

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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TESLA, INC.

Petitioner

v.

CHARGELOGIC LLC

Patent Owner

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*Inter Partes* Review Case No. IPR2026-00377

U.S. Patent No. 10,090,567

**DECLARATION OF SCOTT ANDREWS**

## TABLE OF CONTENTS

|              |                                                                                                              |           |
|--------------|--------------------------------------------------------------------------------------------------------------|-----------|
| <b>I.</b>    | <b>INTRODUCTION .....</b>                                                                                    | <b>8</b>  |
| A.           | EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE .....                                                     | 8         |
| <b>II.</b>   | <b>MATERIALS CONSIDERED.....</b>                                                                             | <b>13</b> |
| <b>III.</b>  | <b>OVERVIEW AND LEGAL STANDARDS.....</b>                                                                     | <b>17</b> |
| A.           | PERSON OF ORDINARY SKILL IN THE ART .....                                                                    | 17        |
| B.           | OBVIOUSNESS .....                                                                                            | 18        |
| C.           | CLAIM CONSTRUCTION .....                                                                                     | 24        |
| D.           | LEVEL OF A PERSON OF ORDINARY SKILL.....                                                                     | 24        |
| <b>IV.</b>   | <b>OVERVIEW OF THE '567 PATENT .....</b>                                                                     | <b>25</b> |
| A.           | FIELD OF ENDEAVOR.....                                                                                       | 26        |
| B.           | PROBLEM SOLVED BY THE INVENTOR .....                                                                         | 26        |
| <b>V.</b>    | <b>OVERVIEW OF THE TECHNOLOGY .....</b>                                                                      | <b>27</b> |
| A.           | ELECTRIC VEHICLES .....                                                                                      | 27        |
| B.           | ELECTRIC VEHICLE HARDWARE .....                                                                              | 28        |
| 1.           | <i>Chargers</i> .....                                                                                        | 28        |
| 2.           | <i>Controllers</i> .....                                                                                     | 28        |
| 3.           | <i>Displays</i> .....                                                                                        | 29        |
| 4.           | <i>User Controls</i> .....                                                                                   | 31        |
| C.           | TRANSMITTER, RECEIVERS, AND TRANSCEIVERS.....                                                                | 31        |
| D.           | REMOTELY COMMUNICATING CHARGING INFORMATION WITH VEHICLE .....                                               | 33        |
| 1.           | <i>Wireless Communications</i> .....                                                                         | 34        |
| 2.           | <i>Wireless Protocols</i> .....                                                                              | 37        |
| 3.           | <i>Bluetooth</i> .....                                                                                       | 39        |
| E.           | CHARGE COST CONSIDERATION .....                                                                              | 43        |
| <b>VI.</b>   | <b>SUMMARY OF THE PRIOR ART REFERENCES .....</b>                                                             | <b>45</b> |
| A.           | SUTARDJA .....                                                                                               | 45        |
| B.           | KELTY.....                                                                                                   | 47        |
| C.           | POLLACK .....                                                                                                | 49        |
| D.           | BOLL.....                                                                                                    | 50        |
| E.           | GALE .....                                                                                                   | 51        |
| F.           | UCHIDA.....                                                                                                  | 52        |
| G.           | ZHANG .....                                                                                                  | 53        |
| H.           | EVANS .....                                                                                                  | 54        |
| <b>VII.</b>  | <b>GROUND OF UNPATENTABILITY .....</b>                                                                       | <b>55</b> |
| <b>VIII.</b> | <b>OPINIONS REGARDING GROUND 1: CLAIMS 1-3 AND 6, ARE<br/>OBVIOUS OVER SUTARDJA, KELTY, AND POLLACK.....</b> | <b>55</b> |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| A. | CLAIM 1 .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 55        |
| 1. | <i>Claim 1[Pre]: “A vehicle charger for charging a battery of a vehicle, the vehicle charger adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger adapted for wireless communication with a second controller remote from the vehicle and the vehicle charger, the second controller associated with a computer, the vehicle charger comprising:” .....</i>                                                                                                                                | <i>55</i> |
| 2. | <i>Claim 1[a]: “an electrical power cord releasably attachable to at least one of the vehicle and a source of power” .....</i>                                                                                                                                                                                                                                                                                                                                                                                                                           | <i>74</i> |
| 3. | <i>Claim 1[b]: “a third controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the third controller and adapted for communication with the first controller and the second controller” .....</i>                                                                                                                                                                                                                                                                                          | <i>76</i> |
| 4. | <i>Claim 1[c]: “wherein the third controller is responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, the at least one signal related to a cost of electrical power, changing the charging state of the vehicle charger including automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power,” .....</i> | <i>83</i> |
| 5. | <i>Claim 1[d][i]: “wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging, .....</i>                                                                                                                                                                                                                                                                                                                                                         | <i>97</i> |
| 6. | <i>Claim 1[d][ii] “the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller” .....</i>                                                                                                                                                                                                                                                                                                                     | <i>97</i> |
| 7. | <i>Claim 1[d][iii] “and wherein the user-manipulatable control is operable by the user to start a manual charge of the battery or enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger.” .....</i>                                                                                                                                                                                                                                       | <i>97</i> |
| B. | CLAIM 2: “THE VEHICLE CHARGER OF CLAIM 1, WHEREIN THE THIRD CONTROLLER IS ADAPTED FOR AUTOMATIC ESTABLISHMENT OF COMMUNICATION WITH THE FIRST CONTROLLER UPON CONNECTION OF THE VEHICLE CHARGER WITH AT LEAST ONE OF THE BATTERY AND THE SOURCE OF POWER.” .....                                                                                                                                                                                                                                                                                         | 111       |
| C. | CLAIM 3: “THE VEHICLE CHARGER OF CLAIM 1, FURTHER COMPRISING A DISPLAY COUPLED TO THE THIRD CONTROLLER, THE DISPLAY DISPLAYING A LEVEL OF CHARGE OF THE BATTERY.” .....                                                                                                                                                                                                                                                                                                                                                                                  | 113       |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| D.  | CLAIM 6: “THE VEHICLE CHARGER OF CLAIM 1, WHEREIN THE THIRD CONTROLLER AUTOMATICALLY CHANGES THE CHARGING STATE OF THE VEHICLE CHARGER BASED AT LEAST IN PART UPON A TIME OF DAY.” .....                                                                                                                                                                                                                                                                          | 126        |
| IX. | <b>OPINIONS REGARDING GROUND 2: CLAIMS 4, 15-17, AND 19 ARE OBVIOUS OVER SUTARDJA, KELTY, POLLACK, AND BOLL.....</b>                                                                                                                                                                                                                                                                                                                                              | <b>128</b> |
| A.  | CLAIM 4: “THE VEHICLE CHARGER OF CLAIM 1, FURTHER COMPRISING A DISPLAY COUPLED TO THE THIRD CONTROLLER, THE DISPLAY DISPLAYING AN AMOUNT OF TIME FOR THE BATTERY TO BE FULLY CHARGED BASED UPON INFORMATION REGARDING THE BATTERY RECEIVED BY THE THIRD CONTROLLER.” .....                                                                                                                                                                                        | 128        |
| B.  | CLAIM 15 .....                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 135        |
| 1.  | <i>Claim 15[Pre]: “A vehicle charger for charging a battery of a vehicle, the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller, the vehicle charger comprising:” .....</i>                                                                                                                                                                              | <i>135</i> |
| 2.  | <i>Claim 15[a]: “a display mounted within the vehicle within reach of a user seated within the vehicle;” .....</i>                                                                                                                                                                                                                                                                                                                                                | <i>135</i> |
| 3.  | <i>Claim 15[b]: “a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and” .....</i>                                                                                                                                                                                                                                                                                                      | <i>140</i> |
| 4.  | <i>Claim 15[c]: “a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,” .....</i> | <i>140</i> |
| 5.  | <i>Claim 15[d]: “wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached,” .....</i>                                                                                                                   | <i>142</i> |
| 6.  | <i>Claim 15[e]: “wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery, and” .....</i>                                                                                                                                                                                                                                                    | <i>147</i> |
| 7.  | <i>Claim 15[f]: “wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user-manipulatable control on a screen associated with the remote controller.” .....</i>                                                  | <i>148</i> |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| C. | CLAIM 16: “THE VEHICLE CHARGER OF CLAIM 15, FURTHER COMPRISING AT LEAST ONE OF A TRANSMITTER AND A RECEIVER, WHEREIN THE CONTROLLER IS ADAPTED FOR WIRELESS COMMUNICATION WITH THE REMOTE CONTROLLER OF THE COMPUTER VIA THE AT LEAST ONE OF THE TRANSMITTER AND THE RECEIVER.” .....                                                                                                                                                                                               | 148 |
| D. | CLAIM 17: “THE VEHICLE CHARGER OF CLAIM 15, WHEREIN THE CONTROLLER IS ADAPTED FOR AUTOMATIC ESTABLISHMENT OF COMMUNICATION WITH A SECOND CONTROLLER REMOTE FROM THE VEHICLE AND THE VEHICLE CHARGER UPON CONNECTION OF THE VEHICLE CHARGER WITH AT LEAST ONE OF THE BATTERY AND A SOURCE OF POWER.” .....                                                                                                                                                                           | 148 |
| E. | CLAIM 19: “THE VEHICLE CHARGER OF CLAIM 15, WHEREIN THE CONTROLLER IS ADAPTED TO DISPLAY UPON THE DISPLAY AN AMOUNT OF TIME FOR THE BATTERY TO BE FULLY CHARGED BASED UPON INFORMATION REGARDING THE BATTERY RECEIVED BY THE CONTROLLER.” .....                                                                                                                                                                                                                                     | 149 |
| X. | <b>OPINIONS REGARDING GROUND 3: CLAIMS 8 AND 10-12 ARE OBVIOUS OVER SUTARDJA, KELTY, POLLACK, AND GALE</b> .....                                                                                                                                                                                                                                                                                                                                                                    | 149 |
| 2. | <i>Claim 8[Pre]: “A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller, the vehicle charger comprising:” .....</i>                                                                                                                                                             | 149 |
| 3. | <i>Claim 8[a]: “a controller;” .....</i>                                                                                                                                                                                                                                                                                                                                                                                                                                            | 150 |
| 4. | <i>Claim 8[b]: “a display coupled to the controller and adapted to display a time; and” .....</i>                                                                                                                                                                                                                                                                                                                                                                                   | 150 |
| 5. | <i>Claim 8[c]: “a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end,” .....</i>                                                                                                                                                                                                                                                                                                             | 154 |
| 6. | <i>Claim 8[d]: “wherein the controller automatically changes the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user,” .....</i> | 155 |
| 7. | <i>Claim 8[e]: “wherein the controller automatically changes the supply of electric power to the vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of power to the battery is equal to or less than the threshold cost of power, and” .....</i>                                         | 161 |
| 8. | <i>Claim 8[f]: “wherein the controller is responsive to at least one signal from the remote controller by changing the supply of</i>                                                                                                                                                                                                                                                                                                                                                |     |

|              |                                                                                                                                                                                                                                                                                                                |            |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|              | <i>electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user-manipulable control on a screen associated with the remote controller.”</i> .....                                | 161        |
| B.           | CLAIM 10: “THE VEHICLE CHARGER OF CLAIM 8, FURTHER COMPRISING AT LEAST ONE OF A TRANSMITTER AND A RECEIVER, WHEREIN THE CONTROLLER IS ADAPTED FOR WIRELESS COMMUNICATION WITH THE REMOTE CONTROLLER OF THE COMPUTER VIA THE AT LEAST ONE OF THE TRANSMITTER AND RECEIVER.” .....                               | 162        |
| C.           | CLAIM 11: “THE VEHICLE CHARGER OF CLAIM 8, WHEREIN THE CONTROLLER IS ADAPTED FOR AUTOMATIC ESTABLISHMENT OF COMMUNICATION WITH A SECOND CONTROLLER REMOTE FROM THE VEHICLE AND THE VEHICLE CHARGER UPON CONNECTION OF THE VEHICLE CHARGER WITH AT LEAST ONE OF THE BATTERY AND A SOURCE OF POWER.” .....       | 162        |
| D.           | CLAIM 12: “THE VEHICLE CHARGER OF CLAIM 8, WHEREIN THE CONTROLLER IS ALSO ADAPTED TO DISPLAY A LEVEL OF CHARGE OF THE BATTERY ON THE DISPLAY.” .....                                                                                                                                                           | 163        |
| <b>XI.</b>   | <b>OPINIONS REGARDING GROUND 4: CLAIM 5 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK AND UCHIDA</b> .....                                                                                                                                                                                                          | <b>163</b> |
| A.           | CLAIM 5: “THE VEHICLE CHARGER OF CLAIM 1, FURTHER COMPRISING A DISPLAY DISPLAYING A TOTAL POWER COST OF A CHARGING SESSION.” .....                                                                                                                                                                             | 163        |
| <b>XII.</b>  | <b>OPINIONS REGARDING GROUND 5: CLAIM 7 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK AND ZHANG</b> .....                                                                                                                                                                                                           | <b>168</b> |
| A.           | CLAIM 7: “THE VEHICLE CHARGER OF CLAIM 1, FURTHER COMPRISING A BATTERY OF THE VEHICLE CHARGER, THE BATTERY OF THE VEHICLE CHARGER COUPLED TO THE THIRD CONTROLLER AND THE ELECTRICAL POWER CORD, AND SUPPLYING POWER TO CHARGE THE BATTERY OF THE VEHICLE IN AT LEAST ONE STATE OF THE VEHICLE CHARGER.” ..... | 168        |
| <b>XIII.</b> | <b>OPINIONS REGARDING GROUND 6: CLAIM 9 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK, GALE AND EVANS</b> .....                                                                                                                                                                                                     | <b>173</b> |
| A.           | CLAIM 9: “THE VEHICLE CHARGER OF CLAIM 8, WHEREIN THE DISPLAY IS MOUNTED IN A CONSOLE WITHIN THE VEHICLE.” .....                                                                                                                                                                                               | 173        |
| <b>XIV.</b>  | <b>OPINIONS REGARDING GROUND 7: CLAIM 14 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK, GALE, AND UCHIDA</b> .....                                                                                                                                                                                                  | <b>179</b> |
| A.           | CLAIM 14: “THE VEHICLE CHARGER OF CLAIM 8, WHEREIN THE CONTROLLER IS ALSO ADAPTED TO DISPLAY ON THE DISPLAY A TOTAL POWER COST OF THE CHARGING SESSION.” .....                                                                                                                                                 | 179        |
| <b>XV.</b>   | <b>OPINIONS REGARDING GROUND 8: CLAIMS 13 AND 18 ARE OBVIOUS OVER SUTARDJA, KELTY, POLLACK, GALE, AND BOLL</b> .....                                                                                                                                                                                           | <b>179</b> |

|              |                                                                                                                                                                                                                                                     |            |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| A.           | CLAIM 13: “THE VEHICLE CHARGER OF CLAIM 8, WHEREIN THE CONTROLLER IS ALSO ADAPTED TO DISPLAY UPON THE DISPLAY AN AMOUNT OF TIME FOR THE BATTERY TO BE FULLY CHARGED BASED UPON INFORMATION REGARDING THE BATTERY RECEIVED BY THE CONTROLLER.” ..... | 179        |
| B.           | CLAIM 18: “THE VEHICLE CHARGER OF CLAIM 15, WHEREIN THE CONTROLLER IS ADAPTED TO DISPLAY A LEVEL OF CHARGE OF THE BATTERY ON THE DISPLAY.” .....                                                                                                    | 179        |
| <b>XVI.</b>  | <b>OPINIONS REGARDING GROUND 9: CLAIM 20 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK, BOLL, AND UCHIDA .....</b>                                                                                                                                       | <b>179</b> |
| A.           | CLAIM 20: “THE VEHICLE CHARGER OF CLAIM 15, WHEREIN THE CONTROLLER IS ADAPTED TO DISPLAY ON THE DISPLAY A TOTAL POWER COST OF THE CHARGING SESSION.” .....                                                                                          | 179        |
| <b>XVII.</b> | <b>CONCLUSION .....</b>                                                                                                                                                                                                                             | <b>180</b> |

I, Scott Andrews, declare as follows:

**I. INTRODUCTION**

1. I have been retained by counsel for Petitioner as a technical expert in the above-captioned case. Specifically, I have been asked to render certain opinions regarding the IPR petition with respect to U.S. Patent No. 10,090,567 (“the ’567 Patent”). I understand that the Challenged Claims are 1-20, and my opinions are limited to those claims. A true and correct copy of my Curriculum Vitae, which provides further details about my background and experience, is appended to this Declaration.

**A. Educational Background and Professional Experience**

2. My current curriculum vitae is attached as Exhibit A, which includes a detailed listing of my education, work experience, honors, awards, professional associations, publications, and a list of my expert consulting activities during the past five years in which I have testified as an expert at deposition or trial.

3. I have over 30 years of professional experience in the field of electronics, mobile information technology, and communication systems. Further, I have authored numerous published technical papers and am a named inventor on 13 U.S. and foreign patents.

4. I received a Bachelor of Science degree in Electrical Engineering from University of California, Irvine in 1977 and a Master of Science degree in Electronic Engineering from Stanford University in 1982.

5. From 1977 to 1979, I worked at Ford Aerospace where I designed, tested and delivered microwave radar receiver systems. From 1979 to 1983, I worked at Teledyne Microwave, where I developed high reliability microwave components and developed CAD tools. From 1983 to 1996, I worked at TRW, Inc., having held various positions. From 1983 to 1985, I was a Member of the technical staff and a Department Manager in the Space Electronics sector. Between 1985 and 1990 I was a project manager working on various communications systems projects including the US DoD Advanced Research Projects Administration (ARPA) MIMIC Program. Between 1990 and 1993 I was the Manager of MMIC (monolithic-microwave-integrated-circuit) Products Organization. In this role, I developed business strategy and managed customer and R&D programs. During this time, I also developed the first single chip 94 GHz Radar, used for automotive cruise control and anti-collision systems. In 1993, I transferred to the TRW Automotive Electronics Group, and managed about 30 engineers in the Systems Engineering and Advanced Product Development organization. In this role, I managed advanced development programs such as electronic and electrohydraulic steering systems, automotive radar, adaptive

cruise control, occupant sensing, automatic crash notification systems, in-vehicle information systems, vehicle user interfaces, and other emerging transportation products.

6. I was employed as a Project General Manager in the Electronics Division of Toyota Motor Corporation at Toyota headquarters in Toyota City, Japan from April 1996 to around April 2000. In this position, I was responsible for leading the development of vehicle telematics systems, infotainment systems, including onboard and off-board navigation systems, traffic information systems, vehicle communications systems, safety applications, and automated vehicle control systems. This work also included advanced parking management systems wherein parking lot sensors would be used to identify open parking places that could then be communicated to drivers via the connected vehicle information system.

7. I am currently a consultant for Cogenia Partners, LLC, focusing on systems engineering, business development and technical strategy supporting automotive and information technology. I have been in this position since 2001. In one of my active engagements, I serve as the technical lead on a project funded by the National Highway Traffic Safety Administration (NHTSA) to develop requirements for connected vehicle safety systems in preparation for NHTSA regulations governing such systems. I also serve as a technical consultant on multiple

projects sponsored by the Federal Highway Administration (FHWA) related to connected vehicle technology research. One project on which I was the chief systems engineer was a truck parking information and reservation system. In this system, truck drivers were provided information on available parking at truck stops along the road ahead of their current location. The system would identify their hours of service, and recommend where they should stop to rest based on parking availability. The system included various techniques for sensing open truck parking places (including ultrasonic (sonar), infrared, and camera sensors), and allowed the driver to also potentially reserve a space. This project also explored mechanisms for truck electrification which is a technique for providing electric power to parked trucks to minimize the use of diesel fuel while parked and idling.

8. In 2003, working with two colleagues, I designed a prototype electric vehicle with the aim of providing a high-performance vehicle with extensive electronic features such as electronically controlled steering, suspension, in vehicle information systems and such. As part of this development effort, I also developed a patent related to how information in a highly integrated vehicle would be shared among the various electronic control units. This invention is described, in, among various other patents, U.S. Patent 7,802,263. Many of the features envisioned for this vehicle are now found in commercially available electric vehicles. As a result

of this activity, I have a deep understanding of the architecture of electric vehicles, the limitations and characteristics of the powertrain and energy sources, and the various considerations associated with charging these vehicles.

9. I also worked on a user interface for a Ford EV concept car called the EVent. In this system I used a laptop computer screen in place of the instrument cluster of the car, and used a small touch pad located on the center console. The screens for the display included four soft button areas that corresponded to the four corners of the touch pad. Touching a corner of the touch pad then activated that button on the screen. This allowed the driver to activate different features, such as the audio system, the navigation system, the charge status, the HVAC systems, etc. without taking eyes off the road. I was subsequently awarded U.S. Patent number 5,864,105, titled Method and Apparatus for Controlling an Adjustable Device, based on the concept of the touch pad being used as a physical (shape) metaphor for the thing being controlled.

