (Rasin, Ex. 1015, 3:12-13) indicates that the user interface system 16 and its associated software (networking gateway 24 and service engine 30 – "*device discovery* [computer program]") is discovering and wirelessly connecting the electronic device 12 ("*communication device*") to the vehicle network. (*See* ¶¶ 485-499.) Further, Clement discloses that its vehicle control unit 320 software performs similar device discovery procedure. Thus, the combination of Rasin, Bosch, Clement, and Ghabra collectively teach the "*device discovery* [computer program]" limitations of Ground 6.

673. Ghabra discloses passive entry and passive start systems that involve wireless communication between a vehicle base station 11 and a key fob 12.

> Referring to FIG. 1, a vehicle 10 includes a base station or vehicle communication module 11 for communicating with a remote portable fob 12. Base station 11 includes a microcontroller 13 coupled to an LF transmitter 14, an RF receiver 15, and an RF transmitter 16.

(Ghabra, Ex. 1011, 2:63-67, *see also* 3:1-15.)

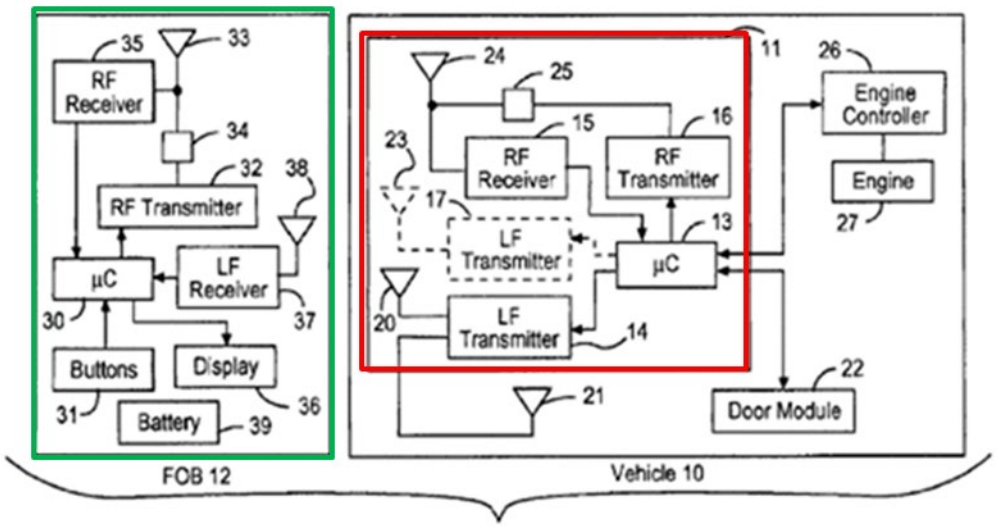


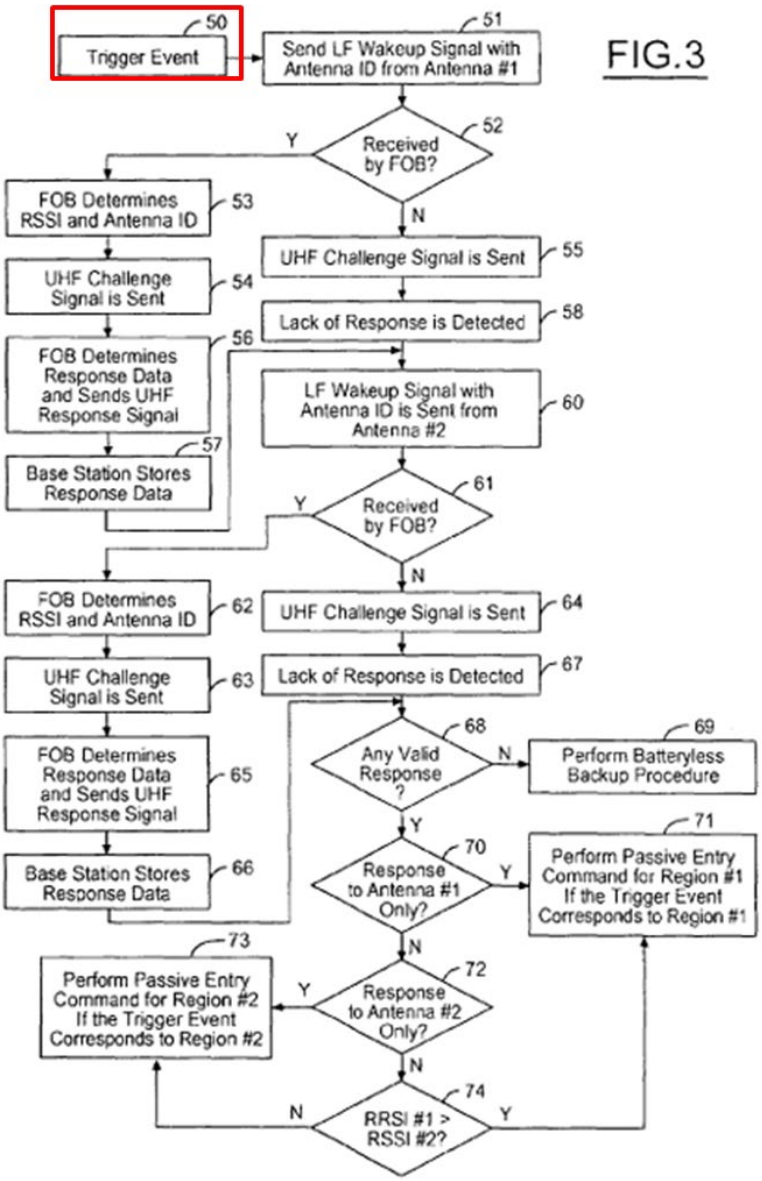
FIG.1

Ghabra, Ex. 1011, Fig. 1 (Annotated)

674. With reference to Figure 3, Ghabra discloses initiating wireless communication in response to a "trigger event":

> In step 50, a trigger event is generated indicating a request for a passive entry function (e.g., lifting a door handle or pressing a start button inside the vehicle).

(Ghabra, Ex. 1011, 5:22-25.)



Ghabra, Ex. 1011, Fig. 3 (Annotated)

675. Ghabra discloses that the door module 22 includes a sensing switch ("*on board vehicle sensor*") that generates a trigger pulse when the handle is lifted and sends it to microcontroller 13, indicating an attempt to enter the vehicle 101 is being made:

> Referring to FIG. 1, a vehicle 10 includes a base station or vehicle communication module 11 for communicating with a remote portable fob 12. Base station 11 includes a microcontroller 13 coupled to an LF transmitter 14, an RF receiver 15, and an RF transmitter 16. In certain embodiments of the present invention, additional LF transmitters or LF antennas may be provided such as an LF transmitter 17. The additional transmitters or antennas may be located in vehicle 10 remotely from base station 11 at an entry zone being monitored by a passive entry system, for example. A single LF transmitter 14 may also use a plurality of LF antennas at respective locations within the vehicle such as an LF antenna 20 deployed in base station 11 and an LF antenna 21 disposed near a door module 22 in vehicle 10 (e.g., in a side view mirror housing). Door module 22 is coupled to microcontroller 13 and may preferably include a sensing switch for detecting the lifting of a door handle and a power lock mechanism for remotely locking and unlocking a corresponding door lock. If a separate LF transmitter 17 is used, an LF antenna 23 is coupled thereto.

(Ghabra, Ex. 1011, 2:633:15.)

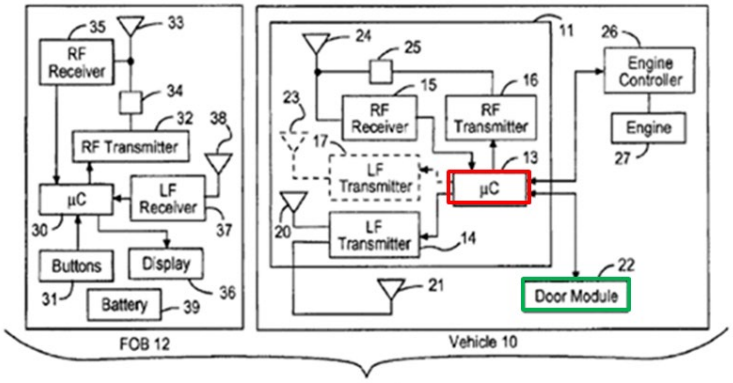


FIG.1

Ghabra, Ex. 1011, Fig. 1 (Annotated)

676. A POSA would have understood that lifting the door handle, indicates that a new occupant is entering or attempting to enter the vehicle.

677. Ghabra also discloses an embodiment in which a trigger event occurs in response to a user pressing an engine start switch ("*on board vehicle sensor*") which in turn provides a trigger signal:

> FIG. 2 shows a first preferred embodiment for localizing a fob in a passive entry sequence wherein it is desired to determine whether the fob is outside the vehicle in the vicinity of a particular door (i.e., when a door unlock request is initiated by **a trigger signal** from the lifting of a door handle) or inside the vehicle (i.e., a passive engine start sequence is triggered by a user pressing an **engine start switch** inside the vehicle).

(Ghabra, Ex. 1011, 4:57-63.)