10. In the various positions mentioned above, I was responsible for research and development projects relating to numerous mobile and vehicle information systems, hybrid vehicles systems, vehicle networks, user interface systems, sensory systems, communications systems, control systems and safety systems, and had the opportunity to collaborate with numerous researchers and suppliers that are involved

in the field of automotive control systems. I therefore believe that I have a detailed understanding of the state of the art during the relevant period, as well as a sound basis for opining how persons of skill in the art at that time would understand the technical issues in this case.

## II. MATERIALS CONSIDERED

11. In forming my opinions, I have relied on my own knowledge and experience, including my education, training, and work experience in the field of electrical engineering, my experience in working with others in this field, and my experience in the design, development, and operation of relevant systems.

12. In developing my opinions, I have considered the following materials:

| Exhibit      | Description                                                               |
|--------------|---------------------------------------------------------------------------|
| Exhibit 1001 | U.S. Patent No. 10,090,567 to Austin (“the ’567 Patent”)                  |
| Exhibit 1002 | U.S. Patent No. 10,090,567 File History (“the ’567 File History”)         |
| Exhibit 1003 | Declaration of Scott Andrews                                              |
| Exhibit 1004 | U.S. Patent Publication No. 2008/0136371 to Sutardja (“Sutardja”)         |
| Exhibit 1005 | U.S. Patent Publication No. 2008/0039989 A1 to Pollack et al. (“Pollack”) |
| Exhibit 1006 | U.S. Patent Publication No. 2009/0021218 to Kelty et al. (“Kelty”)        |
| Exhibit 1007 | U.S. Patent No. 5,623,194 to Boll et al. (“Boll”)                         |

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|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Exhibit 1008 | U.S. Patent No. 2008/0203973 to Gale et al. (“Gale”)                                                                                                                            |
| Exhibit 1009 | U.S. Patent Appl. Publication No. 2010/0102776 to Uchida (“Uchida”)                                                                                                             |
| Exhibit 1010 | U.S. Patent Appl. Publication No. 2008/0067974 to Zhang et al. (“Zhang”)                                                                                                        |
| Exhibit 1011 | U.S. Patent No. 5,534,759 to Evans et al. (“Evans”)                                                                                                                             |
| Exhibit 1012 | U.S. Patent No. 5596261 to Suyama (“Suyama”)                                                                                                                                    |
| Exhibit 1013 | Willett Kempton and Jasna Tomić. <i>Vehicle-to-grid power fundamentals: Calculating capacity and net revenue</i> . Journal of Power Sources. 2005. 144. pp. 268–279 (“Kempton”) |
| Exhibit 1014 | Chan, <i>The State of the Art of Electric and Hybrid Vehicles</i> , February 2002, Vol. 90, No. 2, IEEE (“Chan”)                                                                |
| Exhibit 1015 | <i>Electric Vehicle Battery Systems</i> , Sandeep Dhameja, Newnes, 2002 (“Sandeep”)                                                                                             |
| Exhibit 1016 | U.S. Patent No. 5,573,090 to Ross (“Ross”).                                                                                                                                     |
| Exhibit 1017 | U.S. Patent No. 5,487,002 to Diller et al. (“Diller”)                                                                                                                           |
| Exhibit 1018 | Nadal, M. and Barbir, F. <i>Development of a Hybrid Fuel Cell/Battery Powered Electric Vehicle</i> . International Association for Hydrogen Energy.1996. (“Nadal”).             |
| Exhibit 1019 | U.S. Patent No. 7,084,859 to Pryor (“Pryor”)                                                                                                                                    |
| Exhibit 1020 | PCT Application Pub. No. WO 2006/124130 to Hanssen et al. (“Hanssen”)                                                                                                           |
| Exhibit 1021 | U.S. Patent No. 5,701,122 to Canedy. (“Canedy”).                                                                                                                                |
| Exhibit 1022 | U.S. Patent No. 6,181,996 to Chou et al. (“Chou”)                                                                                                                               |
| Exhibit 1023 | U.S. Patent No. 7,764,932 to Rofougaran et al. (“Rofougaran”)                                                                                                                   |
| Exhibit 1024 | U.S. Patent Application Publication to Witkowski et al. (“Witkowski”)                                                                                                           |

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|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Exhibit 1025 | U.S. Patent No. 7,596,391 to Himmelstein. (“Himmelstein”)                                                                                                                                                                                                  |
| Exhibit 1026 | U.S. Patent Application No. 61/134646 to Ambroziak (“Ambroziak”)                                                                                                                                                                                           |
| Exhibit 1027 | U.S. Patent No. 7,956,570 to Lowenthal et al. (“Lowenthal-570”)                                                                                                                                                                                            |
| Exhibit 1028 | U.S. Patent Application No. 2010/0211340 to Lowenthal et al. (“Lowenthal-340”)                                                                                                                                                                             |
| Exhibit 1029 | U.S. Patent Application No. 2008/0312782 to Berdichevsky et al. (“Berdichevsky”)                                                                                                                                                                           |
| Exhibit 1030 | U.S. Patent No. 7,693,609 to Kressner et al. (“Kressner”)                                                                                                                                                                                                  |
| Exhibit 1031 | U.S. Patent No. 5,367,558 to Gillig et al. (“Gillig”)                                                                                                                                                                                                      |
| Exhibit 1032 | William C.Y. Lee, <i>Wireless &amp; Cellular Telecommunications</i> , McGraw-Hill (3 <sup>rd</sup> Ed.) (“Lee”)                                                                                                                                            |
| Exhibit 1033 | K. Shuaib et al., <i>Co-existence of Zigbee and WLAN, A Performance Study</i> , IEEE Xplore (2006) (“Shuaib”)                                                                                                                                              |
| Exhibit 1034 | Jin-Shyan Lee, Yu-Wei Su, and Chung-Chou Shen, <i>A Comparative Study of Wireless Protocols: Bluetooth, UWB, ZigBee, and Wi-Fi</i> , The 33rd Annual Conference of the IEEE Industrial Electronics Society (IECON) (Nov. 5-8, 2007, Taipei, Taiwan) (“Su”) |
| Exhibit 1035 | <i>Specification of the Bluetooth System Master Table of Contents &amp; Compliance Requirements: Covered Core Package version: 2.0 + EDR</i> . 4 November 2004. (“Bluetooth Specification”).                                                               |
| Exhibit 1036 | The Massachusetts Division of Energy Resources, Sept. 2000, <i>INSTALLATION GUIDE FOR ELECTRIC VEHICLE CHARGING EQUIPMENT An Introduction to EVCE</i>                                                                                                      |
| Exhibit 1037 | U.S. Patent No. 5,467,006 to Sims (“Sims”).                                                                                                                                                                                                                |
| Exhibit 1038 | U.S. Patent No. 8,531,162 to Hafner et al. (“Hafner”)                                                                                                                                                                                                      |
| Exhibit 1039 | U.S. Patent Application No. 2009/0021213 to Johnson (“Johnson”)                                                                                                                                                                                            |
| Exhibit 1040 | U.S. Patent No. 5,406,188 to Myslinski, et al. (“Myslinski”)                                                                                                                                                                                               |

|                 |                                                                             |
|-----------------|-----------------------------------------------------------------------------|
| Exhibit<br>1041 | U.S. Patent No. 7,698,078 to Kelty et al., (“Kelty-078”)                    |
| Exhibit<br>1042 | U.S. Patent No. 5,548,200 to Nor et al., (“Nor”)                            |
| Exhibit<br>1043 | U.S. Patent No. 7,084,859 to Pryor (“Pryor”)                                |
| Exhibit<br>1044 | U.S. Patent No. 6,577,928 to Obradovich (“Obradovich”)                      |
| Exhibit<br>1045 | U.S. Patent Application No. 2003/0230443 to Cramer et al. (“Cramer”)        |
| Exhibit<br>1046 | U.S. Patent No. 5,963,140 to Kawaguchi et al., (“Kawaguchi”)                |
| Exhibit<br>1047 | EP 1220350B1 to Ishii. (“Ishii”).                                           |
| Exhibit<br>1048 | U.S. Patent No. 5,757,595 to Ozawa et al., (“Ozawa”)                        |
| Exhibit<br>1049 | U.S. Patent No. 8,063,757 to Frey et al., (“Frey”)                          |
| Exhibit<br>1050 | Japanese Application Publication 2003-333706 to Hayashi et al. (“Hayashi”). |
| Exhibit<br>1051 | Japanese Application Publication 2006-074868A to Izuno et al. (“Izuno”)     |

13. I have considered these materials from the viewpoint of a POSITA as of the priority date of the '567 Patent. For the purposes of this declaration, the priority date of the '567 Patent is August 18, 2008, as I discuss below. *See* Section 28 below. I note that my opinions provided in this Declaration are made from the perspective of a POSITA as of this priority date of the '567 Patent unless expressly stated otherwise. To the extent that I use any verb tense in this Declaration that is present tense (e.g., “a POSITA would understand” instead of “a POSITA would have

understood”), such verb tense should be understood to be my opinion as of the ’567 Patent’s priority date (again, unless expressly stated otherwise). I merely use the present verb tense for ease of reading.

### **III. OVERVIEW AND LEGAL STANDARDS**

14. In formulating my opinions, I have been instructed to apply certain legal standards. I am not a lawyer. I do not offer any testimony regarding what the law is. Instead, the following sections summarize the law as I have been instructed to apply it in formulating and rendering my opinions found later in this declaration. I understand that, in an *inter partes* review (“IPR”) proceeding, patent claims may be deemed unpatentable if it is shown that they are anticipated or rendered obvious in view of the prior art. I understand that prior art in an IPR review is limited to patents or printed publications that predate the priority date of the patent at issue. I understand that questions of claim clarity (definiteness) and enablement cannot be considered as a ground for considering the patentability of a claim in these proceedings.

#### **A. Person of Ordinary Skill in the Art**

15. I understand that the ’567 Patent, the record of the proceedings at the Patent Office (which I understand is called the “File History” or “Prosecution

History”), and the teachings of the prior art are evaluated from the perspective of a person of ordinary skill in the art (“POSITA”). I understand that the factors considered in determining the ordinary level of skill in the art may include: (i) the levels of education of the inventor; (ii) the types of problems encountered in the art; (iii) prior art solutions to those problems; (iv) the rapidity with which innovations are made; (v) the sophistication of the technology; and (vi) the educational level of persons working in the field.

16. I understand that a person of ordinary skill in the art is not a specific real individual, but rather a hypothetical individual having the qualities reflected by the factors above. The hypothetical person is presumed to have the same level of skill as the typical practitioner of the art and is presumed to have knowledge of all prior art in the relevant field. I understand that the inventor’s actual knowledge or lack of knowledge of prior art reference is irrelevant to the obviousness determination.

**B. Obviousness**

17. I understand that a claim may be invalid under 35 U.S.C. § 103(a) if the subject matter described by the claim as a whole would have been “obvious” to a POSITA in view of a single or combination of prior art references at the time the claimed invention was made. I further understand that a POSITA is assumed to know

and to have all relevant prior art in the field of endeavor covered by the patent-in-suit and all analogous prior art. I understand that obviousness in an IPR review proceeding is evaluated using a preponderance of the evidence standard, which means that the claims must be more likely obvious than nonobvious.

18. I also understand that an obviousness determination includes the consideration of various factors including: (1) the scope and content of the prior art, (2) the differences between the prior art and the claim at issue, and (3) the level of ordinary skill in the pertinent art. I understand that secondary considerations of non-obviousness such as commercial success, long-felt but unresolved needs, failure of others, and so forth may be assessed as well. I have been informed that an obviousness analysis must consider the full scope of the claims to avoid impermissibly using hindsight to invalidate a patent.

19. In considering whether certain prior art renders a particular patent claim obvious, I have been informed that I can consider the scope and content of the prior art, including the fact that a POSITA would regularly look to the disclosures in patents, trade publications, journal articles, conference papers, industry standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard setting organizations, and materials from industry conferences, as examples.

20. I have been informed that for a prior art reference to be proper for use in an obviousness analysis, the reference must be “analogous art” to the claimed invention. A reference is analogous art if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). For a reference to be “reasonably pertinent” to the problem, it must logically have commended itself to an inventor’s attention in considering the problem. In determining whether a reference is reasonably pertinent, one should consider the problem faced by the inventor, as reflected either explicitly or implicitly, in the specification. I believe that the documents I considered in forming my opinions in this IPR are well within the range of documents a POSITA would have consulted to address the type of problems described in the Challenged Claims.

21. I have been informed that to establish that a claimed invention was obvious based on a combination of prior art elements, an articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I have been informed that the prior art, either as a single reference or a combination of multiple items of prior art, renders a patent claim obvious when there was an apparent reason for a POSITA, at the time of the invention, to combine or modify

the prior art. Rationales for combining or modifying the prior art include, but are not limited to, any of the following: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) identifying an explicit 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 the prior art references to arrive at the claimed invention.

22. I have also been informed that where there is a motivation to combine, claims may be rejected as obvious provided a POSITA would have had a reasonable expectation of success regarding the proposed combination. I have also been informed that common sense may be considered. Common sense teaches that familiar items may have obvious uses beyond their primary purposes. I have been informed that if the combination was obvious to try (regardless of whether it was

actually tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than non-obvious innovation.

23. I have been informed that the existence of an explicit teaching, suggestion, or motivation to combine known elements of the prior art is a sufficient, but not a necessary, condition to a finding of obviousness. In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose described in the patent-in-suit controls. I have been further informed that the obviousness analysis may consider the effects of demands known to the technological community or present in the marketplace and the background knowledge possessed by a POSITA. These issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent.

24. I have been informed that it is improper to combine references where the references teach away from their combination. A reference may be said to teach away when a POSITA, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the patent applicant. I have also been informed that a reference does not teach away if it merely expresses a general preference for an

alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed.

25. I am informed that even if a case of obviousness is established, the final determination of obviousness must also consider “secondary considerations” if presented. Secondary considerations include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied 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) lack of independent simultaneous invention within a comparatively short space of time; and (h) teaching away from the invention in the prior art.

26. I have been further informed that secondary considerations evidence is only relevant if the offering party establishes a connection, or nexus, between the evidence and the claimed invention. The nexus cannot be based on prior art features. The establishment of a nexus is a question of fact. While I understand that Patent Owner here has not offered any secondary considerations at this time, I will supplement my opinions should Patent Owner raise secondary considerations during the course of this proceeding.

**C. Claim Construction**

27. I understand that the claim terms in an IPR proceeding not expressly construed otherwise, are interpreted according to their plain and ordinary meaning as understood in light of the claim language, the patent's description, and the prosecution history viewed from the perspective of a POSITA. I further understand that where a patent defines claim language, the definition of the patent controls, even if there are other definitions that might be understood by those working in the art.

28. I have been instructed to apply the following claim construction for purposes of this proceeding:

**“cost of power”** (claims 5, 11, and 19) – monetary price of power.

**D. Level Of A Person Of Ordinary Skill**

29. Based on my review and analysis of the '567 Patent, the cited prior art, and the ordinary skill factors described in this section, a POSITA at the time of the '567 Patent would have had at least a bachelor's degree in electrical or mechanical engineering (or an equivalent field) and at least two years of work experience involving automotive systems, including electric vehicle battery charging systems. Additional industry experience or technical training may offset less formal education, while advanced degrees or additional formal education may offset lesser

levels of industry experience. When I refer to the understanding of a POSITA, I am referring to the understanding of such a person as of August 18, 2008.

30. As of August 18, 2008, I had more than ordinary skill in the art. I am, however, familiar with the skills and knowledge possessed by those I would have considered to be of ordinary skill in the art as of that date. For example, I worked at Toyota Motor Corporation from 1996 to 2000, where I conceptualized and developed new technology products and services for Toyota's future passenger vehicles. Such technology products included a heavy emphasis on vehicle electronic systems, vehicle information systems and vehicle and mobile device based user interface systems. I also designed a novel hybrid electric vehicle that used a dynamically charged electric powertrain system in conjunction with a conventional internal combustion engine to create a very high-performance vehicle.

31. My opinions provided in this declaration would not change in view of minor modifications to this level of ordinary skill.

#### **IV. OVERVIEW OF THE '567 PATENT**

32. The '567 Patent is directed to a vehicle battery charging system in which a controller enables user-defined charging schedules and communicates with remote controllers to control charging based on factors such as time of day, electricity cost, or other factors. Ex. 1001, Abstract, 1:59-2:3.

**A. Field of Endeavor**

33. I have been informed that the field of endeavor of the claimed invention can be determined by reference to explanations of the invention's subject matter in the patent application, including the embodiments, function, and structure of the claimed invention.

34. The '567 Patent relates to electric vehicle battery charging systems. EX1001, Abstract, 1:59-2:3.

35. For these reasons, a POSITA would understand that the field of endeavor of the '567 Patent includes electric vehicle battery charging systems.

**B. Problem Solved by the Inventor**

36. I have been informed that a prior art reference is "reasonably pertinent" if a POSITA would have consulted it and applied its teachings when faced with the problems that the inventor was trying to solve. As such, I have been asked to analyze the '567 Patent and determine the problems that the inventors were trying to solve.

37. The '567 is directed to problems such as efficiently controlling electric vehicle charging in a vehicle system accounting for user preferences and charging conditions. EX1001, 1:49-55, 1:59-2:17, 8:57-9:12.

38. The '567 is directed to problems such as implementing user interfaces and displays for monitoring and controlling vehicle battery charging operations. EX1001, 1:49-55, 2:10-17, 10:31-11:48.

39. The '567 is directed to optimally positioning charging-related displays within a vehicle to improve accessibility and usability for vehicle operators. EX1001, 10:31-11:48.

## **V. OVERVIEW OF THE TECHNOLOGY**

40. I was asked to briefly summarize the background of the prior art from the standpoint of a person having ordinary skill in the art prior to August 18, 2008. As explained below, the charging of electric-powered vehicles described in the '567 Patent was based on well-known intelligent charging systems and technologies used for vehicles with electric drive systems. All the functionalities encompassed by the Challenged Claims were thus well-known and conventional prior to the invention of the '567 Patent.

### **A. Electric Vehicles**

41. Electric vehicles (EV) “use an electric motor to provide all or part of the mechanical drive power.” EX1013-Kempton, 269, Section 3. “EVs may include battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), and fuel-cell

electric vehicles (FCEVs).” EX1014-Chan, 247. The “EV was invented in 1834” and “[b]y the mid-1970s, oil shortages led to aggressive development of EV programs[,]” with EVs being leased and sold in the USA starting in 1996. EX1014-Chan, 248; EX1015-Sandeep, 4; *see also*, EX1014-Chan, 255 at Table 2. Thus, electric vehicles, such as hybrid vehicles and fully electric vehicles, were readily available and well-known prior to the ’567 Patent.

## **B. Electric Vehicle Hardware**

### **1. Chargers**

42. Electric vehicles were known to require some form of charging to maintain the electric power source. EX1016-Ross, 2:10-15. For this reason, electric vehicles included chargers for charging the batteries on the vehicles. *See, e.g.*, EX1017-Diller, 3:30-31, 4:15-19 (generally describing the energy management system (EMS) on-board the vehicle that contains a “micro-controller” controlling the “charger 60 for the battery in the vehicle”); EX1016-Ross, 7:57-67 (describing an electric vehicle that includes an “onboard power receiving module 20” that “receives electrical power”).

### **2. Controllers**

43. Managing EV charging within the vehicle itself was known, as EVs were known to include controllers for controlling charging of the vehicle. For

example, EV systems had a controller on-board the vehicle for controlling charging of the batteries among other vehicle functions; for instance, Diller's EV includes a micro-controller 12 as a calculation engine and means for controlling the various systems of the electric vehicle." EX1017-Diller, 3:29-33. Ross also describes the EV including a "microprocessor controller 56, which is realized using a conventional processor-based system" as part of an on-board "power control unit 32." EX1016-Ross, 8:14-20 (describing the power control unit 32 on-board the vehicle directing charge to the "energy storage system"), 11:37-51, 16:47-50. The microprocessor controller 56 controls charging by "directing the power to and from the energy storage system," among other vehicle functions (e.g., "monitoring onboard vehicle sensors 60" and "receiving appropriate commands from the operator control devices 38"). *Id.*, 11:58-67 (describing many "tasks" carried out by the microprocessor "are the same as carried out with the operation of any EV").

44. Thus, the use of controllers in electric vehicles to monitor and control the charging process was well-known prior to the '567 Patent.

### **3. *Displays***

45. Electric vehicles also commonly included in-vehicle displays for displaying charging information. *See, e.g.*, EX1015-Sandeep, 144-145, EX1018-Nadal, 5-6. For example, vehicles were known to have "a basic vehicle dashboard"

comprising “tactile displays/and or touch screens 10-14” which “can be used for the basic control functions of the vehicle.” EX1019-Pryor, 2:38, 13:19-21. These displays were known to be connected to controllers via, e.g., communication buses. *See, e.g.*, EX1020-Hanssen, 12:5-7, 5:7-13 (generally describing the display of an electric vehicle may “receive[] information from the advanced battery” and “includes means for communication with the vehicle’s communication bus[.]”); EX1021-Canedy, 4:6-12 (“the microprocessor 100 controls a display 110 having a seven segment display array 115, via control bus 111”). Electronic control units typically interface with visual displays and sensors via a communication bus such as a SAE J1850 bus or a CAN-bus. EX1022-Chou, 3:1-13 (“a vehicle 100 having at least one sensor (e.g. sensor circuit) and more preferably a plurality of sensors located at different positions in the vehicle [], an electronic control unit (ECU) 140 [] for controlling sensor circuits, a vehicle communication bus 105 for carrying data and control signals to the ECU 140, an ECU 160 interfaced with the bus 105, and at least one interface device...including, for example, any one or more of a visual display 170”), 3:58-63 (“the car bus, such as a Society of Automotive Engineers (SAE) J1850 communication bus, or a Controller Area Network (CAN)”).