678. A POSA would have understood that the trigger signal generated by the engine start switch ("*on board vehicle sensor*") also provides an indication, or

"*information that a new occupant has entered the vehicle*."

679. As I explained in the rational to combine section, the combination of Rasin, Bosch, Clement, and Ghabra includes Ghabra's sensors that provide a trigger signal in response to a triggering event. (*See* ¶¶ 633-668.)

680. Accordingly, the combination of Rasin, Bosch, Clement, and Ghabra teaches "*receiving, by the device discovery* [computer program], *information from an on board vehicle sensor that a new occupant has entered the vehicle* [e.g., a trigger signal from the engine start switch, or door module 22]."

681. Ghabra also discloses determining whether a fob is authorized by using unique identifier numbers or security codes. For example, Ghabra discloses:

> The LF wakeup signal has a known format including an operation code for identifying the signal as a wakeup signal and preferably also including an antenna identifier unique to the antenna being used to transmit each LF wake-up signal. Localization of the fob is necessary to ensure that a person carrying an authorized fob is properly located in the area where the passive function is being requested (e.g., located outside the door with the triggering door handle for a passive entry function and located in the passenger compartment for a passive engine start function).

(Ghabra, Ex. 1011, 3:57-67.)

> For example, microcontroller 13 in base station 11 generates a random number to be used as a seed number in a secret mathematical

> transformation that is also known to microcontroller 30 in fob 12. RF transmitter 16 in base station 11 is used broadcast a UHF challenge signal including the random number. RF receiver 35 in fob 12 receives the UHF challenge signal and microcontroller 30 passes the random number through the known mathematical transformation. The resulting transformed number is included in response data together with the RSSI signal and a fob identifier for inclusion in a UHF response signal broadcast via RF transmitter 32 and antenna 33. The UHF challenge and response signals are sent with a much shorter time delay than if they were sent at the low frequency. The challenge and response may both be sent at 9.6 k baud, for example. The UHF response signal is received by RF receiver 15 via antenna 24 in base station 11 and is processed by microcontroller 13 in a known manner. For instance, microcontroller 13 checks the transformed number as received from fob 12 with its own results of the transformation and determines the UHF response signal to be valid if the transformed numbers match.

(Ghabra, Ex. 1011, 4:8-29.)

> Fob 12 and base station 11 also function to provide remote keyless entry functions in a conventional manner. Thus, when a user presses a manual input key (i.e., pushbutton) 31 for a desired remote control function, a UHF control signal incorporating a remote control message having a corresponding function identifier and a pre-assigned fob ID is broadcast. When base station 11 receives a UHF control signal, it validates the fob ID and any security codes and then initiates the remote control function via a vehicle message sent from base

> station controller 13 to an actuator such as door module 22 or engine controller 26.

(Ghabra, Ex. 1011, 4:30-40.)

682. A POSA would have understood that an "authorized fob" can include a fob that has been previously connected to the vehicle communication system, thus it is recognizable. A POSA would also have understood that the process of authorizing the fob is yet another indication that a new occupant is attempting to connect to the vehicle or has entered the vehicle.

[6b] in response to the receipt of the information, emitting, by the device discovery daemon, a ping to discover the computational device; and

683. Ghabra discloses transmitting a wakeup signal 40 ("*ping*"), in response to receiving a trigger signal ("*information*") that indicates lifting a door handle or pressing an engine start button, to awaken ("*discover*") the fob, and then sending a challenge signal 41:

> FIG. 2 shows a first preferred embodiment for localizing a fob in a passive entry sequence wherein it is desired to determine whether the fob is outside the vehicle in the vicinity of a particular door (i.e., when a door unlock request is initiated by a trigger signal from the lifting of a door handle) or inside the vehicle (i.e., a passive engine start sequence is triggered by a user pressing an engine start switch inside the vehicle). A first LF wakeup signal 40 is generated from a first

antenna preferentially transmitting to a first area with respect to the vehicle (e.g., outside the vehicle adjacent to a particular door or other closure such as a trunk). After waiting an amount of time sufficient to allow the fob to awaken, the base station sends a challenge signal 41 via the base station RF transmitter and antenna.

(Ghabra, Ex. 1011, 4:57-5:3.)

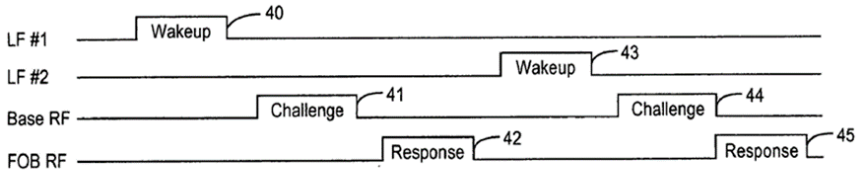
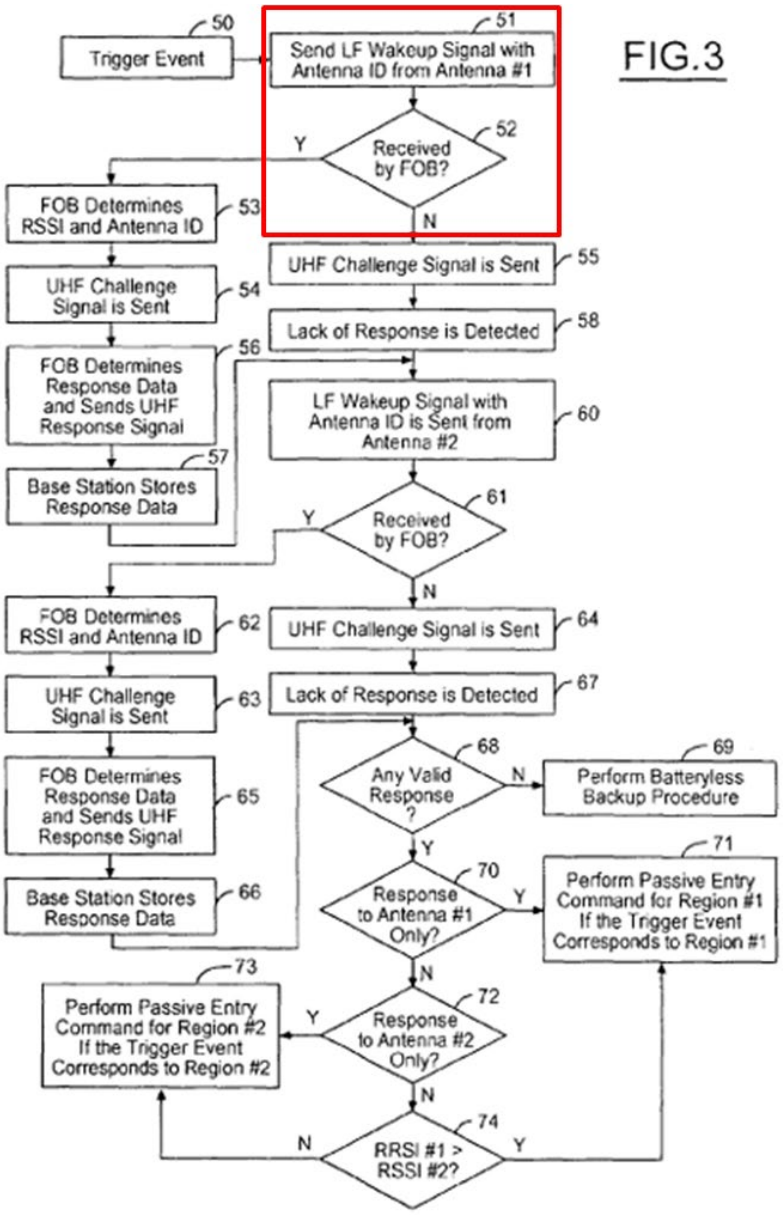