46. Thus, in-vehicle displays were known to be included in vehicles and were commonly connected to controllers in the vehicle, prior to the ’567 Patent.

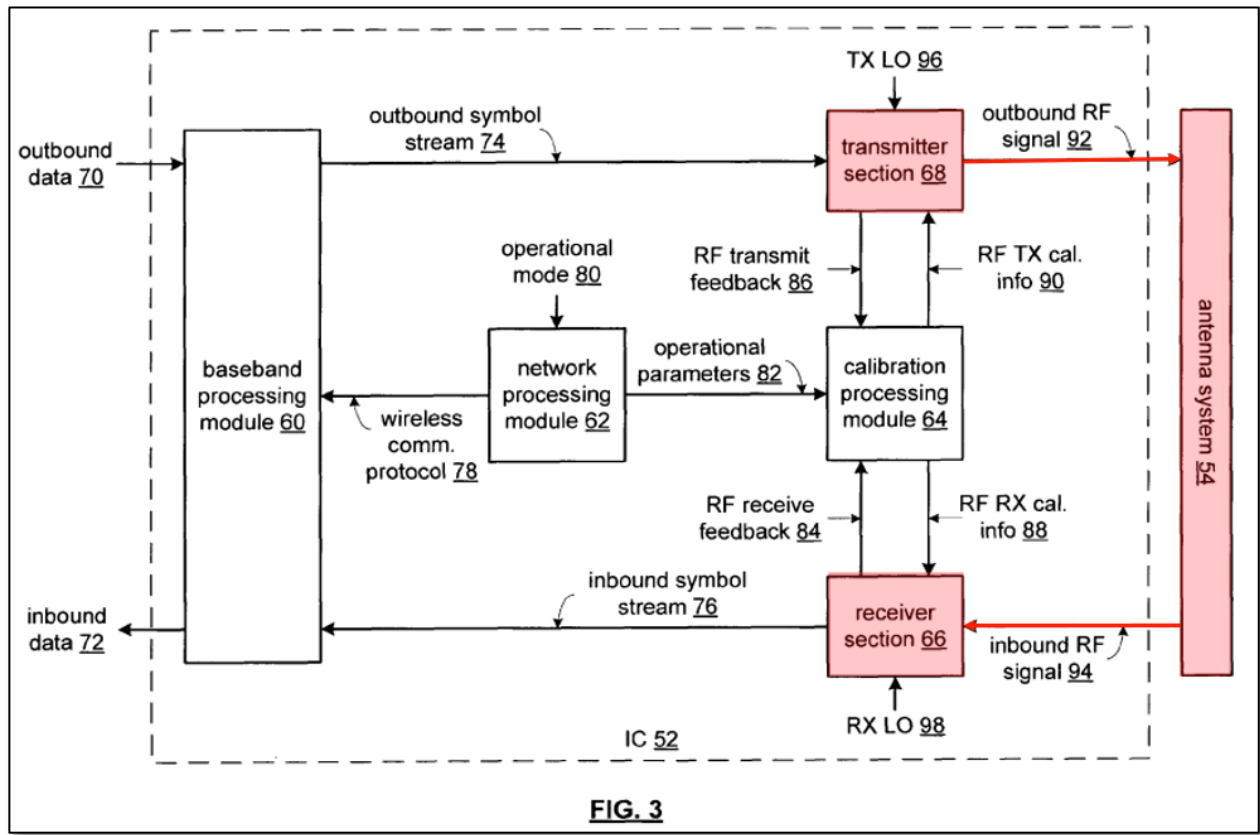
#### **4. *User Controls***

47. Devices and methods for user-controllable input values and thresholds related to electric vehicle (EV) charging were well known prior to the '567 patent. User interfaces “associated with an electric resource such as an electric vehicle that includes an energy storage system... may be displayed on a device associated with the owner of the electric resource, such as a cell phone or portable computer.” These user interfaces enabled the input of “power aggregation preferences and constraints,” allowing a user to “control a degree of participation of the electric resource in a power aggregation scenario via the user interface.” EX1006-Pollack, [0228]. Thus, user-controllable input values and thresholds were well known before the '567 patent.

#### **C. Transmitter, Receivers, and Transceivers**

48. It was well known prior to the '567 patent that transmitters, receivers, and transceivers were commonplace components of wireless communication systems and devices. For example, Rofougaran describes a wireless communication device that utilizes cellular telephone systems and that “[f]or each wireless communication device to participate in wireless communications, it includes a built-in **radio transceiver (i.e., receiver and transmitter)** or is coupled to an associated radio transceiver” EX1023-Rofougaran, 1:34-37, 2:6-9. More specifically,

Rofougaran teaches a “wireless communication device that includes an integrated circuit and an antenna system”, the integrated circuit including “a receiver section 66, and a transmitter section 68.” EX1023-Rofougaran, 5:14-17, 5:56-65, Fig. 3.



EX1023-Rofougaran, Fig. 3. The antenna system includes “an antenna 290,” where the antenna system “provides inbound RF signal 94 to the receiver section 66 and receives the outbound RF signal 92 from the transmitter section 68...then transmits the outbound RF signal 92.” EX1023-Rofougaran, 9:5-10, 27:5-13, Fig. 13. Fig. 18. Rofougaran teaches that transmitter section 68 “converts the outbound symbol

stream 74 into an outbound RF signal 92,” where the conversion is dependent on the wireless communication protocol. EX1023-Rofougaran, 8:54-9:4.

**D. Remotely Communicating Charging Information with Vehicle**

49. At the time of the '567 Patent, it was well known that mobile devices were able to wirelessly communicate with vehicle systems. EX1024-Witkowski, Abstract, [0018], FIG. 1; EX1025-Himmelstein, 1:66-65, Abstract. For example, it was known that systems existed for “transfer of information between a motor vehicle and other electronic systems outside of the vehicle.” EX1026-Witkowski, [0018]; *see also id.*, Abstract (“A system for communicating information includes a transceiver provided within a vehicle that is configured for wireless communication with a cellular phone and with a portable computing device.”); EX1025-Himmelstein, 1:55-65 (discussing that the method disclosed is for “providing communication between a cellular phone and vehicle”).

50. It was further known that this communication with the vehicle via a cellular phone would be desirable for the user of a vehicle. EX1024-Witkowski, [0004] (“In many environments, such as within an automobile, it would be desirable to be able to communicate voice and/or data in wireless fashion between various subsystems of the vehicle, such as overhead display subsystem of the vehicle, a

cellular phone, notebook computer, PDA, pager or other personal electronic device which is carried on the person of an individual.”). Additionally, it was also known such users would desire communicating charging information remotely from a phone to a vehicle. *See, e.g.*, EX1026-Ambroziak, 11 (generally describing a user entering charging information, such as “charging parameters” via an “iPhone®” through Bluetooth).

### ***1. Wireless Communications***

51. Managing EV charging via wireless communication protocols was known prior to the ‘567 patent. For example, Lowenthal taught and claimed “A method of transferring charge between a local power grid and an electric vehicle”, comprising: “(1) assembling a user profile, the user profile containing payment information, the user profile being stored on a server; (2) providing an electrical receptacle for transferring charge, the receptacle being connected to the local power grid by an electric power line, charge transfer along the electric power line being controlled by a controller configured to operate a control device on the electric power line; (3) receiving a request to the controller for charge transfer, the request being made from a mobile wireless communication device by an operator of the electric vehicle, the controller being connected to a communication device for communication with the mobile wireless communication device; (4) relaying the

request from the controller to the server, the controller being connected to a local area network for communication to the server via a wide area network; (5) validating a payment source for the operator of the electric vehicle based on the user profile corresponding to the operator, (6) enabling charge transfer by communicating from the server to the controller to activate the control device; (7) monitoring the charge transfer using a current measuring device on the electric power line, the controller being configured to monitor the output from the current measuring device and to maintain a running total of charge transferred; (8) detecting completion of the charge transfer, and (9) on detecting completion, sending an invoice to the payment source and disabling charge transfer.” EX1027-Lowenthal-570, 4:15-43, Claim 55.

52. Lowenthal also taught sending “one or more notifications messages to a user of an electric vehicle (E.G., Electric vehicle is fully charged)” EX1028-Lowenthal-340, [0052], Fig. 4. This notification may be in the form of an email, SMS message, or other types of electronic messaging, and “may be sent to the user if the electric vehicle is fully charged or almost charged, or not charging, or periodic updates providing the amount of energy transferred thus far.” EX1028-Lowenthal-340, [0052], Fig. 4.

53. Wireless communication capabilities prior to the ’567 patent were also known to enable charge management in response to power costs and time windows.

As taught by Pollack, “In one implementation, the system 100 also uses cost as a temporal variable. For example, if the system 100 schedules a discharged pack to charge during an upcoming time window, the system 100 can predict its look-ahead cost profile as it charges, allowing the system 100 to further optimize, adaptively.” EX1006-Pollack, [0103]. Berdichevsky describes an electric vehicle communication interface that allows “the user to pre-register with local utility companies and energy providers to control the timing of charging of the vehicle such that charging occurs during low power consumption times at a lower cost to the vehicle user.” EX1029-Berdichevsky, [0010]. Kressner taught a system which “arranges the schedule to minimize the demand loading on the local distribution network to more efficiently operate powerplants providing electrical power to the distribution networks.” EX1030-Kressner, Abstract. “The system includes a meter having a power connection configured to electrically couple to the hybrid vehicle. A local electrical distribution network is electrically coupled to the meter. A controller associated with the local electrical distribution network and disposed in communication with the utility distribution network and the meter, said controller including a processor responsive to executable computer instructions for providing a signal to said meter to allow electrical power to flow to said battery.” EX1030-Kressner, 2:4-12. “The meter includes a communications device 64 that provides a means for the meter to

communicate with external devices such as controller 66” EX1030-Kressner, 5:65-67. “The communications device 64 may incorporate any type of communications protocol capable of allowing the meter 60 to receive, transmit and exchange information with one or more external devices. Communications device 64 may use communication systems, methodologies and protocols such as, but is not limited to, TCP/IP, IEEE 802.11, RS-232, RS-485, Modbus, IrDA, infrared, radio frequency, electromagnetic radiation, microwave, Bluetooth, power line, telephone, local area networks, wide area networks, Ethernet, cellular, fiber-optics, barcode, and laser.” EX1030-Kressner, 6:1-10.

## **2.     *Wireless Protocols***

54.     Further, Rofougaran’s wireless communication device “supports one of more of wireless local area network (WLAN) communications 55, wireless personal area network (WPAN) communications 56, and wireless wide area network (WWAN) communications 58. The WLAN communications 55 may be in accordance with past, present, or future versions of IEEE 802.11 (e.g., 802.11a, b, g, n, etc.).... The WPAN communications 56 may be in accordance with past, present, or future versions of Bluetooth, ZigBee, and/or IEEE 802.15x (e.g., IEEE 802.15.1, 2, 3, and 4).... The WWAN communications 58 may be in accordance with past, present, or future versions of cellular voice standards (e.g., global system

for mobile communications (GSM), wide bandwidth code division multiplexing (WCDMA), CDMA), cellular data standards (e.g., high speed downlink packet access (HSDPA), high-speed uplink packet access (HSUPA), Enhanced Data rates for GSM Evolution (EDGE), General Packet Radio Service (GPRS))[.]” EX1023-Rofougaran, 5:20-55. Prior to Rofougaran, Gillig teaches a cellular cordless telephone that includes a “cellular transceiver, antenna, keyboard, a display, handset, and microcomputer... in a single housing,” where “[c]ordless base stations 180 and 188 communicate with the cellular cordless telephone (CCT) 10 through antennas[.]” EX1031-Gillig, Abstract, 2:25-27. Thus, it was well known prior to the ’567 patent that wireless communication devices and, more specifically, transceivers would include a transmitter, receiver, and antenna.

55. Communication systems using cellular telephony were well known prior to the ’567 patent. Cellular telephony was known to use radio waves to wirelessly enable computerized equipment, such as personal digital assistants (PDAs), phones, and other devices, to send information in digital form. In a third edition textbook, Lee described a wide range of wireless and cellular telecommunications systems. EX1032-Lee, 113, 33-34. More specifically, cellular systems including CDMA, TDMA, and GSM, as well as wireless data networks using 802.11, Bluetooth, and ZigBee. EX1032-Lee, 113, 33-34. As another example,

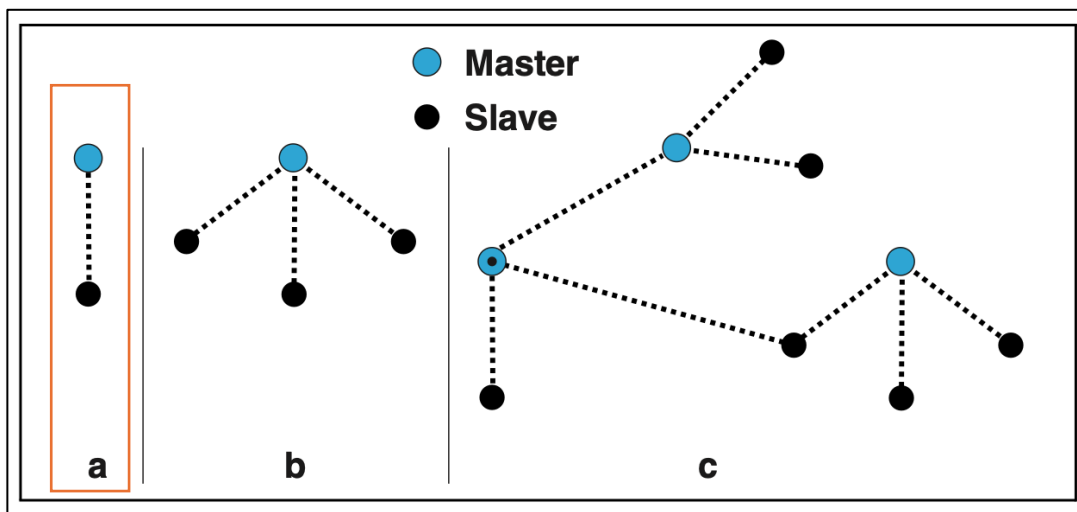
Shuaib describes Zigbee, Bluetooth, and Wi-Fi products as wireless area network (WAN) technologies that enable communication across distances and devices, allowing wireless access to networks and services. EX1033-Shuaib, 1. Su discloses that Bluetooth, ZigBee, and Wi-Fi (IEEE 802.11) were well known “protocol standards for short-range wireless communications with low power consumption.” EX1034-Su, 1, Abstract. Su further discloses that wireless communications is a technology to provide flexibility and mobility with benefits including reducing cable restrictions of cabled devices, low cost, and easy deployment. EX1034-Su, 1, Introduction.

### **3. Bluetooth**

56. It was well known prior to the '567 Patent that Bluetooth was a communication protocol that establishes wireless communication between devices. The Bluetooth Specification teaches that “**Bluetooth wireless technology** is a short range **communications system** intended to replace the cable(s) connection portable and/or fixed electronic devices.” EX1035-Bluetooth, 13. “The Bluetooth core system consists of an RF [radio frequency] transceiver, baseband, and protocol stack. The system offers services that **enable the connection of devices** and the exchange of a variety of classes of data between these devices.” EX1035-Bluetooth, 13.

Further, the connection is wireless. EX1035-Bluetooth, 13 (“The Bluetooth RF (physical layer) operates in the unlicensed ISM band at 2.4 GHz.”).

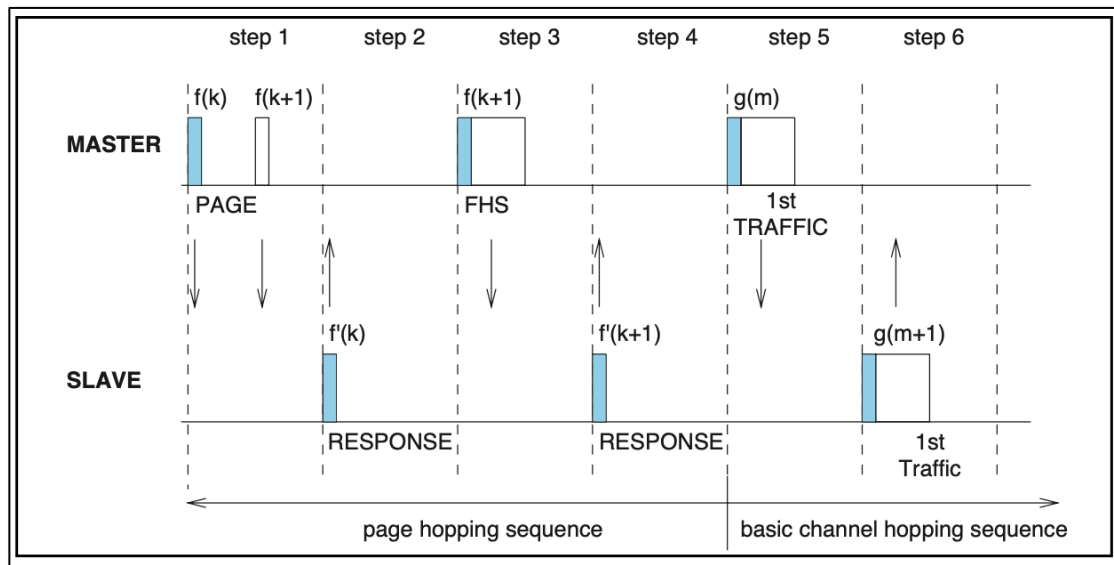
57. “The Bluetooth system provides a point-to-point connection” wherein “the physical channel is shared between two Bluetooth devices.” EX1035-Bluetooth, 63, FIG. 1.1(a). “Two Bluetooth devices use a shared physical channel for communication. To achieve this their transceivers need to be tuned to the same RF frequency at the same time, and they need to be within a nominal range of each other.” EX1035-Bluetooth, 34.



EX1035-Bluetooth, FIG. 1.1. “Figure 1.1:Piconets with a single slave operation (a)... .” EX1035-Bluetooth, 63. The Bluetooth Specification describes four “defined” physical channels: the basic and adapted piconet channels (“used for communication between connected devices”), an inquiry scan channel (“used for

discovering Bluetooth devices”), and a page scan channel (used “for connecting Bluetooth devices”). EX1035-Bluetooth, 34, 63, Fig. 1.1.

58. “In order to establish new connections the paging procedure is used.” EX1035-Bluetooth, 154. In the Kelty-078 system using Bluetooth communications, the paging procedure establish[es] wireless communication between a master (“the paging device,” Kelty-078’s communication chip 14 under the control of VMS 32) and slave (“the page scanning device,” similar Bluetooth functionality connected to the processor of Kelty-078’s portable device 24) devices. EX1035-Bluetooth, 76. Steps of the paging procedure are provided discussed below and shown in FIG. 8.3 and Table 8.3. EX1035-Bluetooth, 159 (“The initial messaging between master and slave is shown in Table 8.3...and in Figure 8.3....”). Steps of the paging procedure including both devices for pairing entering a “CONNECTION” state and sending packets between the two devices. EX1035-Bluetooth, 159-162, FIGs. 8.1, 8.3, Table 8.3. Specifically, steps of the paging procedure are provided discussed below and shown in FIG. 8.3 and Table 8.3. EX10XX-Bluetooth, 159 (“The initial messaging between master and slave is shown in Table 8.3...and in Figure 8.3....”).



EX1035-Bluetooth, FIG. 8.3. “Messaging at initial connection when slave responds to first page message.” EX1035-Bluetooth, 160; *see also id.*, FIG. 8.1

59. In Step 1, the master device is paging (in the “page substate”) and the slave device is page scanning (in the “page scan substate”). EX1035-Bluetooth, 156, 159. The slave device replies to the “page message” sent by the master device (Step 2). EX1035-Bluetooth, 159-160. “The master shall then transmit an FHS [(Frequency Hop Synchronization)] packet in step 3” to synchronize both devices “to a common clock and frequency hopping pattern” which is fundamental to Bluetooth communication. EX1035-Bluetooth, 13 (“One device provides the synchronization reference and is known as the master.”), 63, 162. Then, “the slave shall return a slave page response message in step 4 to acknowledge reception of the FHS packet” and be synchronized to the master device. EX1035-Bluetooth, 161.

Both devices “enter[] the CONNECTION state in step 5.” EX1035-Bluetooth, 161-162. “The connection mode shall start with a POLL packet transmitted by the master. The slave may respond with any type of packet” in Steps 5-6. EX1035-Bluetooth, 161.

60. Thus, wirelessly communicating and managing charging information between a remote device and vehicle was well-known prior to the '567 Patent.