FIG.2

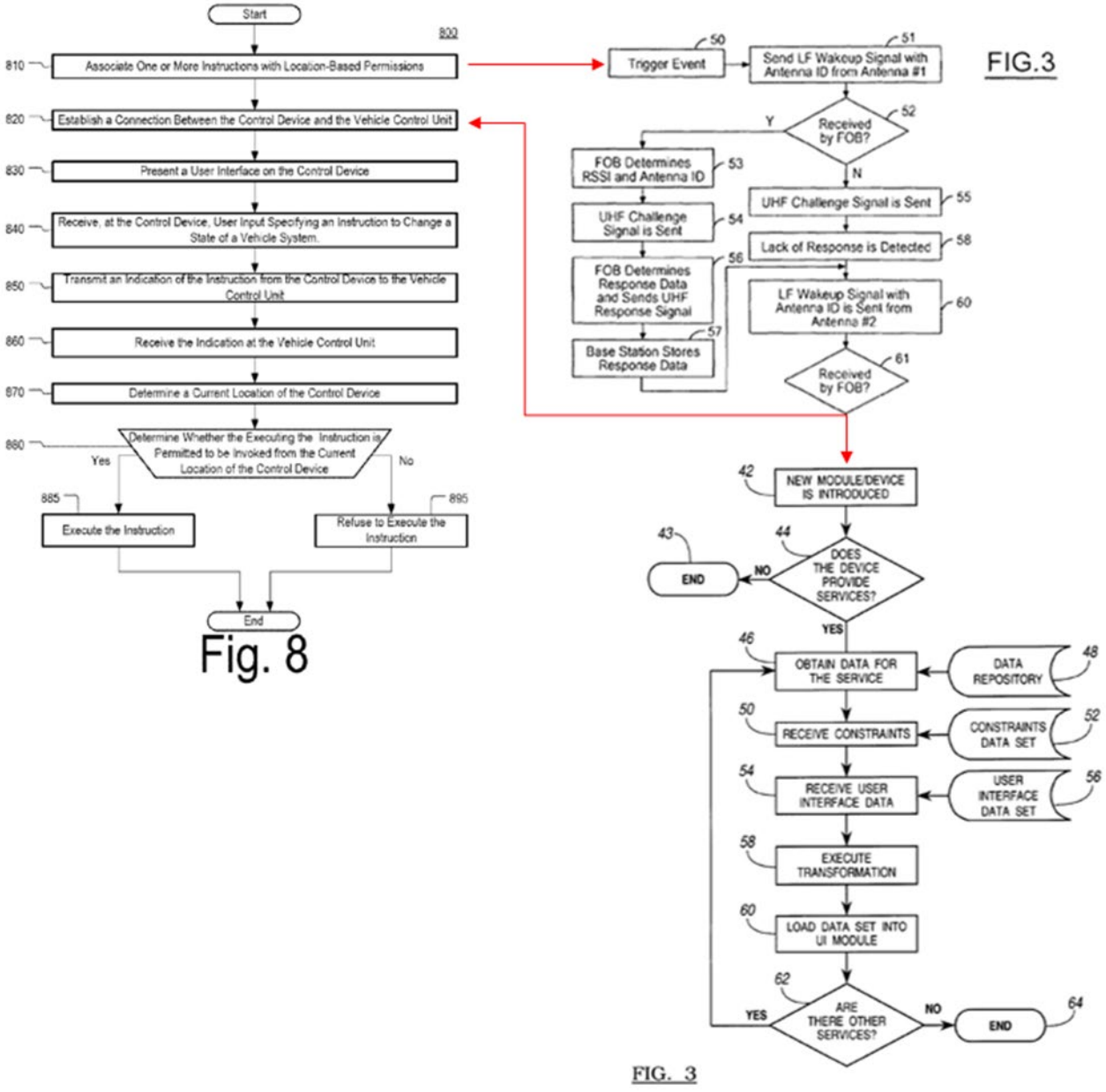
Ghabra, Ex. 1011, Fig. 2

684. Ghabra further discloses, with reference to Figure 3, that "[a]n LF wakeup signal with a corresponding antenna ID is sent in step 51 from the first antenna. At point 52, either a fob is actually present or not in the area being interrogated by the first antenna." (Ghabra, Ex. 1011, 5:25-28.)



Ghabra, Ex. 1011, Fig. 3 (Annotated)

685. As I explained above with reference to the rationale to combine Rasin, Bosch, Clement, and Ghabra, a POSA would have been motivated to modify the vehicle systems of Rasin/Bosch/Clement to include Ghabra's device discovery technique in response to a triggering event as shown in the image below:



Rasin, Ex. 1015, Fig. 3 (Annotated); Clement, Ex. 1010, Fig. 8 (Annotated); Ghabra, Ex. 1011, Fig. 3 (Annotated)

686. Thus, the combination of Rasin, Bosch, Clement, and Ghabra teaches, "*in response to the receipt of the information* [trigger signal], *emitting, by the device discovery* [computer program], *a ping to discover the computational device* [transmitting a wakeup signal from a first antenna and sending a challenge signal

from the base station]."

[6c] when a responsive signal is received from the computational device, determining, by the device discovery daemon, that the computational device is attempting to connect to a network and/or communication subsystem of a vehicle.

687. In my analysis I apply the proposed construction of the term "*daemon*" as a computer program. (*See* ¶¶ 83-85.) I understand that claim [6c] is referring to the same network, communication subsystem, and vehicle as those recited in claims [1a] and [4a] despite claim [6c] reciting "a network" and "a vehicle" rather than "the" network and "the" vehicle. It is therefore my understanding that claim [6c] should be interpreted as "when a responsive signal is received from the computational device, determining, by the device discovery [computer program], that the computational device is attempting to connect to [the] network and/or communication subsystem of [the] vehicle."

688. Ghabra discloses that once the wakeup signal 40 is sent, the base station waits for a response signal 42 indicating whether the fob is attempting to connect to the vehicle network::

> After waiting an amount of time sufficient to allow the fob to awaken, the base station sends a challenge signal 41 via the base station RF transmitter and antenna. If the fob is in fact in the first area being preferentially transmitted to, then after receiving the challenge signal and formulating response data the fob RF transmitter sends a UHF

response signal 42. When the fob is located in the area, then the response includes RSSI data showing strong reception. If outside the first area, then the RSSI data will reflect a weak signal. If the fob is not close enough to the target area, the wakeup signal will not have been received and there will no response to the challenge signal at all. In order to poll an additional location, an LF wakeup signal 43 is sent via a second LF antenna preferentially transmitting to a second area (e.g., inside the vehicle). Following sufficient time to allow a fob to awaken, a UHF challenge signal 44 is sent via the RF transmitter in the base station. **If a fob was awakened in the desired location being polled, a UHF response signal 45 is sent from the fob RF transmitter to the base station RF receiver.**

(Ghabra, Ex. 1011, 4:67-5:19.)

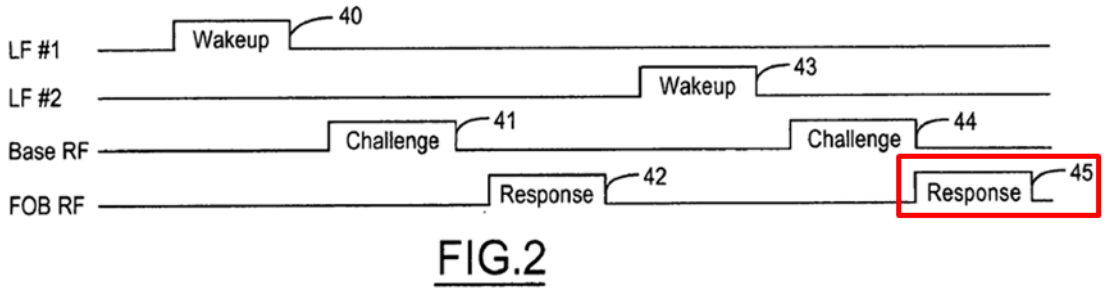


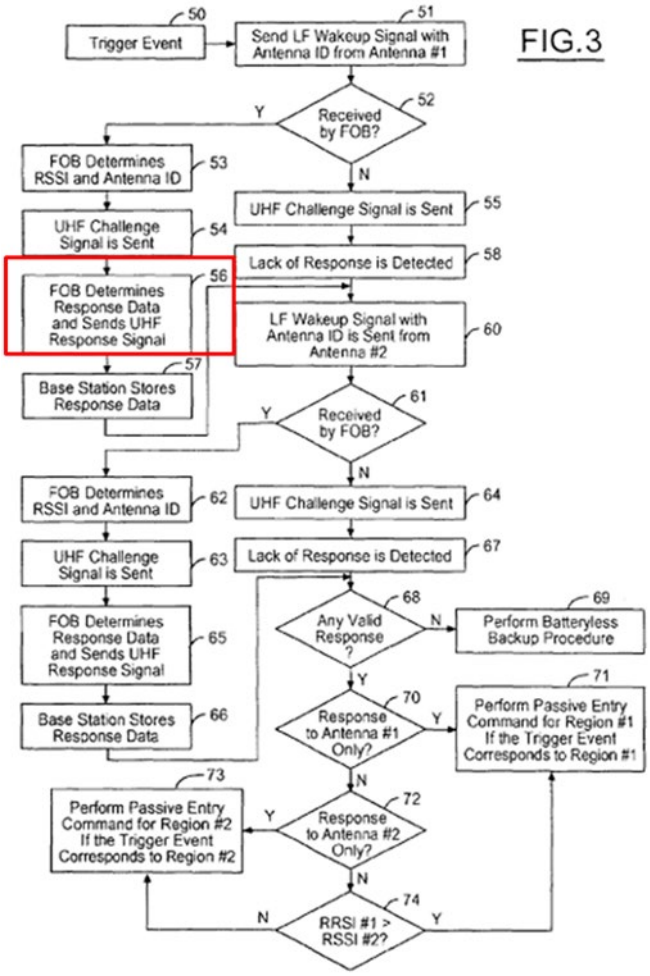
FIG.2

Ghabra, Ex. 1011, Fig. 2 (Annotated)

689. Ghabra further discloses:

If the UHF challenge signal is received by a fob, then the fob determines response data and sends a UHF response signal in step 56. In step 57, the base station stores the response data. If no fob is awakened or an awakened fob fails to send a valid response signal, then the lack of a response is detected in step 58.

(Ghabra, Ex. 1011, 5:33-38.)