#### **E. Charge Cost Consideration**

61. Energy utility services and charging stations both provide energy to the vehicle at a certain cost. The cost of electricity fluctuates, being “controlled in real-time by either an integrated electric utility or an Independent System Operator.” EX1013-Kempton 2005 - Revenue, 270, Section 4. Specifically, “during peak daytime hours (8 a.m. - 6 p.m., generally) the rates are considerably higher than regular residential rates” for “recharging an EV.” EX1036-Massachusetts Division of Energy Resources, 17.

62. Thus, for an EV user, it is “desirable to optimize the battery charging of an electric vehicle to take maximum advantage of reduced cost time of day energy rates and to insure [*sic*] the battery is sufficiently charged for the next anticipated use of the vehicle.” EX1037-Sims, 1:36-39. To optimize battery charging, charging systems were known to schedule the charging of electric vehicles. *See, e.g.*, EX1030-

Kressner, 7:65-8:6 (describing “[o]ne example of a recharge schedule” where the charging of “vehicles is arranged to maintain a constant electrical demand between 23:30 and 06:00[.]”). Through a charging schedule, “the vehicle is scheduled for a recharging period” and the schedule is based on factors including “the expected itinerary of the vehicle 152, the state of charge of each of the batteries 154, the recharge electrical consumption data 156, [and] the cost of electrical energy 158[.]” EX1030-Kressner, 8:66-9:2.

63. Scheduling the charge of an EV based on factors such as the cost was desirable for both users and utility providers. The user may customize preferences, such as

a maximum price per kilowatt hour to be paid by a party for electricity, a location where charging may occur, a location where charging may not occur, a rate of charging the electric vehicle, a minimum amount of charge, or any other preferences associated with charging the electric vehicle.

EX1038-Hafner, [0049].

64. The idea of a user choosing to charge a vehicle based on the time of day was known, as vehicle owners would be able to “experience reduced charging cost by avoiding peak time rates,” because “the cost of electricity may be reduced during periods of low demand.” EX1006-Pollack, [0184], EX1028-Lowenthal, [0007].

Charging during these low demand periods is implemented through a user “display screen” that prompts the user with a series of questions such as “Off-peak Charging? Yes or No” “If yes, enter beginning and ending times.”” EX1039-Johnson, [0075]-[0076]. Other charging systems also allow for “power aggregation preferences and constraints [to be] input via the user interface.” EX1006-Pollack, [0228]. The user can take into consideration multiple charging parameters via an interface that “present[s] information such as the current electricity price, the estimated recharge cost, [and] the estimated time until recharge.” EX1006-Pollack, [0181].

65. Thus, using the monetary price of power based on a user preference to optimize scheduled charging of EVs (e.g., keep charging cost and demand on the energy network low) was well-known prior to the ’567 Patent.

## **VI. SUMMARY OF THE PRIOR ART REFERENCES**

### **A. Sutardja**

66. U.S. Patent Appl. No. 2008/0136371 to Sutardja (“Sutardja”) (EX1004) was filed on December 4, 2007, and published on June 12, 2008. I have been instructed by counsel that Sutardja is prior art to the challenged patent.

67. Sutardja describes a system for charging an electric vehicle’s battery according to a set of user-defined charging parameters. EX1004-Sutardja, Abstract, [0004], [0008]. Sutardja’s system includes a charge management system (CMS) 100,

having a vehicle 102 that “is charged at a location such as a home or work location.”

EX1004-Sutardja, [0239], FIG. 3A.

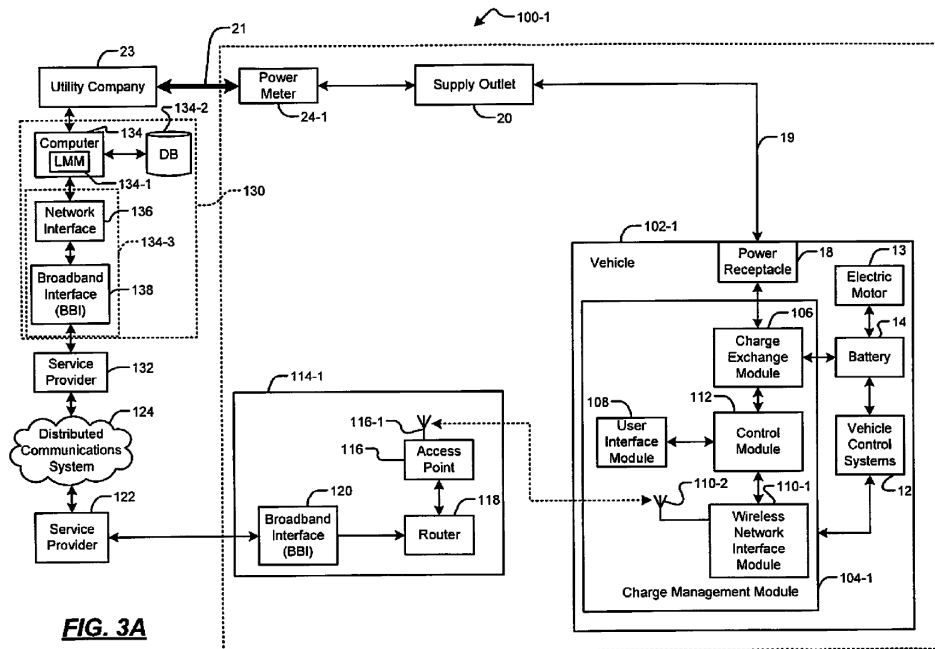


**FIG. 3A**

EX1004-Sutardja, FIG. 3A.

68. Sutardja teaches that a “user of the vehicle 102-1 may use the user interface module 108 to set charging parameters for charging the battery 14[.]” EX1004-Sutardja, [0243]. Charging parameters include a desired charge level (e.g., full charge) and a requested charge completion time. EX1004-Sutardja, [0119] (“[O]ne or more of the N first sets of charging parameters include charge levels and requested charge completion times for the batteries of corresponding ones of the N vehicles.”), [0270] (“The charge monitoring module 150 may inform the control

module 112 when the battery 14 is charged to a predetermined level (e.g., full charge) that may be indicated in the charging parameters.”).

69. The charging parameters are communicated “to the utility company 23 via the wireless network interface module 110-1.” EX1004-Sutardja, [0244]. “The utility company 23 may receive the charging parameters generated by the user and may respond to requests for charging the battery 14.” EX1004-Sutardja, [0251].

70. Sutardja is analogous to the claimed invention of the ’567 Patent because Sutardja is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1004-Sutardja, [0002], [0231]–[0233], with EX1001, Abstract, 1:59-2:3.

71. Sutardja is also reasonably pertinent to a particular problem with which the inventor of the ’567 Patent was involved: efficiently controlling electric vehicle charging in a vehicle system accounting for user preferences and charging conditions. *Compare* EX1004-Sutardja, [0116], [0122], [0253] with EX1001, 1:49-55, 1:59-2:17, 8:57-9:12, 10:31-11:3, 11:16-48.

## **B. Kelty**

72. U.S. Patent Appl. Publication No. 2009/0021218 to Kelty et al. (“Kelty”) (EX1005) was filed on July 18, 2007. I have been instructed by counsel that Kelty is prior art to the challenged patent.

73. Kelty describes systems and methods for charging batteries in electric vehicles based on charging cost and battery charge conditions. EX1005-Kelty, Abstract, [0013]-[0014]. Kelty discloses a charging system including a charging circuit 208, charging cost circuit 212, battery monitoring functionality, and control logic for initiating charging during periods when charging cost rates are below specified thresholds. EX1005-Kelty, [0022]-[0027]. Kelty further teaches charging a battery to a specified energy level or threshold level of charge during low-cost charging periods and, in some instances, continuing charging during higher-cost periods until a desired battery charge level is reached. EX1005-Kelty, [0026]-[0027]

74. Kelty is analogous to the claimed invention of the '567 Patent because Sutardja is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1005-Kelty, Abstract, [0013]-[0014], with EX1001, Abstract, 1:59-2:3.

75. Kelty is also reasonably pertinent to a particular problem with which the inventor of the '567 Patent was involved: efficiently controlling electric vehicle charging in a vehicle system accounting for user preferences and charging conditions. *Compare* EX1005-Kelty, [0022]-[0027] with EX1001, 1:49-55, 1:59-2:17, 8:57-9:12, 10:31-11:3, 11:16-48.

**C. Pollack**

76. U.S. Patent Publication No. 2008/0039989 to Pollack (“Pollack”) (EX1006) was filed August 9, 2007, and published February 14, 2008. I have been instructed by counsel that Pollack is prior art to the challenged patent.

77. Pollack discloses a “user interface and user control in a power aggregation system for distributed electric resources[,]” such as “battery/charger/inverter systems for electric or hybrid vehicles.” EX1006-Pollack, Title, [0039].

78. Pollack’s describes and claims a “user interface” associated with an electric vehicle that allows the user to “input[] user-selected power aggregation constraints and...preferences via the user interface” and “display[s] parameters of the power aggregation system.” EX1006-Pollack, claims 1-3; claim 6 (describing “an in-vehicle user interface”)

79. Pollack is analogous to the claimed invention of the ’567 Patent because Pollack is from the same field of endeavor: electric vehicle battery charging systems. *Compare* EX1006-Pollack, Title, [0039], [0227], with EX1001, Abstract, 1:59-2:3.

80. Pollack is also reasonably pertinent to a particular problem with which the inventor of the ’567 Patent was involved: providing user interfaces and displays for monitoring and controlling vehicle battery charging operations. *Compare*

EX1006-Pollack, [0039], [0227], Claims 1-4, 6, 12, 15, with EX1001, 1:49-55, 2:10-17, 10:31-11:48.

**D. Boll**

81. U.S. Patent No. 5,623,194 to Boll et al. (“Boll”) (EX1007) was filed on December 27, 1994, and published on March 22, 1977. I have been instructed by counsel that Boll is prior art to the challenged patent.

82. Boll discloses “a charge information and control system for an electric or hybrid vehicle.” EX1007-Boll, 1:8-9. Boll’s system includes a microcomputer, charger, display unit, and input unit that allow a user to input charging parameters, monitor charging conditions, and initiate charging operations. EX1007-Boll, 2:28-54. Boll further teaches displaying charging-related information, including battery charge conditions and remaining charging time required to achieve a desired charge state. EX1007-Boll, 2:57-3:41.

83. Boll is analogous to the claimed invention of the ’567 Patent because Boll is from the same field of endeavor: electric vehicle battery charging systems. *Compare* EX1007-Boll, 1:8-0, 2:28-3:41, with EX1001, Abstract, 1:59-2:3.

84. Boll is also reasonably pertinent to a particular problem with which the inventor of the ’567 Patent was involved: providing user interfaces and displays for

monitoring and controlling vehicle battery charging operations. *Compare* EX1007-Boll, 2:28-3:7, 5:18-24, with EX1001, 1:49-55, 2:10-17, 10:31-11:48.

**E. Gale**

85. U.S. Patent Appl. No. 2008/0203973 to Gale (“Gale”) (EX1008) was filed on February 27, 2007. I have been instructed by counsel that Gale is prior art to the challenged patent.

86. Gale teaches the electric vehicle “controller 30 uses information from steps 64 and 66 to determine the length of the period required to fully recharge the battery 28 from its current state of charge.” EX1008-Gale, [0041], Abstract (“determining the length of time required to recharge the battery”), Fig. 12.

87. Gale is analogous to the claimed invention of the ’567 Patent because Gale is from the same field of endeavor: electric vehicle battery charging systems. *Compare* EX1008-Gale, Abstract, [0026], with EX1001, Abstract, 1:59-2:3.

88. Gale is also reasonably pertinent to a particular problem with which the inventor of the ’567 Patent was involved: efficiently controlling electric vehicle charging in a vehicle system accounting for user preferences and charging conditions. *Compare* EX1008-Gale, [0027]-[0028], [0041], with EX1001, 1:49-55, 2:10-17, 10:31-11:48.

**F. Uchida**

89. U.S. Patent Appl. Publication No. 2010/0102776 to Uchida (“Uchida”) (EX1009) was filed March 27, 2008. I have been instructed by counsel that Uchida is prior art to the challenged patent.

90. Uchida discloses a charging control system for an electrically powered vehicle that predicts and displays charging-related costs associated with charging operations. EX1009-Uchida, [0008]-[0010]. Uchida teaches displaying predicted energy cost, battery-related charging cost, and total cost information to a user through a display device to assist users in evaluating and controlling charging operations. EX1009-Uchida, [0052], [0114]-[0115], Figs. 1, 8, and 12.

91. Uchida is analogous to the claimed invention of the ’567 Patent because Uchida is from the same field of endeavor: electric vehicle battery charging systems. *Compare* EX1009-Uchida, [0008]-[0010], with EX1001, Abstract, 1:59-2:3.

92. Uchida is also reasonably pertinent to a particular problem with which the inventor of the ’567 Patent was involved: providing user interfaces and displays for monitoring and controlling vehicle battery charging operations, including displaying battery charging status, charge-related information, charging cost information associated with charging a vehicle battery. *Compare* EX1009-Uchida,

[0008]-[0010], [0052], [0103], [0114]-[0115] with EX1001, 1:49-55, 2:10-17, 10:31-11:48.

**G. Zhang**

93. U.S. Patent Appl. Publication No. 2008/0067974 to Zhang et al. (“Zhang”) (EX1010) was filed September 18, 2007, and published March 30, 2008. I have been instructed by counsel that Zhang is prior art to the challenged patent.

94. Zhang discloses electric car charging systems that include charging equipment, battery packs, and energy-control systems for supplying power to electric vehicles. EX1010-Zhang, Abstract, [0009]. Zhang explains that battery packs may be integrated into the charging system to provide charging power during high-demand conditions or power outages. EX1010-Zhang, Abstract, [0032], [0038].

95. Zhang is analogous to the claimed invention of the ’567 Patent because Zhang is from the same field of endeavor: electric vehicle battery charging systems. *Compare* EX1010-Zhang, Abstract, [0009], with EX1001, Abstract, 1:59-2:3.

96. Zhang is also reasonably pertinent to a particular problem with which the inventor of the ’567 Patent was involved: efficiently controlling electric vehicle charging in a vehicle system accounting for user preferences and charging

conditions. *Compare* EX1010-Zhang, [0032], [0038], with EX1001, 8:57-9:12, 10:31-11:3.

#### **H. Evans**

97. U.S. Patent No. 5,534,759 to Evans et al. (“Evans”) (EX1011) was filed on May 19, 1995, and published on July 9, 1996. I have been instructed by counsel that Evans is prior art to the challenged patent.

98. Evans discloses an electric vehicle monitoring system that includes an operator display mounted in a conventional dashboard location within the vehicle. EX1011-Evans, Abstract, 3:37-53. Evans teaches that the operator display presents vehicle operating information, including battery and charging information, to the vehicle operator through a dashboard-mounted display arrangement. EX1011-Evans, Fig. 2, Fig. 3, 4:19-24.

99. Evans is analogous to the claimed invention of the ’567 Patent because Evans is from the same field of endeavor: electric vehicle battery charging systems. *Compare* EX1011-Evans, Abstract, 3:37-53, with EX1001, 10:31-11:48.

100. Evans is also reasonably pertinent to a particular problem with which the inventor of the ’567 Patent was involved: positioning charging-related displays within a vehicle to improve accessibility and usability for vehicle operators. *Compare* EX1011-Evans, 3:43-53, 4:19-30, with EX1001, 10:31-11:48.

## VII. GROUNDS OF UNPATENTABILITY

| Proposed Grounds of Unpatentability under §103                                                      | Exhibits              |
|-----------------------------------------------------------------------------------------------------|-----------------------|
| <b><u>Ground 1:</u></b> Claims 1-3, and 6 are obvious over Sutardja, Kelty, and Pollack.            | 1004-1006             |
| <b><u>Ground 2:</u></b> Claims 4, 15-17, and 19 are obvious over Sutardja, Kelty, Pollack and Boll. | 1004-1007             |
| <b><u>Ground 3:</u></b> Claims 8 and 10-12 are obvious over Sutardja, Kelty, Pollack, and Gale.     | 1004-1006, 1008       |
| <b><u>Ground 4:</u></b> Claims 5 is obvious over Sutardja, Kelty, Pollack, and Uchida.              | 1004-1006, 1009       |
| <b><u>Ground 5:</u></b> Claim 7 is obvious over Sutardja, Kelty, Pollack, and Zhang.                | 1004-1006, 1010       |
| <b><u>Ground 6:</u></b> Claim 9 is obvious over Sutardja, Kelty, Pollack, Gale, and Evans.          | 1004-1006, 1008, 1011 |
| <b><u>Ground 7:</u></b> Claim 14 is obvious over Sutardja, Kelty, Pollack, and Uchida.              | 1004-1006, 1008-1009  |
| <b><u>Ground 8:</u></b> Claim 13 and 18 are obvious over Sutardja, Kelty, Pollack, Gale, and Boll.  | 1004-1008             |
| <b><u>Ground 9:</u></b> Claim 20 is obvious over Sutardja, Kelty, Pollack, Boll, and Uchida.        | 1004-1007, 1009       |

## VIII. OPINIONS REGARDING GROUND 1: CLAIMS 1-3 AND 6, ARE OBVIOUS OVER SUTARDJA, KELTY, AND POLLACK

### A. Claim 1

- Claim 1[Pre]: “A vehicle charger for charging a battery of a vehicle, the vehicle charger adapted for communication with a first controller remote from the vehicle and vehicle charger, the vehicle charger adapted for wireless communication with a second controller remote from the vehicle and the vehicle charger, the second controller associated with a computer, the vehicle charger comprising:”*

101. To the extent the preamble is limiting, Sutardja in view of Kelty teaches a *vehicle charger (including CMM 104-2 and connector/cable 19)*<sup>1</sup> (1) *for charging a battery of a vehicle* (2) *adapted for communication with a first controller (LMM of computer 134) remote from the vehicle and vehicle charger*<sup>2</sup> and (3) *adapted for wireless communication with a second controller (Kelty's computer processor implementing Sutardja's user interface module 108 and wireless network interface module 110-3 (hereinafter "UIM-WNIM")) remote from the vehicle and the vehicle charger, the second controller associated with a computer (Kelty's computer).*

**a) Sutardja's CMM 104-2 is a vehicle charger**

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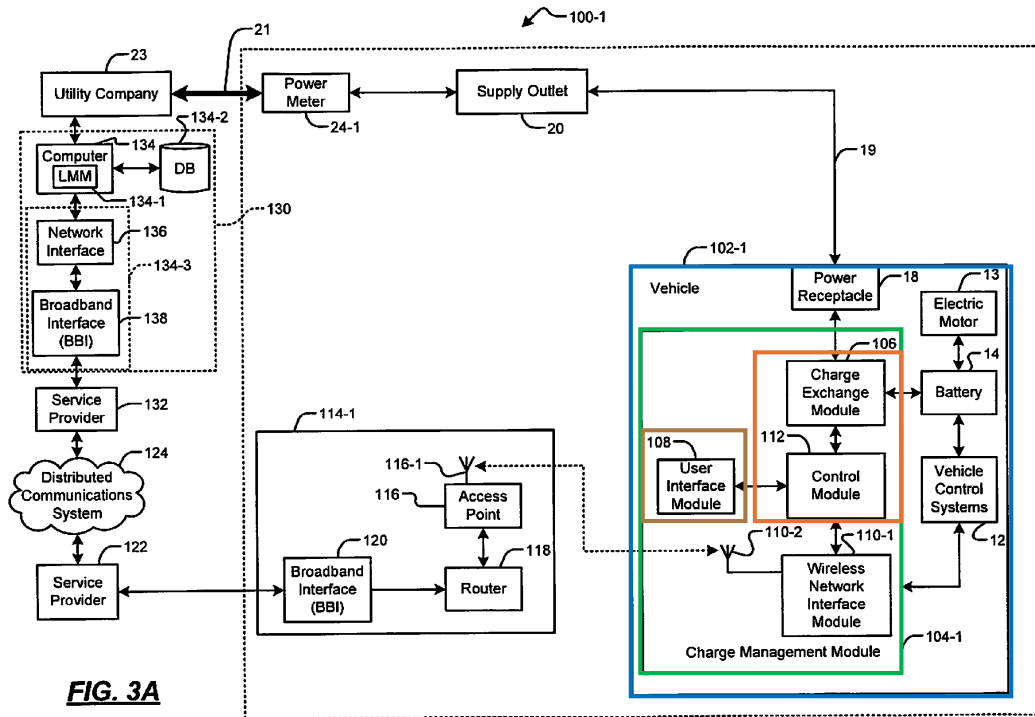
<sup>1</sup> Hereinafter, "vehicle charger (CMM 104-2)" may be used for simplicity where the connector/cable 19 is not relevant to the discussed limitation.