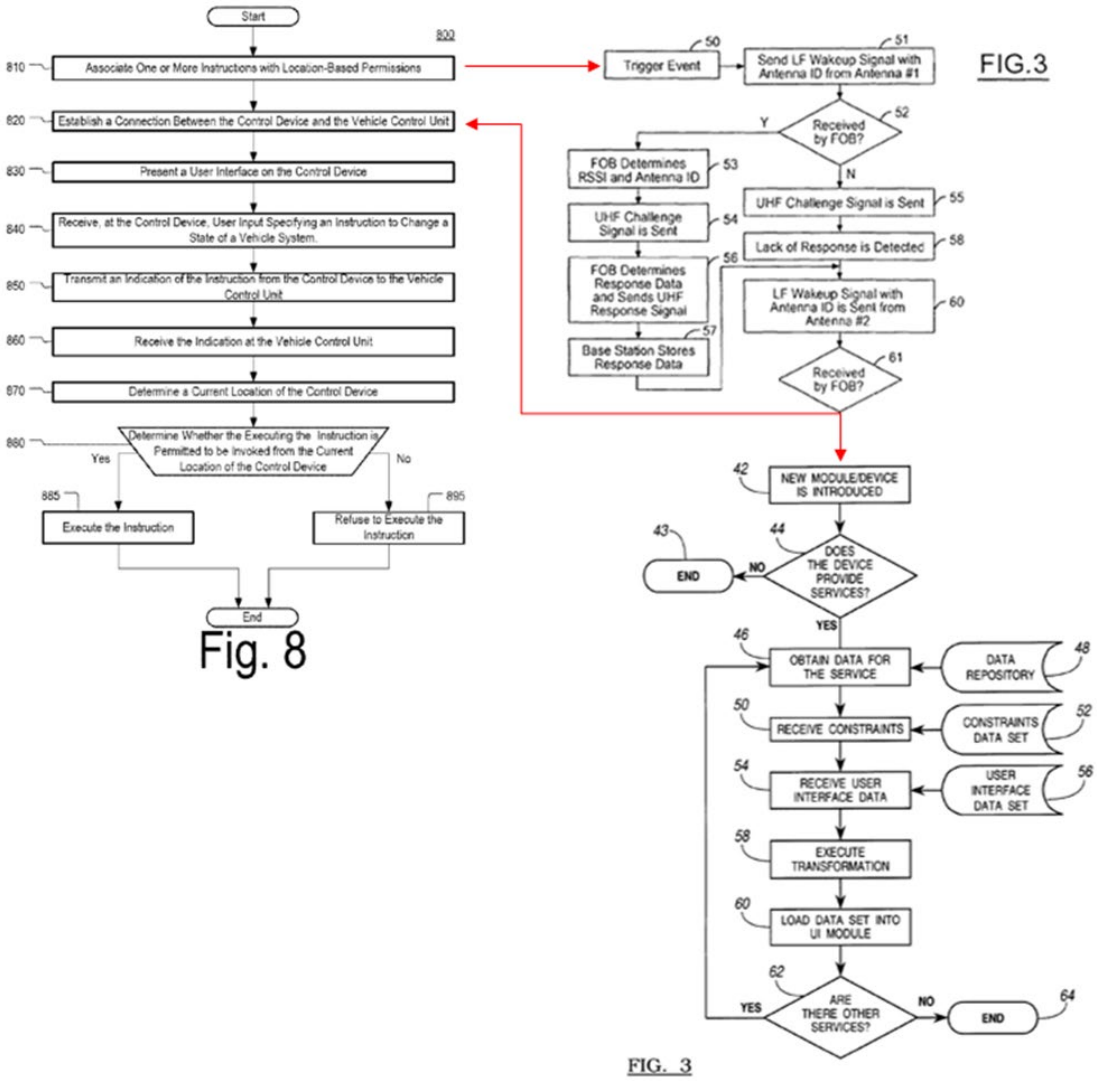


Ghabra, Ex. 1011, Fig. 3 (Annotated)

690. A POSA would have understood that Ghabra's disclosure of receiving the response signal 45 after transmitting the UHF challenge signal 44 indicates that the fob was awakened in the proper zone and is attempting to connect to the vehicle network. The presence of the response signal 45 confirms that the fob was successfully awaked and is therefore actively engaging in communication with the vehicle. A POSA would have recognized that such response only occurs when the

device is within the proper zone, receives the challenge signal and responds within the expected timing window, thereby signaling an attempt to connect with the vehicle, e.g., to unlock a door or start the vehicle.