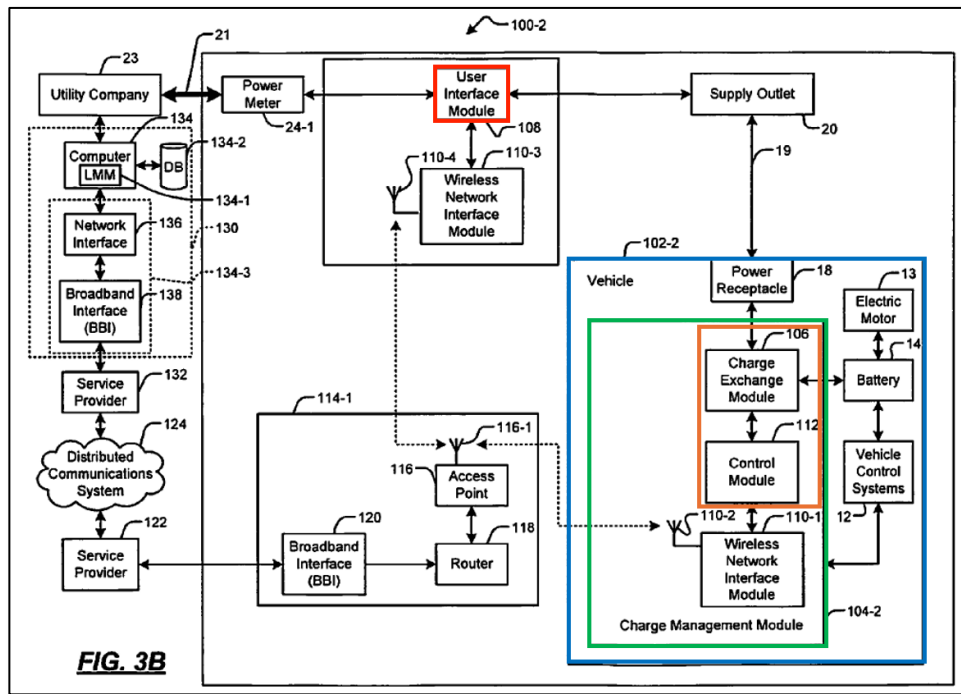
<sup>2</sup> Claim language provided in italics. All drawing annotations and emphases added unless otherwise noted. Citations to a claim limitation (e.g., Claim 1[a]) and/or section number are to the limitations mapping such claim limitation in this Petition and are incorporated by reference, including the motivations to combine (MTC) and showing of reasonable expectation of success provided in the cross-referenced section. All reasonable expectation of success include the benefits described for the respective MTC.

102. Sutardja's charge management module **CMM 104-2** is *a vehicle charger for charging a battery of a vehicle* because it "may communicate with the battery 14 and the power receptacle 18" of Sutardja's vehicle "and may **manage the amount of charge** in the battery 14." EX1004-Sutardja, [0239]. **CMM 104-2** "**charges the battery 14 using the power supplied by the utility company 23 to the supply outlet 20.**" EX1004-Sutardja, [0239].

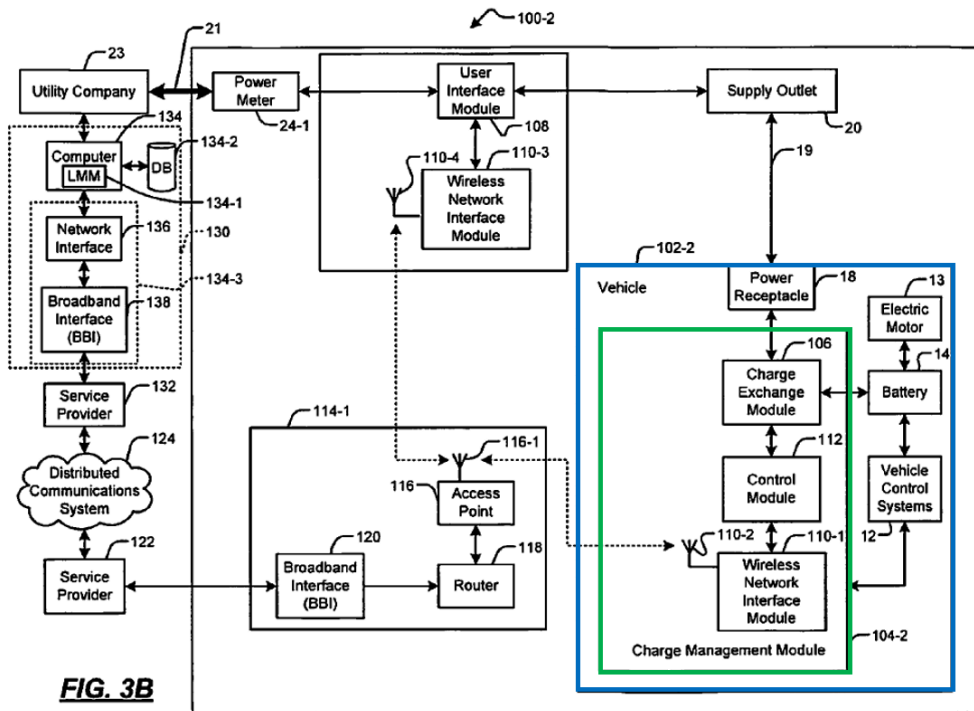
103. Sutardja's **CMM 104-2** is located in **vehicle 102-2**, and is part of "a charge management system (CMS [100-2]) to coordinate charging of batteries in vehicles at multiple locations" as depicted in Figure 3B. EX1004-Sutardja, [0231]. Sutardja initially describes components and functionalities of the CMS with reference to Fig. 3A which includes CMM 104-1. Sutardja then explains that, aside from the location of the user interface module 108, Fig. 3B is "substantially similar." EX1004-Sutardja, [0247]. A POSITA would have understood components and functionalities of the CMS 100-1 and 100-2 are "substantially similar," including **vehicle 102-1/102-2**, **CMM 104-1/104-2**, **modules 112/106**, wireless network interface module 110-1, power receptacle 18, cable and connector 19, supply outlet 20, power meter 24-1, and wireless LAN 114-1. EX1004-Sutardja, Figs. 3A-3B, [0247]. Sutardja refers to each of the said components and functionalities collectively, such as "**vehicle 102**," "**CMM 104**," "network interface module 110,"

and “LAN 114.” EX1004-Sutardja, [0250], [0252]. Sutardja further describes features of Sutardja’s system by “collectively refer[ing] to” all CMMs as “CMM 104.” EX1004-Sutardja, [0261], [0267], [0275]-[0278], [0282]-[0283].





EX1004-Sutardja, Figs. 3A-3B.



EX1004-Sutardja, Fig. 3B. A POSITA would have understood the main difference between CMS 100-1 and 100-2 is the placement of user interface module 108. EX1004-Sutarjda, [0234] (“The user interface modules may be arranged inside vehicles as shown in FIGS. 3A, 4A, and 5A or outside vehicles as shown in FIGS. 3B, 4B, and 5B.”) Therefore, Sutardja teaches and a POSITA would have understood that Sutardja’s description of CMM 104-1 applies to CMM 104-2, and vice versa. **CMM 104-2** includes a charge exchange module 106, a control module 112, and a wireless network interface module 110-1. EX1004-Sutardja, [0241], [0247], Figs. 3A-3B. Claim 1 does not require a user interface in the vehicle. Later claims do, and it would have been obvious to incorporate an in-vehicle user interface module into Sutardja’s system as discussed below in detail at Claim 3.

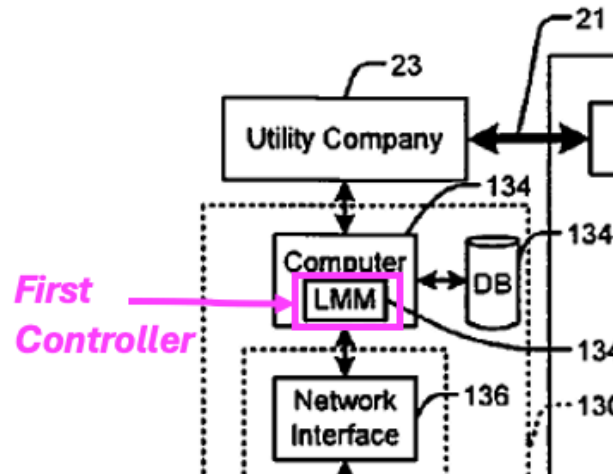
**b) Sutardja’s vehicle charger is adapted for communication with a first controller**

104. Sutardja teaches vehicle charger (CMM 104-2) adapted for communication with a **first controller (LMM of computer 134)** remote from the **vehicle** and the vehicle charger.

105. Sutardja’s **load management module (LMM 134-1)** is located in utility company 23 and therefore is remote from the vehicle and the vehicle charger (id., [0251]-[0252], Fig. 3A-3B).

106. Further, Sutardja's **load management module (LMM 134-1)** is a first controller. Per Sutardja, the term "**module...refers to...a processor (shared, dedicated, or group) and memory that execute one or more software or firmware programs, a combinational logic circuit, and/or other suitable components** that provide the described functionality." EX1004-Sutardja, [0228]. The '567 Patent states: "other controller can be one or more processors of a personal computer, phone, PDA, or other processor-based device associated with a user of the vehicle charging cord 22, **one or more processors of a server or other computer associated with a power utility** providing power to the vehicle charging cord 22, and the like." EX1001, 9:1-6. Therefore, Sutardja's **LMM of computer 134** is implemented using "a processor" and is a **controller**. EX1004-Sutardja, [0228]. The '567 repeatedly equates a controller with a computer. EX1001, 28:25-27 (describing "controller 444 (e.g., a computer)"), 21:44-48, 9:8-10, 13:57-58.

107. Finally, Sutardja's **load management module (LMM)** is adapted for communication with the vehicle charger (CMM 104-2). EX1004-Sutardja, [0252]) ("the utility company 23 may communicate with the CMM 104 in the vehicle 102...via the LAN...[t]he LAN 130 may include at least one computer 134 with a load management module (LMM)").



EX1004-Sutardja, Fig. 3B (excerpt).

**c) Sutardja's vehicle charger is adapted for wireless communication with a second controller**

108. Sutardja's UIM-WNIM, implemented on Kelty's computer processor, is a *second controller* that is (1) *associated with a computer* (Kelty's computer) (EX1005-Kelty, [0030]), (2) *remote from the vehicle and the vehicle charger*, e.g., "in a home or workplace", and (3) in *wireless communication* with *vehicle charger* (CMM 104-2). *Id.*, [0026], [0030]; EX1004-Sutardja, [0243], [0247].

**(1) Sutardja's Teachings**

109. Sutardja teaches a user interface module 108 and wireless network interface module 110-3 ("UIM-WNIM") which are "arranged outside a vehicle" EX1004-Sutardja, [0247] ("CMS 100-2 may include the user interface module 108 that is arranged outside a vehicle 102-2."), [0249]. User interface

module 108 includes input elements such as a keypad, and output elements, including a display and allow a user to input charging parameters EX1004-Sutardja, [0243]. Wireless network interface module 110-3 includes an antenna 110-4 to wirelessly communicate with a vehicle charger having an antenna 110-2 and utility company. EX1004-Sutardja, [0243], [0247].

### (2) Kelty's Teachings

110. In related art, Kelty teaches an electric vehicle charging system that communicates with a home computer, through which a user can set charging parameters. EX1005-Kelty, [0026] (“the charging cost circuit 212 is part of a computer in a home that at least partially controls how the electric vehicle 204 is charged.”), [0030] (“a user could specify to charge only when below a certain threshold by interacting with a computer (e.g.,...a home computer)”, Figs. 2-3.

### (3) The Combination

111. Sutardja's UIM-WNIM, implemented on Kelty's computer processor, is a *second controller associated with a computer*. The '567 Patent states: “other controller can be one or more **processors** of a **personal computer**, phone, PDA, or other processor-based device associated with a user[.]” EX1001, 9:1-6. Therefore, the claimed *second controller* includes at least a processor of a computer. EX1001, 9:8-10. The '567 repeatedly equates a controller with a computer. EX1001, 28:25-

27 (describing “controller 444 (e.g., a computer)”), 21:44-48, 9:8-10, 13:57-58. Kelty’s *computer* includes “one or more processor(s) 306...” and accordingly a POSITA would have understood Kelty’s computer processor is *a controller associated with a computer*. Specifically, Kelty teaches an article 300 and provides an example of “a computer” which includes “one or more processor(s) 306” as depicted below in Figure 3. EX1005-Kelty, [0035].

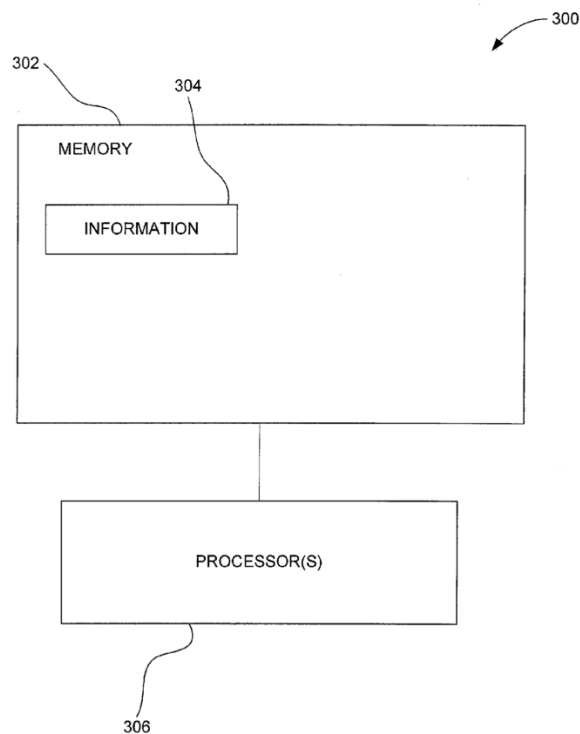


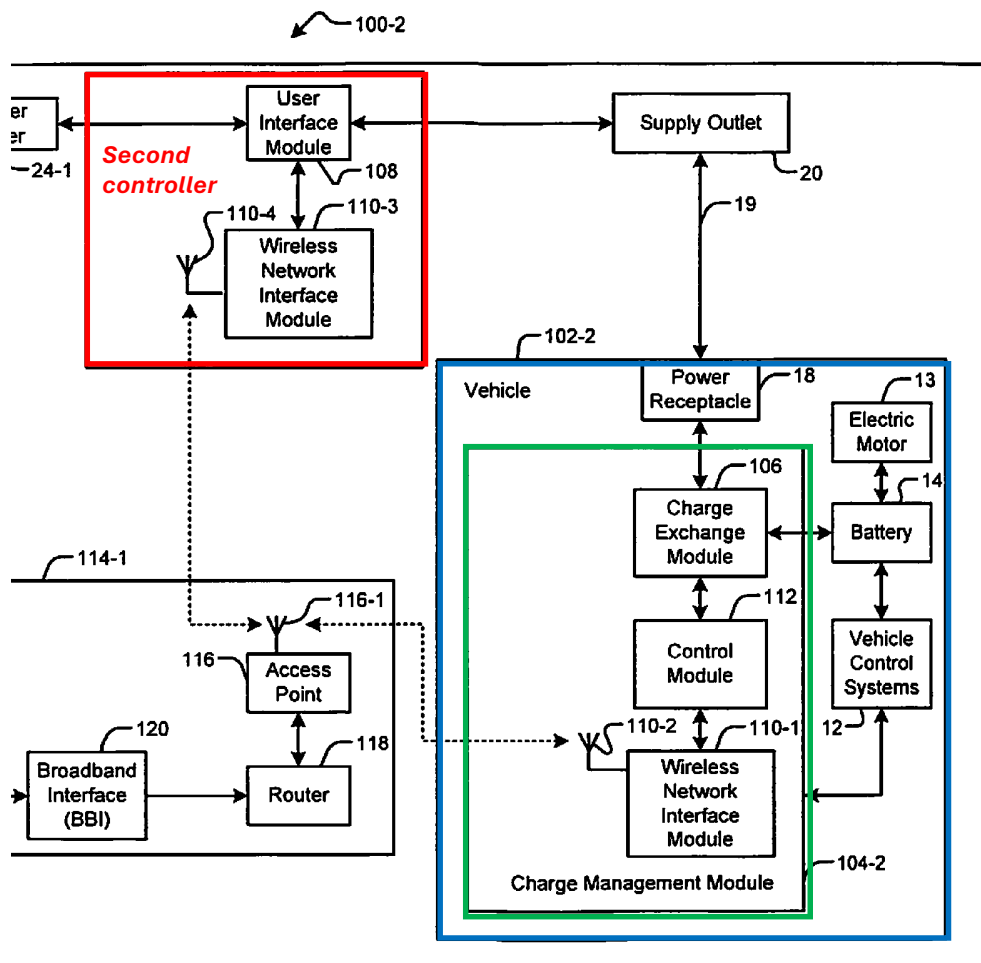
FIG. 3

EX1005-Kelty, Fig. 3; EX1001, 8:57-9:12. It was well known that computers have an associated processor. As an example, Sutardja's computer 134 includes a **load management module (LMM 134-1)**. Per Sutardja, the term "**module...refers to...a processor (shared, dedicated, or group) and memory that execute one or more software or firmware programs, a combinational logic circuit, and/or other suitable components** that provide the described functionality." EX1004-Sutardja, [0228]. As discussed below, it would have been obvious to implement Sutardja's UIM-WNIM on Kelty's computer processor.

112. **Sutardja's UIM-WNIM**, implemented on Kelty's computer processor, is *remote from the vehicle and the vehicle charger*. Sutardja teaches **UIM-WNIM**, are "arranged outside a vehicle" (EX1004-Sutardja, [0247]) and allow a user to input charging parameters (*id.*, [0243]-[0244]). Further, Kelty's computer is a "computer in a home or workplace," therefore **Sutardja's UIM-WNIM**, implemented on Kelty's computer processor, is remote from Sutardja's *vehicle* and *vehicle charger (CMM 104-2)*. EX1005-Kelty, [0026], [0030].

113. **Sutardja's UIM-WNIM, implemented on Kelty's computer processor**, wirelessly communicates with Sutardja's *vehicle charger (CMM 104-2)*. Sutardja's wireless network interface module 110-3 includes an antenna 110-4 to wirelessly communicate with *vehicle charger (CMM 104-2)* having an antenna 110-2.

EX1004-Sutardja, Fig. 3B, [0243]-[0244], [0247] (“wireless network interface module 110-3 may enable the user interface module 108 to communicate with CMM 104-2 in the vehicle 102-2 via the user LAN 114-1.”). The control module 112 that controls the operation of vehicle charger CMM 104-2 and is part of vehicle charger CMM 104-2 “may receive data input by the user for charging the battery 14...from the user interface module 108” (a second controller). EX1004-Sutardja, [0241].



EX1004-Sutardja, Fig. 3B (excerpt).

**d) Motivation to Combine Sutardja and Kelty**

114. A POSITA would have been motivated and found obvious to implement Sutardja's UIM-WNIM on the processor of a home computer, as taught by Kelty. A POSITA would have appreciated that it was common for home computers to include features of Sutardja's UIM-WNIM such as wireless network interface modules including antennas which allow wireless communication and "a keypad, a display, a microphone, and/or a speaker" for inputting and outputting information and inputting commands, etc. EX1004-Sutardja, [0243]. As an example, Myslinski teaches "portable computer 10" with a "microprocessor 14..and loudspeaker 22..." EX1040-Myslinski, 3:32-53.

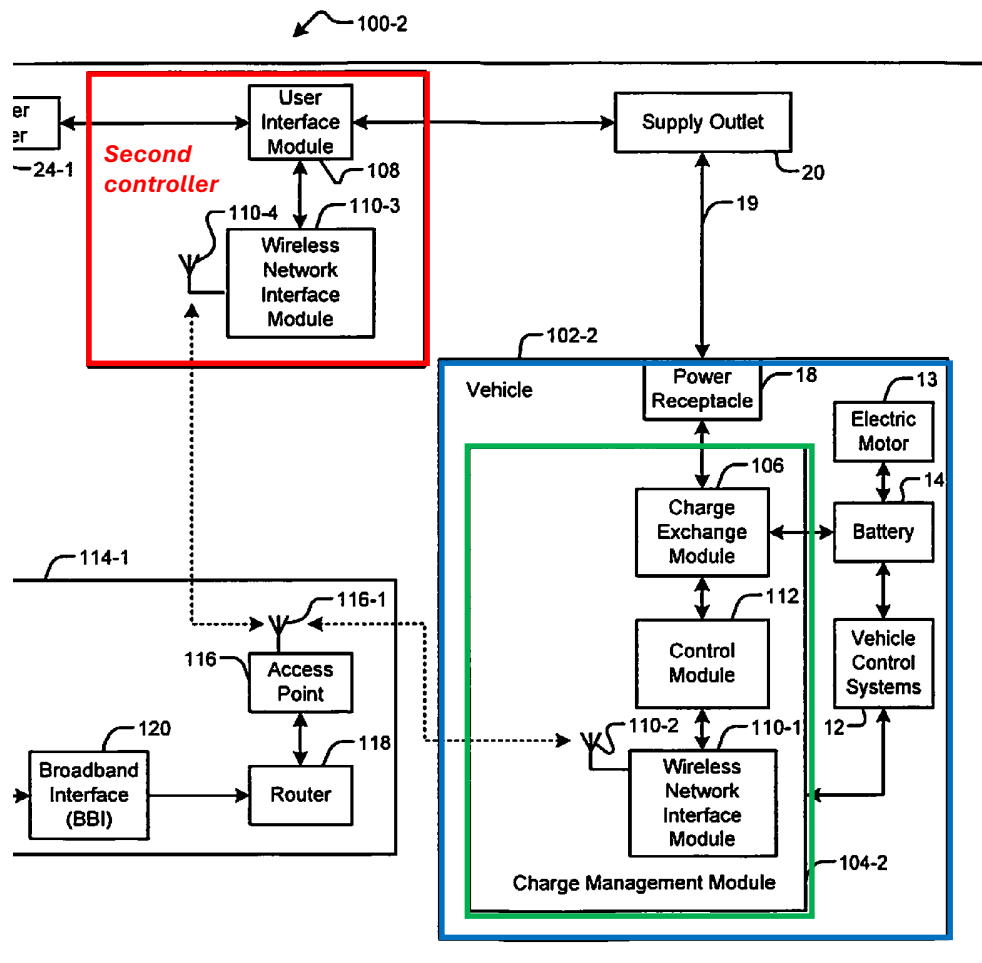
115. Sutardja already teaches that UIM-WNIM is "arranged outside of a vehicle[.]" EX1004-Sutardja, [0247] ("CMS 100-2 may include the user interface module 108 that is arranged outside a vehicle 102-2."), [0249]. Sutardja teaches a UIM-WNIM that wirelessly communicates with CMM 104-1 through wireless network interface modules 110-1 and 110-3 to exchange charging-related information and user-entered charging parameters. EX1004-Sutardja, [0243]-[0249], [0267].

116. At the time, systems allowing for remote control of a charging system—such as on a remote computer—were already well-known in the art, and

Kelty was simply one example of such a system. For example, Kelty-078 teaches “user 20 will be capable of communicating with...the vehicle 12 via any user interface device 24 (step 305).” EX1041-Kelty-078, 4:16-19. Kelty-078 teaches “user interface devices 24 may ...desktop computers, laptop computers...” EX1041-Kelty-078, 4:19-25.

117. Therefore, implementing Sutardja’s UIM-WNIM on a home computer, to allow the user remote control of a vehicle charging system, was a simple application of a known technique to improve a similar vehicle charging system in the same way. The resulting combination would have predictably allowed the user to take advantage of the benefits of remote vehicle charging system control, taught by Kelty. This was well known in the prior art. For example, Kelty-078 teaches “[t]here is a need in the art for a communication interface for an electric vehicle or PHEV that will be able to control remotely the charging of the battery and the discharging of the battery to an electric grid if need be.” EX1041-Kelty-078, 1:35-39. A home computer control would allow the user to manage and schedule charging without going outside or interacting with the charger directly—particularly beneficial in bad weather, at night, or when the vehicle is in a shared location. The user would also have been able to remotely monitor the vehicle’s charging state and history without leaving their home. EX1005-Kelty, [0014] (explaining that the

invention allows users to select charging schedules based on varying electricity rates, including charging to a regular level before sleep and adding further charge in the morning as they prepare for the day).



EX1004-Sutardja, Fig. 3B (excerpt).

118. A POSITA would have further understood that implementing Sutardja's UIM-WNIM on the processor of Kelty's home computer would improve usability and convenience by allowing the user to interact with the charging system

through a computer that the user already regularly uses for network-based communications, increasing usability of the system. This was well known in the prior art as discussed above. As another example, user interfaces enable the input of “power aggregation preferences and constraints,” allowing a user to “control a degree of participation of the electric resource in a power aggregation scenario via the user interface.” EX1006-Pollack, [0228]. In the combination, the user would be able to enter charging parameters on Kelty’s known device of a home computer, which would then communicate with the utility company and vehicle charger based on those parameters, as taught by both Sutardja and Kelty. EX1004-Sutardja, [0247], [0252]-[0253], [0262]; EX1005-Kelty, [0014], [0026], [0030]. Specifically, the charging cost circuit 212 may include a user controllable interface “such that the user can input a **threshold** for what is a less expensive charging cost rate and what is a more expensive charging cost rate.” EX1005-Kelty, [0030]. For example, a user may specify via their vehicle or home computer “to charge **only** when below a certain threshold.” EX1005-Kelty, [0030], [0047]-[0048], FIG. 8. *See* Claim 1[c].

119. Given the ubiquity of remote controllers associated with computers in EV systems and the familiarity of users interacting with computers, there would have been a reasonable expectation of success implementing Sutardja’s UIM-WNIM on the processor of a home computer. For example, Kelty-078 teaches “[t]here is a need

in the art for a communication interface for an electric vehicle or PHEV that will be able to control remotely the charging of the battery and the discharging of the battery to an electric grid if need be.” EX1041-Kelty-078, 1:35-39.

**a) Sutardja-Kelty teaches all three claimed controllers**

120. The preamble of Claim 1 requires a vehicle charger adapted for communication with a first controller and a second controller. Claim 1[b] further requires a third controller<sup>3</sup> adapted for communication with the first controller and the second controller. The specific limitations of claim 1[b] are discussed in detail below, but for clarity, in the overall mapping:

The *first controller* is LMM of computer 134

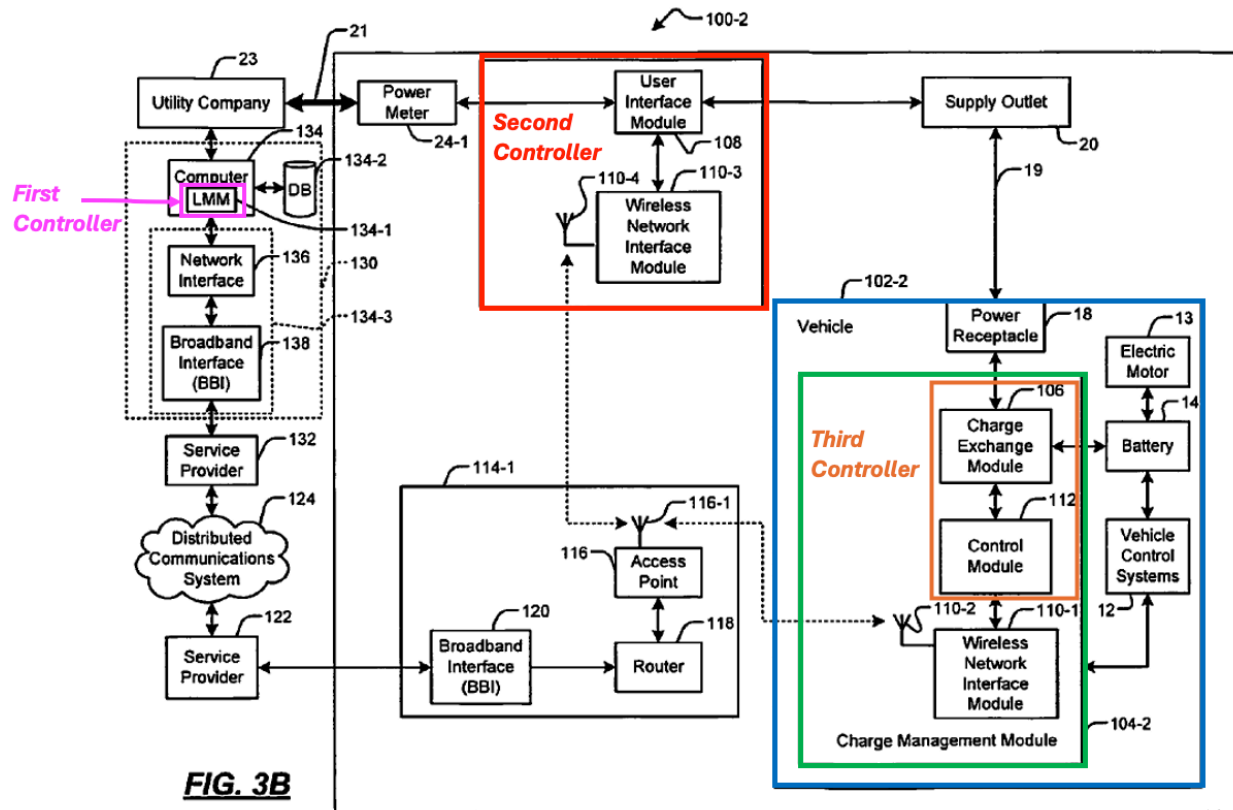
The *second controller* is Kelty’s computer implementing Sutardja’s UIM-WNIM; and

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<sup>3</sup> The specification of the ’567 Patent does not disclose any embodiment that expressly identifies distinct “first,” “second,” and “third” controllers. Instead, the specification broadly describes “a controller 44 located within the housing 28” of the vehicle charger and “another controller” that communicates with the controller housed within the charger. EX1001, 8:57-9:12.

The *third controller* is control module 112 and charge exchange module 106

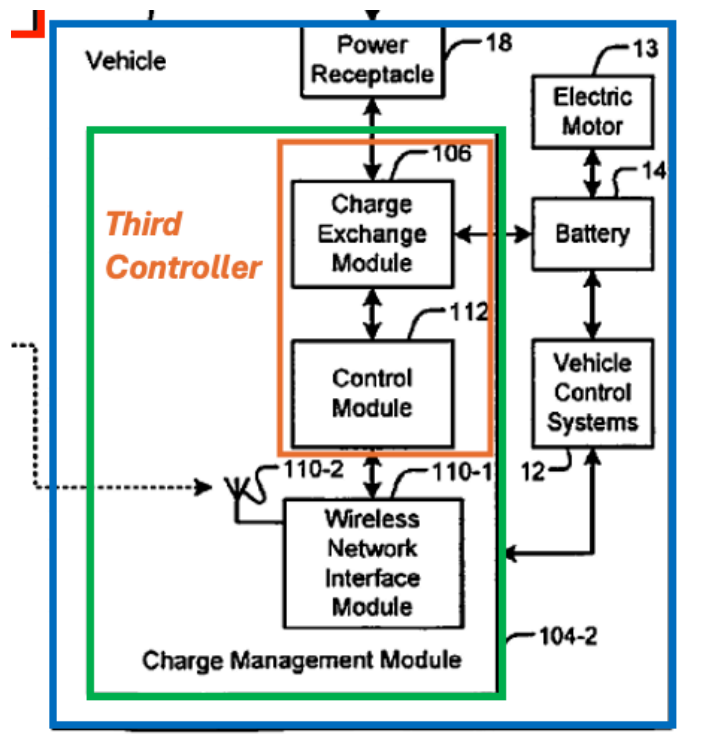
121. Each controller is depicted below:



EX1004-Sutardja, Fig. 3B.

122. Sutardja's *third controller*, comprises one or more processors, namely the collective control module 112 and charge exchange module 106 ("modules 112/106") that (1) are housed within the vehicle charger (CMM 104-2), and (2) control charging of the vehicle battery and operation of CMM 104. EX1004-Sutardja, [0267], [0243].

123. Accordingly, the **third controller (modules 112/106)** perform I/O and data processing tasks typically performed by processors executing software or firmware programs. EX1004-Sutardja, [0242] (“The charge exchange module 106 may monitor the amount of charge in the battery 14”), [0243] (“The control module **112** may communicate with the charge exchange module 106”), [0244] (“the control module 112 may receive data relating to the amount of charge present in the battery 14 (i.e., a charge level of the battery 14) from the charge exchange module 106.. Additionally, the control module 112 may receive data input by the user for charging the battery 14... The CMM 104-1 may transmit the data received by the control module 112 to the utility company 23 via the wireless network interface module 110-1.”), Fig. 3B. Per Sutardja, the term **“module...refers to...a processor (shared, dedicated, or group) and memory that execute one or more software or firmware programs, a combinational logic circuit, and/or other suitable components that provide the described functionality.”** EX1004-Sutardja, [0228].

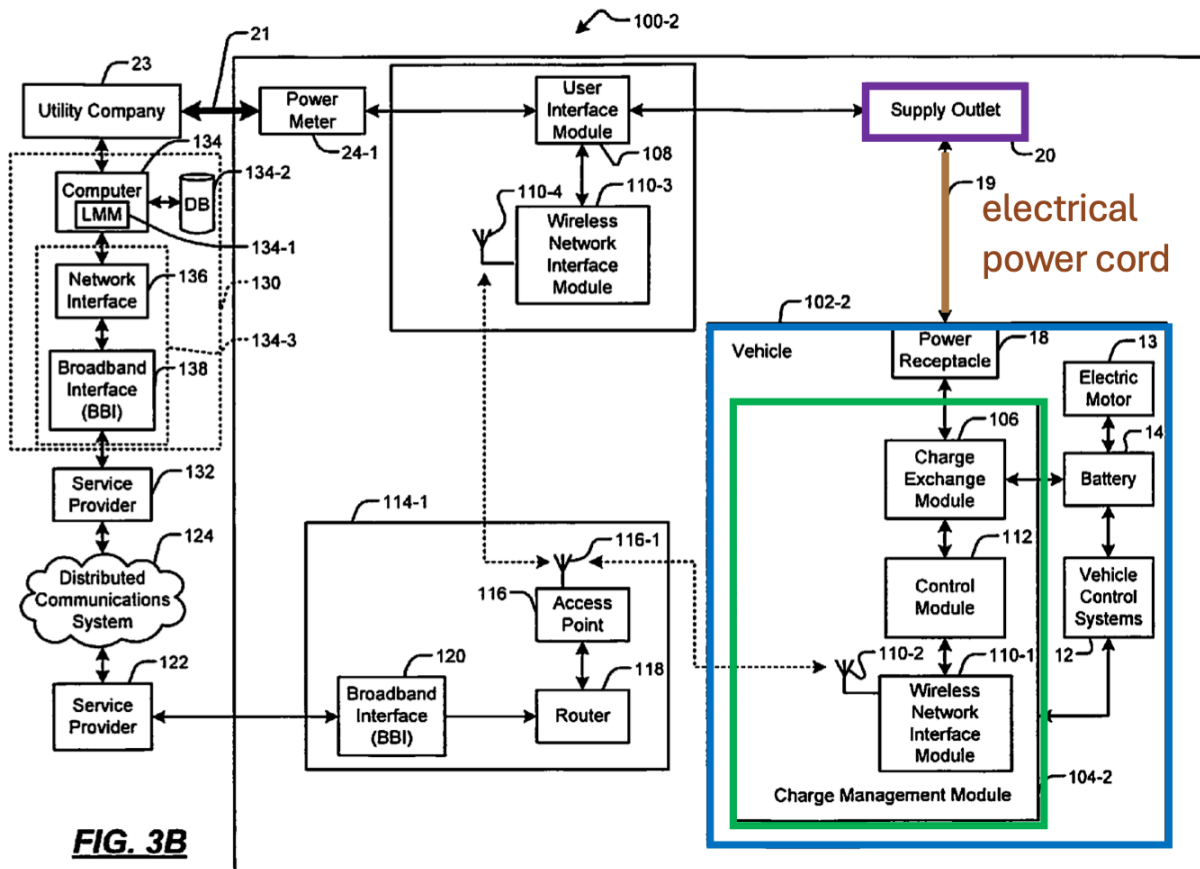


EX1004-Sutardja, Fig. 3B (excerpt).

2. ***Claim 1[a]: “an electrical power cord releasably attachable to at least one of the vehicle and a source of power”***

124. Sutardja teaches a vehicle charger (CMM 104-2) comprising an electrical power cord (a cable and connector 19) releasably attachable to at least one of the vehicle (vehicle 102) and a source of power (supply outlet 20).

125. Sutardja depicts a “cable and connector 19” (“*electrical power cord*”) that connects the electric vehicle 102 with a supply outlet 20:



EX1004-Sutardja, Fig., 3B. Sutardja teaches that “[t]he cable and connector 19 may connect the supply outlet 20 to the power receptacle 18 of the vehicle 102-1” and that Sutardja’s vehicle draws “power from the supply outlet 20 to charge the battery 14[.]” EX1004-Sutardja, [0240]. Therefore, Sutardja’s cable and connector 19 is an *electrical power cord*. EX1004-Sutardja, [0240]. Cable and connector 19 supplies power to the vehicle from an external power source (supply outlet 20), in the same way as the ’567 Patent’s *electrical power cord*. EX1001, 4:18-20; EX1004-Sutardja, [0240].

126. Sutardja's **cable and connector 19** ("*electrical power cord*") is *releasably attachable* to **supply outlet 20**. EX1004-Sutardja, [0262] ("the **user plugs** the vehicle 102 into the supply outlet 20 at the end of the day..."), [0006] ("the vehicle 10 may include a **power receptacle (a plug) 18** to receive power from the supply outlet 20 via a cable and connector 19."). "Plug-in" connections are detachable and re-attachable, and therefore *releasably attachable*. A POSITA would have understood that a connector of **cable and connector 19** that has to plug into the vehicle for the vehicle to receive power, as taught by Sutardja, is a connector that can be plugged in and unplugged from the vehicle, and is thus *releasably attachable to the vehicle*. Sutardja further teaches the user action of plugging into the vehicle, and a POSITA would have understood that action to be performed using **cable and connector 19** in order to supply power from supply outlet 20 to the vehicle. EX1004-Sutardja, [0006], [0281], [0283] ("The user may plug the vehicle 102 into the supply outlet 20 in step 303."). *See also* EX1004-Sutardja, Figs. 9A-9B ("Plug vehicle into supply outlet"); FIG. 8B ("Vehicle plugged in[?]").

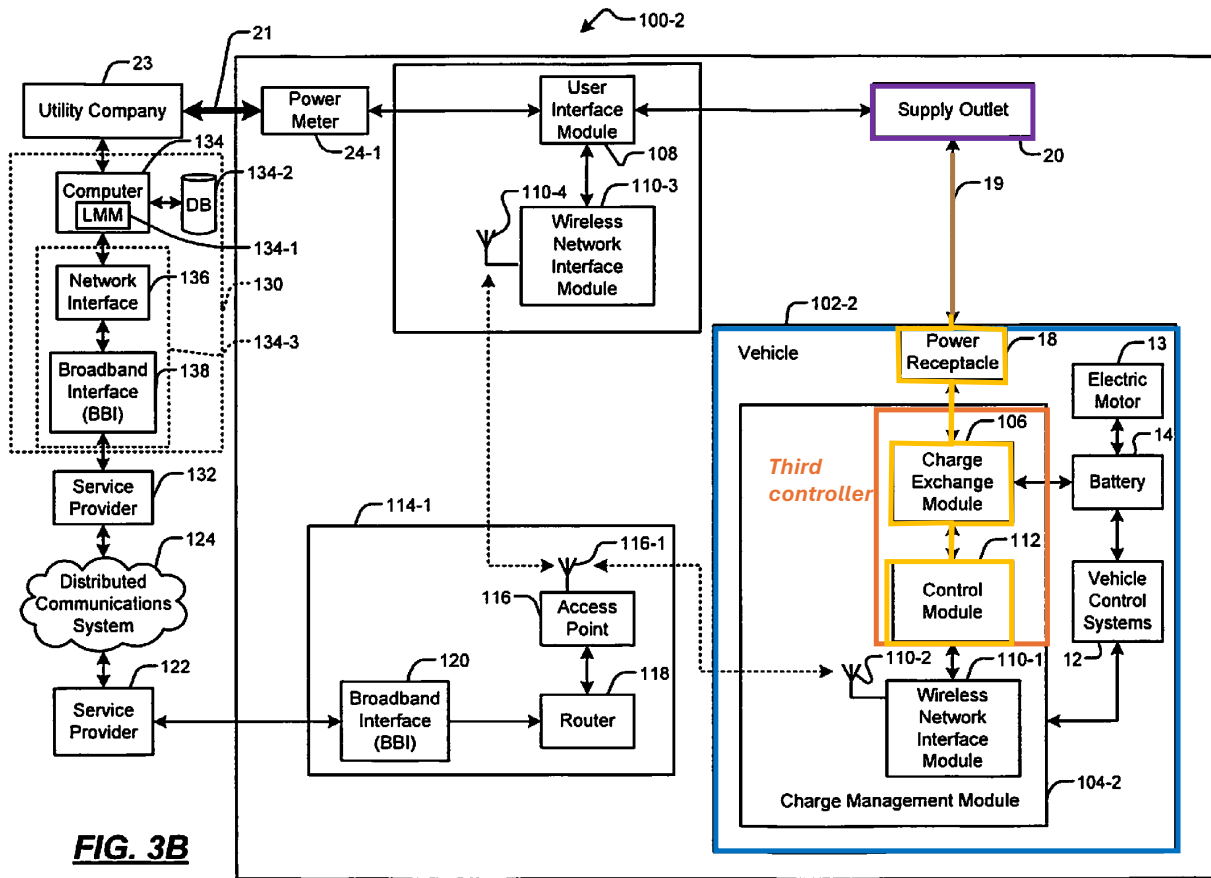
3. ***Claim 1[b]: "a third controller electrically coupled to the electrical power cord; at least one of a transmitter and a receiver coupled to the third controller and adapted for communication with the first controller and the second controller"***

**a) Sutardja teaches a **third controller** electrically coupled to the electrical power cord**

127. As explained Sutardja teaches **vehicle charger (CMM 104-2)** comprising a **third controller (modules 112/106)** electrically coupled to the electrical power cord (cable and connector 19).

128. The '567 Patent explains that the term “‘coupled’ and variations thereof, [is] used broadly and encompass both direct and indirect” connections. EX1001, 6:23-29 (“Further, ‘connected’ and ‘coupled’ are not restricted to physical or mechanical connections or couplings.”).