691. As I explained regarding the rational to combine Rasin, Bosch, Clement, and Ghabra, a POSA would have been motivated to modify the vehicle systems of Rasin/Bosch/Clement to include Ghabra's device discovery technique including receipt of a response signal from a fob as shown in the image below:



Rasin, Ex. 1015, Fig. 3 (Annotated); Clement, Ex. 1010, Fig. 8 (Annotated); Ghabra, Ex. 1011, Fig. 3 (Annotated)

692. Thus, the combination of Rasin, Bosch, Clement, and Ghabra teaches, "*when a responsive signal is received from the computational device* [e.g., response 45], *determining, by the device discovery* [computer program], *that the computational device is attempting to connect to a network and/or communication subsystem of a vehicle.*"

3. Dependent Claim 17

a. Claim 17

[17a] The vehicle of claim 15, wherein operation (a) comprises the sub-operations: receive information from an on board vehicle sensor that a new occupant has entered the vehicle;

[17b] in response to the receipt of the information, emit a ping to discover the computational device; and

[17c] when a responsive signal is received from the computational device, determine that the computational device is attempting to connect to a network and/or communication subsystem of a vehicle.

693. Claim 17 depends from claim 15, therefore I understand that claim 17 includes all the limitations of claim 15, in addition to the limitations in claim 12. The combination of Rasin, Bosch, and Clement teaches all of the limitations of claim 15 as discussed above. (*See* ¶¶ 454-463, 575-577.)

694. Claim limitations [17a]-[17c] are largely duplicative of claim limitations [6a]-[6c]. To illustrate, the table below shows a side-by-side comparison of claims 6 and 17. Claim 17 is "marked up" to show the minor differences.

'153 Patent Claim 6	**'153 Patent Claim 17**
[6a] The method of claim 4, wherein step (a) comprises the substeps:	**[17a]** The vehicle of claim 15, wherein operation (a) comprises the

receiving, by the device discovery daemon, information from an on board vehicle sensor that a new occupant has entered the vehicle;	sub-operations: receive [ ] information from an on board vehicle sensor that a new occupant has entered the vehicle;
[6b] in response to the receipt of the information, emitting, by the device discovery daemon, a ping to discover the computational device; and	**[17b]** in response to the receipt of the information, emit [ ] a ping to discover the computational device; and
[6c] when a responsive signal is received from the computational device, determining, by the device discovery daemon, that the computational device is attempting to connect to a network and/or communication subsystem of a vehicle.	**[17c]** when a responsive signal is received from the computational device, determine [ ] that the computational device is attempting to connect to a network and/or communication subsystem of a vehicle.

695. Claim 17 depends from claim 15, but claim 15 does not recite an "*operation (a)*". The reference to "*operation (a)*" in claim 17 appears to be referring to the determining step of claim [15a]: "*wherein the device discovery* [computer program] *is further configured to: determine that a computational device is connected to or attempting to connect to a network and/or communication subsystem of a vehicle*; . . . ." Claim 17 requires "*wherein operation (a) comprises the sub-operations*," whereas claim 6 requires "*wherein step (a) comprises the substeps*." Neither difference is substantial to the meaning of the claim, thus, I refer back to my analysis of claim 6 to establish that these limitations are met by the combination of Rasin, Bosch, Clement, and Ghabra.

VIII. Objective Indicia Does Not Support Patentability

696. Considering the information that I have reviewed, my general knowledge of the field of vehicle communication systems and subsystems that communicate with a mobile communication device, including aspects of device discovery and customization, and publications within that and related fields, I am not aware of any objective evidence that might support the patentability of the claims of the '153 Patent. Further, from my review of the file history (Ex. 1002) of the '153 Patent, I did not see that the applicant raised any secondary indicia of nonobviousness during prosecution. I am not otherwise aware of any publicly available evidence of secondary indicia of nonobviousness. Should any alleged

secondary indicia of nonobviousness be presented, I reserve the right to provide an opinion thereon.

IX. Conclusion

697. In my opinion, all the elements of the challenged claim limitations are disclosed by the references discussed above and that the claims are unpatentable in view of these prior art references.

698. I reserve the right to supplement my opinions to address any information obtained, or positions taken, based on any new information that comes to light throughout this proceeding.

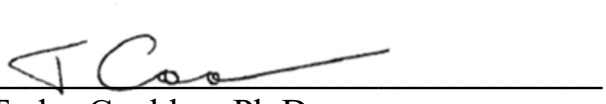
* * *

In signing this declaration, I recognize that the declaration will be filed as evidence in a case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination and that cross-examination will take place within the United States. If cross-examination is required, I will appear for cross-examination during the time allotted.

I hereby declare that all statements made herein of my own knowledge are true and all statements made herein on information and belief were and are believed by me to be true, and that all statements herein were and are made with the knowledge that willful false statements and the like so made are punishable by

fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code.

Executed on: August 14, 2025



Todor Cooklev, Ph.D.