129. Fig. 3B shows Sutardja’s **modules 112/106 (“third controller”)** electrically coupled to the **cable and connector 19 (“electrical power cord”)** via **intervening charging circuitry**:



EX1004-Sutardja, Fig. 3B. Sutardja's **electrical power cord (cable and connector 19)** “connect[s] the **supply outlet 20** to the power receptacle 18 of the vehicle 102-1,” to draw power from supply outlet 20 to charge the battery 14. EX1004-Sutardja, [0240]. The **charge exchange module 106** charges the battery 14 using the power supplied via the supply outlet 20. EX1004-Sutardja, [0242]. The **charge exchange module 106** “communicate[s] data regarding the amount of charge in the battery

14 to the **control module 112**, and may exchange charge between the battery 14 and the **power receptacle 18**.” EX1004-Sutardja, [0242].

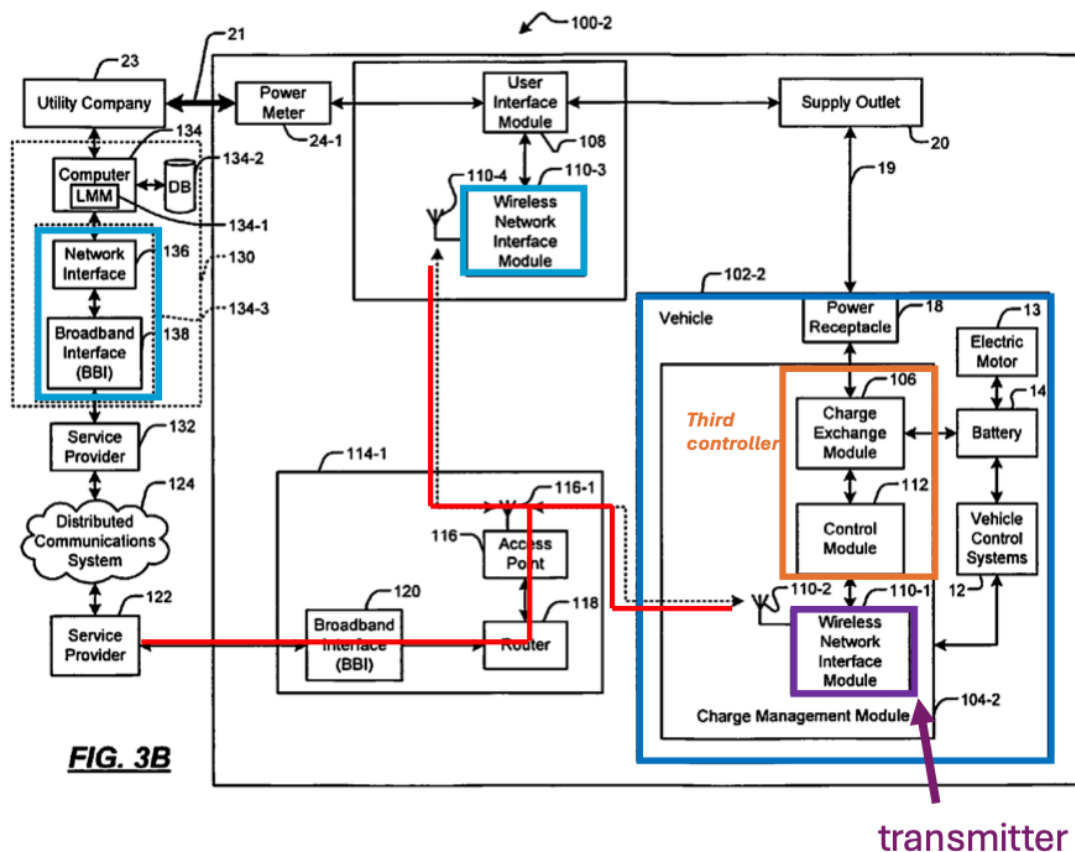
**b) Sutardja teaches a third controller coupled to at least one of a transmitter and a receiver**

130. Sutardja’s teachings of using a wireless network interface module 110-1 including an antenna to transmit and receive data are consistent with the ’567 spec about antennas being used with transmitters and receiver to send and receive communications. EX1001, 10:14-23 (“In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”); EX1004-Sutardja, [0244]-[0245], [0037], [0267].

131. Sutardja teaches *at least one of a transmitter and a receiver* (transmitter and receiver in wireless network interface module 110-1 having antenna 110-2) *coupled to the **third controller** (modules 112/106)*.

132. Sutardja teaches transmitting and receiving data via wireless network interface module 110-1. EX1004-Sutardja, [0244] (“The CMM 104-1 may **transmit the data received by the control module 112** to the utility company 23 via the **wireless network interface module 110-1**.”); [0037] (“the network interface means comprises one of wireline, wireless, and powerline carrier (PLC) interface **means**

for transmitting and receiving data.”); [0267] (receiving “charging parameters transmitted by the utility company 23.”) Sutardja’s CMM 104 communicates with wireless LAN 114-1 “via the wireless network interface module 110-1, which may include an antenna 110-2.” EX1004-Sutardja, [0245]. Thus, Sutardja’s wireless network interface means is expressly configured to transmit data and includes transmission circuitry, i.e., *a transmitter*. Sutardja’s wireless data transmission path is annotated in red below.



EX1004-Sutardja, Fig.3B.

133. Transmitters and receivers were well known components in wireless communication systems. For example, US Patent No. 7,764,932 (“Rofougaran”) teaches that wireless communication devices included a built-in transceiver (i.e., receiver and transmitter) in order to participate in wireless communications. EX1023-Rofougaran, 1:34-37, 2:6-9; *see* Section VI.C-D. Another example, US Patent No. 5,367,558 (“Gillig”) describes a cordless cellular telephone including a transceiver and an antenna, capable of wirelessly communicating with a base station. EX1031-Gillig, Abstract, 2:25-27; *see* Section VI.C-D. A POSITA would have understood that an antenna, such as antenna 110-2 is a physical transducer that converts electrical signals into radio waves for transmission and converts received radio waves into electrical signals for reception, and that a transmitter and receiver are electronic circuits connected to the antenna. As shown by Rofougaran’s wireless communication device, consisting of an antenna system and receiver and transmitter, where the antenna system provides RF signals to the receiver and transmits RF signals from the transmitter. EX1023-Rofougaran, 9:5-10; *see* Section VI.C-D. The transmitter generates and modulates the electrical signals supplied to the antenna, while the receiver processes and demodulates the electrical signals produced by the antenna from received radio waves. Rofougaran teaches the transmitter of a wireless communication device converting an outbound symbol stream into an outbound RF

signal that is then supplied to the antenna. EX1023-Rofougaran, 8:54-9:4, 9:5-10; *see* Section VI.D. Therefore, to the extent not expressly described by Sutardja, a POSITA would have understood that Sutardja's wireless network interface modules include a transmitter.

**c) Sutardja-Kelty Teaches a Third Controller Adapted for Communication with the First and Second Controllers**

134. Sutardja's *third controller* (control module 112 and charge exchange module 106) is adapted to wirelessly communicate with the *first controller* (LMM of computer 134) and *second controller* (Kelty's processor implementing Sutardja's UIM-WNIM).

135. Sutardja's *third controller* (modules 112/106) communicates with *first controller* (LMM of computer 134). Sutardja's control module 112 "receive[s] data input by the user for charging the battery 14" and "transmit[s] the data...to the utility company 23 via the wireless network interface module 110-1." *Id.*, [0244]. The LMM of computer 134 at utility company 23, "receive[s] the charging parameters transmitted by the CMM and/or the user," analyzes charging requests and distribution-system load. *Id.*, [0253], [0256]. The replies are "communicate[d] with the CMM 104 in the vehicle 102 and/or the user of the vehicle 102 via the LAN

130, the distributed communication system 124, and the LAN 114.” *Id.*, [0252], [0267].

136. Sutardja-Kelty further teaches *third controller (modules 112/106)* communicates with *second controller* (Kelty’s computer implementing Sutardja’s UIM-WNIM). As an example, “*the control module 112*” that controls the operation of *vehicle charger (CMM 104-2)* “may receive data input by the user for charging the battery 14...from the user interface module 108” (the UIM part of *second controller*) [0241]. *See also* [0244], [0247], [0265].

4. ***Claim 1[c]: “wherein the third controller is responsive to at least one signal from the first controller by automatically changing a charging state of the vehicle charger at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, the at least one signal related to a cost of electrical power, changing the charging state of the vehicle charger including automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power,”***

137. As discussed above, I have been instructed to apply the claim construction for *cost of power* as “monetary price of power.” §III.C.1

138. The ’567 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:30-44 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the

power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:11-30 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.)”)

139. As explained above Sutardja similarly sends signals (e.g., the utility company transmitting a reply or “alternate charging parameters”) using wireless communication (for example, wireless LANs). EX1004-Sutardja, [0234], [0251]-[0253], [0267]; Claim 1[b].

140. Sutardja teaches a third controller (modules 112/106) that is responsive to at least one signal from the first controller (LMM of computer 134) by automatically changing a charging state of the vehicle charger...the at least one signal related to a cost of electrical power (e.g., supplying power based on pre-approved power costs), changing the charging state of the vehicle charger including automatically starting charging based on user charging parameters (e.g. daily charging times, pre-approved power costs, etc.). EX1004-Sutardja, [0243], [0277], [0265], [0267], [0270], [0276], [0283], 8A. Kelty further teaches automatically

changing the charging state based on a threshold cost. EX1005-Kelty, [0030], [0036].

**a) Sutardja's Teachings**

141. Sutardja teaches a user inputting charging parameters, including the cost the user wishes to charge at. EX1004-Sutardja, [0235]-[0236], [0265]. Sutardja teaches that the charging parameters may also include “costs the user may pay if batteries are charged at higher than normal priority.” EX1004-Sutardja, [0235]. One of Sutardja's charging parameter options are for the user to indicate that the utility company “may choose the time to charger the batteries when the cost is lowest.” EX1004-Sutardja, [0235]. Sutardja teaches negotiating parameters for charging between a control module 112 (inside the vehicle) and a utility company 23. EX1010-Sutardja, [0267] (“[T]he user may accept, decline, or negotiate the additional cost and/or alternate charging times Suggested by the utility company 23 by interacting with the utility company 23 using the user inter face module 108.”).

142. Sutardja states, “the control module 112 may receive charging parameters input by the user and/or alternate **charging parameters transmitted by the utility company 23.**” *Id.* Such “alternate charging parameters” are exemplified by Sutardja as including “additional costs” for charging, expressly teaching receiving data indicative of a monetary price (cost) of power. EX1010-Sutardja,

[0235-0236], [0243], [0264] (“For example, the utility company 23 may inform the user of any extra cost the user may incur if the utility company 23 Supplies power at the requested time or a discount the user may receive if the user accepts power at a different time. Thus, the alternate charging parameters may include alternate charging times, additional costs, discounts, etc.”), [0265] (“The user may include in the schedule a pre-approval for a predetermined amount of additional cost that the user may pay if the utility company supplies power as requested.”), [0267]. Sutardja’s cost of power is a “monetary price of power,” per the applied claim construction, at least because Sutardja teaches the “costs the users may pay” may be less/more.

143. Sutardja’s Fig. 8A illustrates a method for supplying power to charge vehicle battery 14 based on user-defined charging parameters and utility-company 23 load management decisions:

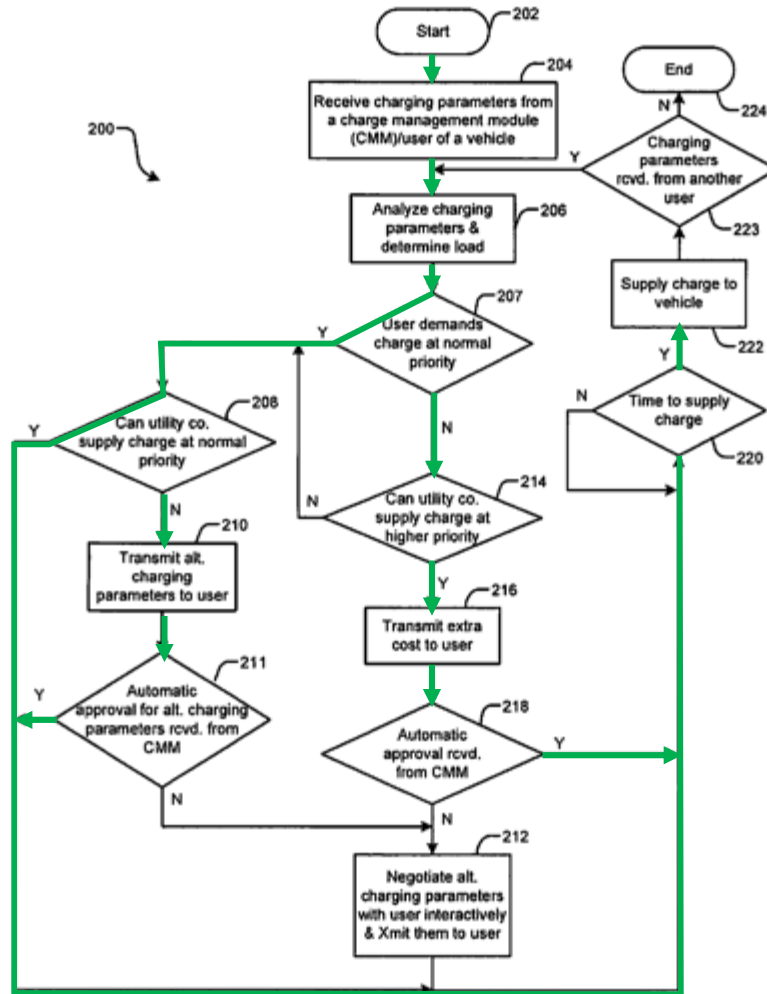


**FIG. 8A**

EX1004-Sutardja, Fig. 8A. Utility company 23 receives charging parameters from CMM 104 and/or the user, analyzes those charging parameters and determines the load on the distribution system. EX1004-Sutardja, [0276]. At step 207, LMM 134-1 determines whether the user requested charging under normal- or higher-priority charging conditions. EX1004-Sutardja, [0276]-[0277].

144. If the user requests normal-priority charging and utility company 23 can supply power as requested (step 208), LMM of computer 134 waits until the scheduled charging time arrives (step 220) and then supplies power to battery 14 according to the user-defined charging parameters (step 222), without further user interaction. *Id.*, [0276]-[0278]. If utility company 23 cannot supply power under the requested conditions, LMM 134-1 determines whether CMM 104-2 and/or user has automatically approved alternate charging parameters, such as an alternate charging time (step 211). *Id.* If so, utility company 23 supplies power according to the approved alternate charging parameters. *Id.* Similarly, if the user requests higher-priority charging and has pre-approved additional charging costs (step 218), utility company 23 supplies power without further user interaction. *Id.* These charging paths are annotated green in Fig. 8A above.

145. Accordingly, Sutardja's method 200 of supplying power teaches a third controller (modules 112/106) that is responsive to at least one signal from the first controller (LMM of computer 134) by automatically changing a charging state of the vehicle charger...the at least one signal related to a cost of electrical power (e.g., supplying power based on pre-approved power costs) changing the charging state of the vehicle charger including automatically starting charging. Therefore, a POSITA would have appreciated that Sutardja teaches a third controller (modules 112/106)

that is responsive to at least one signal from the first controller (LMM of computer 134) by automatically changing a charging state of the vehicle charger...the at least one signal related to a cost of electrical power (e.g., supplying power based on pre-approved power costs) changing the charging state of the vehicle charger including automatically starting charging. *See also* EX1004-Sutardja, [0262] (“The utility company 23 may charge the battery 14 between 9 pm and 6 am without interacting with the user.”), [0265] (“The user may include in the schedule a pre-approval for a predetermined amount of additional cost that the user may pay if the utility company supplies power as requested. In that case, the utility company 23 may receive an automatic approval for the extra cost from the CMM 104. Alternatively, the user may respond interactively.”).

#### b) Kelty’s Teachings

146. In related art, Kelty teaches an EV charging system adapted to, in response to receiving a signal related to a cost of electrical power...automatically starting charging when the cost of electrical power is equal to or less than the threshold cost of power.

147. Kelty’s charging cost circuit 212 is a controller associated with a computer, such as a vehicle computer or home computer, that controls how the electric vehicle is automatically charged based on charging costs. *See* Claim 1[Pre].

Kelty discloses “a user controllable interface connected to the charging cost circuit 212” that allows a user to “input a threshold for what is a less expensive charging cost rate and what is a more expensive charging cost rate[,]” and to “**specify to charge only when below a certain threshold**[.]” EX1005-Kelty, [0030]. Kelty therefore teaches “**automatically charg[ing]** a vehicle in consideration of...less expensive charging cost rates.” EX1005-Kelty, [0036] (“In some instances, this electricity is less expensive during certain times of the day. In particular, many parts of the world offer less expensive energy during evening times.”).

148. Kelty specifies that a transmitted *cost of power* is a “monetary price of power,” per the applied claim construction. Kelty teaches charging an electric vehicle based on a “charging cost rate [that] is the instantaneous cost of energy transfer. Cost rate is in cost per energy transferred over time (e.g., \$0.06 United States Dollar per kilowatt hour.” EX1005-Kelty, [0024]. Kelty also teaches estimating that it will cost “\$5.00 to charge an electric vehicle based on measured conditions and optionally learned conditions.” EX1005-Kelty, [0028].

### (1) Motivation to Combine Sutardja and Kelty

149. A POSITA would have been motivated and would have found it obvious to modify Sutardja’s battery charging system so that the *third controller (modules 112/106)* (1) automatically starts charging (*chang[e] a charging state*) (2)

in response to at least one signal from the *first controller (LMM of computer 134)*, *the signal* relating to a cost of power, and (3) automatically starts charging when the cost of electrical power is equal to or less than the threshold cost of power,” as taught by Kelty, recognizing that the utility company would be the expected source of accurate cost of power information. A POSITA would have recognized Sutardja’s utility company 23 as a natural source of the applicable cost-of-power information because utilities established time-of-use electricity rates, which varied depending on when and how much electricity was used. EX1036-Massachusetts 2000, 38, 41. It was also known that integrated electric utilities or independent system operators controlled electricity resources in real time and transmit control signals directly to vehicles. EX1013-Kempton, 269-270, Fig. 1, §4. Moreover, known EV charging controllers automatically began charging when electric utility rates were at their lowest. EX1037-Sims, 1:36-45, 3:53-64.

150. Sutardja already teaches basing charging decisions on user-defined parameters, including cost-related considerations. EX1004-Sutardja, [0235], [0265]. Sutardja’s charging system allows users to pre-approve additional charging costs and determines whether charging can proceed automatically based on system conditions and those cost parameters. EX1004-Sutardja, [0262], [0265]. However, to the extent Sutardja does not specify a mechanism for automatically initiating

charging based on a comparison between the current cost of power and a defined threshold, Kelty teaches determining a charging cost rate and automatically initiating charging of an EV battery when that cost is below a threshold. EX1005-Kelty, [0030], [0036]. A POSITA would have understood that incorporating Kelty's threshold-based cost control functionality into Sutardja's EV-charging system would provide a more precise and automated mechanism for implementing Sutardja's cost-based charging preferences. As explained by Kelty, once a cost threshold is selected, the charging system compares the applicable monetary charging rate against that threshold and automatically initiates charging when the threshold condition is satisfied. EX1005-Kelty, [0024], [0030], [0036]. This understanding is consistent with known cost-responsive EV-charging systems. For example, Sims teaches optimizing EV charging to take maximum advantage of reduced-cost time-of-day rates and automatically beginning charging when utility rates are lowest. EX1037-Sims, 1:36-45, 3:53-64; see also §V.E (Charge Cost Consideration). Pollack similarly teaches using cost as a temporal variable and predicting a look-ahead cost profile to optimize scheduled charging adaptively. EX1006-Pollack, [0103]; see also §V.D.1 (Wireless Communications), and §V.E (Charge Cost Consideration),

151. Applying Kelty's threshold-based control to Sutardja's charging system is a straightforward application of a known technique (charging based on threshold cost of power) to improve similar devices (EV charging systems) in the same way. Kelty's charging based on threshold cost implementation was one implementation of the broader, known technique of automatically controlling when an EV charges based on the cost of electricity. For example, Sims teaches that it was desirable to optimize EV charging to take advantage of reduced-cost time-of-day rates and describes a charging system that generally begins charging when utility rates are at their lowest. EX1037-Sims, 1:36-45, 3:46-64; see §V.E (Charge Cost Consideration).

152. A POSITA would have appreciated that such a modification to Sutardja would benefit the grid because the user has the choice to not charge their vehicle when peak demand (and cost) is high. Massachusetts 2000 explains that off-peak charging rates were available when there was "excess regional power plant capacity," whereas rates during peak daytime hours were considerably higher, and that time-of-use rates were established by utilities to encourage off-peak electricity use. EX1036-Massachusetts 2000, 17, 41; see §V.E (Charge Cost Consideration). EV charging systems that initiate charging based on cost considerations were well-known prior to the '567 Patent. Nor confirms this recognized benefit, explaining that

higher daytime prices would discourage charging-station operation during peak energy-consumption periods and that charging during off-peak hours would result in “less demand on the power authority” and “economies to be realized by the consumer.” EX1042-Nor, 10:30-47. A POSITA would have therefore recognized the benefit of implementing threshold-based cost control in Sutardja’s system to provide users with more direct and predictable control over charging costs.

153. Modifying Sutardja’s control module 112 to initiate charging when the cost of power is at or below a threshold—as taught by Kelty—would predictably result in charging occurring during lower-cost periods, consistent with both references’ objectives, and a user would have appreciated that the modification would allowed users to benefit from cheaper power costs. This predicted result is consistent with Sims, which teaches that an EV controller determines the “most effective and efficient means” for charging the battery and generally begins charging “when the electric utility rates are at their lowest.” EX1037-Sims, 3:53-64; see §V.E (Charge Cost Consideration). This modification would refine the decision criteria used to initiate charging and would have yielded predictable results of increased efficiency, and a POSITA would have had a reasonable expectation of success in making such a modification since such a modification would have required only routine programming. Sims illustrates that known EV-charging controllers already

included an input/output device, a computer processing unit, permanent memory, and random-access memory, and used those components to store charging parameters, evaluate charging conditions, and determine when charging should begin. EX1037-Sims, Fig. 1, Fig. 2, 3:3-21, 3:34-64. In view of that conventional architecture, a POSITA would have understood that implementing Kelty's threshold criterion would require programming the controller to store the threshold value, compare it to the applicable cost-of-power value, and invoke the existing charging-start operation when the comparison was satisfied. Those changes would use the existing processor, memory, communication pathway, and charging circuitry and would not require redesigning the charger's hardware.

154. A POSITA would have been motivated and found obvious to use monetary value (e.g., \$0.06, per Kelty) as the costs the user may pay in the Sutardja-modified Kelty system. Nor confirms that monetary values were conventionally used as EV-charging parameters. Nor teaches that a charging-station meter defines in advance "the monetary price of the energy to be delivered to the battery" and terminate charging when a "predetermined monetary price" had been reached. EX1042-Nor, 9:16-28. Nor further teaches setting a unit monetary price for energy based on the time of day and displaying the cost of delivered energy in local currency, "such as dollars." Id., 10:30-47. A monetary price based in U.S. dollars

per common units of energy, e.g., kilowatt per hour, is a well-recognized, commonly understood, and well-accepted method of exchanging services (e.g., supplying power) for payment (e.g., U.S. dollars). Nor's disclosure of displaying charging cost in dollars and providing a credit- or debit-card interface through which a customer pays for the energy delivered to the vehicle further confirms that presenting and collecting EV-charging costs as monetary values was conventional and readily understandable to users. EX1042-Nor, 3:52-4:2, 10:30-33. The end user would have easily recognized the cost of power in terms of U.S. dollars, given the ubiquity of payment for services render in U.S. dollars. There would have been a reasonable expectation of success, at least because of payment in money is well accepted. For example, Nor's use of a meter and controller to store a predetermined monetary amount and terminate charging when that amount was reached the predetermined monetary amount as control criteria. EX1042-Nor, 9:15-29. Additionally, Kelty-218 provides express motivation for the combination, teaching its system may be particularly "helpful in areas in which municipal power grid pricing fluctuates frequently, such as in areas where wind turbines produce excess power at windy times, and a shortage of power during times in which is it not windy." EX1005-Kelty, [0048]. Therefore, a POSITA would have recognized that Kelty includes an express teaching, suggestion, or motivation that would have been achieved by

modifying Sutardja to control charging timing to occur when power consumption is low and prices are below a user desired threshold, per Kelty.

155. Sutardja's first controller (LMM of computer 134) has a communication module 134-3, which allows for communicating signals with the third controller (modules 112/106), including transmitting charging parameters/alternate charging parameters (including cost) in the form of a signal. EX1004-Sutardja, Fig 3B, [0243], [0235]-[0236], [0247]. *See also* EX1005-Kelty, [0031], [0048] (describing transmission of cost in the form of a "signal.").

5. ***Claim 1[d][i]: "wherein the third controller is responsive to at least one signal from the second controller by changing a charging state of the vehicle charger to start charging,***
6. ***Claim 1[d][ii] "the at least one signal from the second controller being received by the third controller in response to a user selecting a user-manipulable control on a screen associated with the second controller"***
7. ***Claim 1[d][iii] "and wherein the user-manipulatable control is operable by the user to start a manual charge of the battery or enter at least one of a group consisting of a time of day by which the battery must be charged and a command to delay charging of the battery by the vehicle charger."***

156. In addressing limitation 1[d], this section begins by discussing the user-manipulable controls and their functions per 1[d][ii] and [iii] before returning to 1[d][i].

- a) **User-manipulable control on a screen (1) associated with a controller and (2) operable to enter a time of day by which the battery must be charged or a command to delay charging of the battery by the vehicle charger and (3) operable to start a manual charge of the battery.**

157. First, a user selects *a user-manipulable control on a screen associated with the **second controller** (Kelty's computer implementing Sutardja's UIM-WNIM)* per claim 1[d][ii]. EX1004-Sutardja, [0243], [0265]; Claim 1[Pre].

158. The '567 Patent describes “the process of charging a vehicle battery in ‘manual’ mode (i.e., not based upon a time of day).” EX1001, 11:23-25. The '567 Patent describes “user-manipulatable controls” broadly as controls that a user may physically operate to interact with the charging system. EX1001, 8:33-46. Per the '567 Patent, such controls may include “buttons[,]” “dome or tact switches, heat-sensitive controls, knobs, dials,” and similar input mechanisms, and different embodiments may include more or fewer controls depending on the charging-system configuration and displayed options. Id. The user interface module 108 within the Sutardja-Kelty computer implementing Sutardja's UIM-WNIM includes a display and user input components (e.g., a keypad) and is configured to allow a user to input charging parameters and interact with the utility company 23. EX1004-Sutardja, [0243], [0247], [0265].

159. Second, Sutardja teaches a user entering (1) *a time of day by which the battery must be charged* (e.g., by 6 am) (*id.*, [0262]) and (2) *a command to delay charging* (e.g., to “wait until time to supply power arrives”, such as 9 pm). *Id.*, [0262], [0275]-[0278]. Sutardja teaches “[t]he user may use the user interface module 108 to generate charging parameters comprising the time at which the battery 14 may be charged,” such as requesting “a full charge daily between 9 pm and 6 am.” EX1004-Sutardja, [0262]. Then, the charging system “wait[s] until time to supply power arrives” before charging begins. EX1004-Sutardja, [0275]-[0278].

160. However, Sutardja does not provide details regarding how a user may operate a user manipulable control *on a screen* or the specific method by which a user would start immediate charging.

#### **b) Pollack’s Teachings**

161. Pollack teaches a *user manipulable control on a screen*, because Pollack teaches a user interface that “displays checkboxes, icons, and/or menus for user-selection of preferences, constraints, customizations, and optimizations” relating to system and vehicle parameters. EX1006-Pollack, claim 12. EX1001, 8:33-46.

162. Pollack’s user interface “is associated with an electric resource...such as an electric vehicle that includes an energy storage system.” *Id.* [0227]. Pollack’s

“user interface may be displayed on a device associated with the owner of the electric resource, such as a cell phone or **portable computer**.” *Id.* See also, claim 6 (“user interface comprises an in-vehicle user interface...a **web-based user interface**, or a cell phone user interface”). Pollack allows the user to “input[] user-selected power aggregation constraints and...preferences via the user interface” and “display[s] parameters of the power aggregation system.” EX1006-Pollack, claims 1-4.

163. A POSITA would have understood how Pollack’s disclosed screen controls would be used to enter Sutardja’s charging-time parameters. For example, a displayed menu allows the user to select or enter the time by which charging must be completed, such as Sutardja’s 6:00 a.m. completion time, or the time at which charging should begin, such as Sutardja’s 9:00 p.m. start time. EX1004-Sutardja, [0262] (“The user may use the user interface module **108** to generate charging parameters comprising the time at which the battery **14** may be charged, etc. For example, the user may request a full charge daily between 9 pm and 6 am.”). A checkbox, icon, or other selectable display object is used to enable or confirm that scheduled-charging preference, thereby commanding the system to delay charging until the selected start time. EX1004-Sutardja, [0262], [0275]-[0278]. This would use Pollack’s disclosed controls for their stated purpose—inputting user-selected

preferences and constraints—to enter the particular charging schedule and delay command expressly taught by Sutardja.

164. Pollack also teaches *a user-manipulatable control is operable by the user to start a manual charge of the battery*. EX1006-Pollack, Claims 4, 15, [0100], [0202]; EX1001, 8:33-46. Pollack teaches that the user interface may include “an override for requesting immediate charging of the electric vehicle.” EX1006-Pollack, Claims 4, 15, [0100], [0202]. The parameters displayed on Pollack’s user interface include “energy pricing preference,” “vehicle state-of-charge,” “predicted amount of time until the electric resource disconnects from a power grid,” and **“user-selectable manual charging overrides.”** EX1006-Pollack, claim 4. A POSITA would therefore have understood Pollack’s manual-charging override to be a displayed control that the user selects when the user wishes to bypass the otherwise scheduled or automatically adapted charging time and begin charging immediately. Because Pollack’s display objects are selected through an input device to access electrical-resource control, selecting the immediate-charging override constitutes operation of a user-manipulatable control on the screen to request a manual charge, rather than merely viewing charging information. EX1006-Pollack, claims 12, 15, [0202]. The ’567 Patent describes “the process of charging a vehicle battery in ‘manual’ mode (i.e., not based upon a time of day).” EX1001, 11:23-25.

**c) Motivation to Combine Sutardja and Pollack**

165. A POSITA would have been motivated and would have found it obvious to further modify Kelty's computer implementing Sutardja's UIM-WNIM according to Pollack's teachings such that (1) user interface module 108 presents screen-based user-manipulable controls, including checkboxes, icons, menus, and manual charging overrides to (2) enter a time of day by which the battery must be charged or a command to delay charging of the battery by the vehicle charger per Sutardja, and (3) start a manual charge of the battery. Sutardja already teaches a user interface that allows users to input charging parameters, schedule charging operations, and interact with utility company 23 regarding charging conditions. EX1004-Sutardja, [0243], [0262], [0264]-[0265]. Pollack specifically displaying "checkboxes, icons, and/or menus" for a user to select charging preferences and "user-selectable manual charging overrides," including "an override for requesting immediate charging of the electric vehicle." EX1006-Pollack, Claims 4, 12, 15, [0202]. A POSITA would have understood that Pollack's different graphical controls would have been assigned to the particular charging functions already taught by Sutardja. For example, a menu or time-entry field would have permitted the user to select Sutardja's charging-completion time, such as 6:00 a.m., or scheduled start time, such as 9:00 p.m.; a checkbox or icon would have enabled or

confirmed the delayed-charging schedule; and a displayed manual-charging override would have permitted the user to request that charging begin immediately. EX1004-Sutardja, [0262], [0275]-[0278]; EX1006-Pollack, Claims 4, 12, 15, [0202]. Pollack further teaches that display objects, when selected through an input device, provide access to operations including electrical-resource control. EX1006-Pollack, Claim 15.

166. It would have been obvious to apply Pollack's teachings of presenting user-selectable charging controls on a screen to Sutardja's similar EV charging and energy- system. Screen-based graphical user-interface controls for selecting system preferences and overrides were well known prior to the priority date, as EV control systems commonly used menus, icons, buttons, and similar interface elements to improve user interaction and system usability, therefore a POSITA would have had a reasonable expectation of success in implementing Pollack's teachings. For example, Pryor teaches that vehicle dashboards included tactile displays and touchscreens usable for "basic control functions of the vehicle," as well as programmable touchscreens and displays employing physical selection or adjustment mechanisms. EX1043-Pryor, Abstract, 2:38, 13:19-21; see §V.B.3 (Displays). Pryor further illustrates a touchscreen located on a vehicle dashboard and used to control vehicle functions. EX1043-Pryor, 14:5, 39:1-2, Fig. 13B. Obradovich

similarly teaches a vehicle multifunction display that provides graphic display and control of selected vehicle functions using “well-known touch screen technology.” EX1044-Obradovich, Abstract, 6:20-24. These disclosures confirm that using selectable screen objects to invoke particular vehicle-control functions was a conventional interface technique. Sutardja already teaches processor-based user interfaces and charging-parameter processing functionality (EX1004-Sutardja, [0208], [0228], [0243]) but does not depict specific examples of displayed controls. Pollack’s checkboxes, icons, menus, and overrides therefore would supply a known graphical implementation for functionality that Sutardja’s system was already configured to receive and process.

167. A POSITA would have recognized that implementing Pollack’s screen-based charging controls would have predictably improved improve user convenience and control by allowing users to readily select charging schedules, charging preferences, and manual charging through familiar graphical interface controls. Screen-based graphical user interface controls readily inform users of the charging options available to them, allowing easier charging customization and customer satisfaction with their charging experience. The recognized benefits of vehicle displays included improved ergonomics and the ability to modify, add, or upgrade vehicle features. EX1045-Cramer, [0307]. In the modified system, users would input

charging parameters—including a time of day by which the battery must be charged or a command to delay charging of the battery by the vehicle charger (as taught by Sutardja (EX1004-Sutardja, [0262], [0275]-[0278]) and a request for manual charging as taught by Pollack (EX1006-Pollack, Claims 4, 15, [0202])—through screen-based user-manipulable controls while preserving Sutardja’s existing charging-control architecture, charging-parameter processing, and utility-coordinated charging functionality. The proposed modification therefore would change the manner in which the user enters the charging selection, not the underlying power-conversion or battery-charging hardware used to carry it out..

168. It also would have been obvious to modify Sutardja-Kelty to allow users to manually initiate charging operations and immediately begin charging the vehicle battery through a screen-based user control as expressly taught by Pollack. A POSITA would have recognized the benefit of enabling a user of Sutardja’s system to directly initiate charging via a user-manipulable control on a screen, rather than relying solely on scheduled triggered charging. Such a modification would have resulted in greater system flexibility to address a user’s immediate charging needs (e.g., for an emergency or on a long trip, or if the user was likely to lose access to a shared charger). Immediate charging may user to take advantage of low power rates, or to charge their vehicle up to a minimum desired amount of charge to provide

peace of mind. Manual initiation of EV charging and the need to begin charging without waiting for a previously scheduled time were known. For example, Nor teaches a charging station having a manually selected operating mode in which “a manual start decision must be made,” after which the charging parameters are entered and the charge-control module takes over the charging operation. EX1042-Nor, 7:56-8:5, 9:15-29, Fig. 1

169. Modifying Sutardja according to Pollack’s teachings would have involved applying a known manual charging initiation technique to a similar EV charging and energy-management system and a POSITA would have had a reasonable expectation of success in such a modification. User-selectable controls for immediately initiating charging operations were well known prior to the priority date, as EV charging systems commonly provided users with the ability to manually initiate charging when desired, including through charging overrides and immediate charging requests. A POSITA would have understood that implementing Pollack’s graphical user-interface controls using conventional processors, displays, input devices, and software applications would have required only routine programming and system integration. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-

within the skillset of a POSITA. Programmable vehicle touchscreens were already used to input data to computers controlling vehicle subsystems and to perform basic vehicle-control functions. EX1043-Pryor, Abstract, 2:38, 13:19-21; see §V.B.3 (Displays). Vehicle processors were also conventionally coupled to and used to control displays through communication buses. EX1021-Canedy, Fig. 2, 3:66-4:33; see §V.B.3 (Displays). A POSITA therefore would have implemented the modification by programming the graphical interface to associate selection of the displayed manual-charge control with an immediate-charge command and transmitting that command through the communication pathway already provided by Sutardja. This would have used the existing processor, display, input mechanism, communications interface, and charging controller for their established functions, without requiring a redesign of the charger's power circuitry

**d) The third controller, responsive to at least one signal from the second controller, changing a charging state of the vehicle charger to start charging**

170. The '567 Patent gives an example of a "wireless signal" transmitted using "wireless communication." EX1001, 22:30-44 ("As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in

connection with the controller 50...”), 10:11-30 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”)

171. As explained above, Sutardja similarly sends signals (e.g., transmitting charging parameters) using wireless communication (e.g., wireless LANs). EX1004-Sutardja, [0234], [0244], [0252]-[0253]; Claim 1[b].

172. Per Claim 1[d][i], Sutardja’s *third controller (modules 112/106)* receives a signal containing charging parameters from the *second controller* and in response, the *third controller (modules 112/106)* initiates vehicle charging (*chang[es] a charging state of the vehicle charger to start charging*).

173. In addition, per 1[d][ii]-[iii], above, it would have been obvious and a POSITA would have been motivated to implement Pollack’s “override for requesting immediate charging of the electric vehicle” as a user input option on the display of the *second controller*. In response, the *second controller* sends a signal to the *third controller (modules 112/106)* which causes the *third controller* to immediately start charging. Both of these options are discussed further below.

**e) Sutardja's Teachings**

174. Sutardja teaches the **second controller (Kelty's computer implementing Sutardja's UIM-WNIM)** transmits user-input data, such as predetermined charging-time parameters, to the **third controller (modules 112/106)**. *See* Claim 1[Pre]; Claim 1[b]-[c].

175. Sutardja's **third controller (modules 112/106)** receives user-input charging parameters from the user via Sutardja's **second controller**. EX1004-Sutardja, [0243] ("A user of the vehicle 102-1 may use the user interface module 108 to set charging parameters for charging the battery"); [0267] ("the control module 112 may receive charging parameters input by the user...[and] may provide the charging parameters to the charge exchange module."). Then, "[t]he control module 112 may generate a charge control signal based on the charging parameters based on which the charging module 152 may charge the battery." *Id.*, [0269].

176. Sutardja's **third controller (modules 112/106)** further changes a charging state of the **vehicle charger (CMM 104-2)** to start charging when the time to charge the battery has arrived, taking into account the user's charging parameters. EX1004-Sutardja, claim 1, Fig. 10. "Specifically, when the battery 14 is being charged, the charge monitoring module 150 may activate a converter 156 and the charging module 152 based on the charging parameters received from the control

module 112” such as “when the time for charging the battery 14 has arrived.” EX1004-Sutardja, [0269], [0285]. The charge monitoring module 150 is part of Sutardja’s charge exchange module 106. EX1004-Sutardja, [0268].

**f) Pollack’s Teachings**

177. Pollack also teaches a user interface associated with an electric vehicle (such as the user interface of a “portable computer” per EX1006-Pollack, [0227], claim 6) that includes “an override for requesting immediate charging of the electric vehicle.” EX1006-Pollack, claims 4, 15, [0100], [0202].

**g) Application of Pollack’s Teachings**

178. In combination with Sutardja-Kelty, Pollack’s override would be implemented as an option on Sutardja’s *second controller*. When the override is selected, Sutardja’s *third controller (modules 112/106)* would receive an override signal (per Pollack) from Sutardja’s *second controller* and Sutardja’s *third controller (modules 112/106)* would respond to the override signal by starting to charge because the time to charge had arrived, as taught by Sutardja. See EX1004-Sutardja, [0269] (charging “when the time for charging the battery 14 has arrived), [0285]. It would have been obvious to apply Pollack’s teachings of an override for requesting

immediate charging to Sutardja-Kelty for the reasons discussed above. *See* Claims 1[d][ii]-[iii].

**h) Kelty's Teachings**

179. To the extent argued that Sutardja's does not transmit charging parameters/alternate charging parameters in the form of a signal., Kelty teaches transmitting charging instructions in the form of a "signal" based on "interaction with a user." EX1005-Kelty, [0031].

180. As explained above, a POSITA would have been motivated and would have found it obvious to modify Sutardja's system to transmit charging parameters/alternate charging parameters in the form of a "signal," per Kelty. Claim 1[c].

**B. Claim 2: "The vehicle charger of claim 1, wherein the third controller is adapted for automatic establishment of communication with the first controller upon connection of the vehicle charger with at least one of the battery and the source of power."**

181. Sutardja teaches a vehicle charger (CMM 104-2) comprising a third controller (modules 112/106), wherein the third controller (modules 112/106) is adapted for automatic establishment of communication with the first controller

(LMM of computer 134) upon connection of the vehicle charger (CMM) with at least one of the battery and the source of power (supply outlet 20).

182. Sutardja's control module 112 controls the operation of CMM 104. EX1004-Sutardja, [0243]. Sutardja teaches the user input "charging parameters may be stored in the CMM 104." EX1004-Sutardja, [0262]. "When the user plugs the vehicle 102 into the supply outlet 20 at the end of the day, the CMM 104-2 may transmit the charging parameters to the utility company 23" so that "[t]he utility company 23 may charge the battery 14 between 9 pm and 6 am without interacting with the user." EX1004-Sutardja, [0262], [0253], [0256], [0262]; Claim 1[a]-[c].

183. Sutardja's first controller (LMM of computer 134) at utility company 23, "receive[s] charging parameters from CMMs" and will "analyze the load on the distribution system based on the requested charging parameters from multiple customers" to "determine a schedule for charging" and ultimately the communication module of computer 134, "134-3 may communicate the replies...to the CMMs[.]" EX1004-Sutardja, [0253]; [0256]. Sutardja teaches "[w]hen the user plugs the vehicle 102 into the supply outlet 20 at the end of the day, the CMM 104-2 may transmit the charging parameters to the utility company 23" EX1004-Sutardja, [0262]. Sutardja's control module 112 (part of controller)

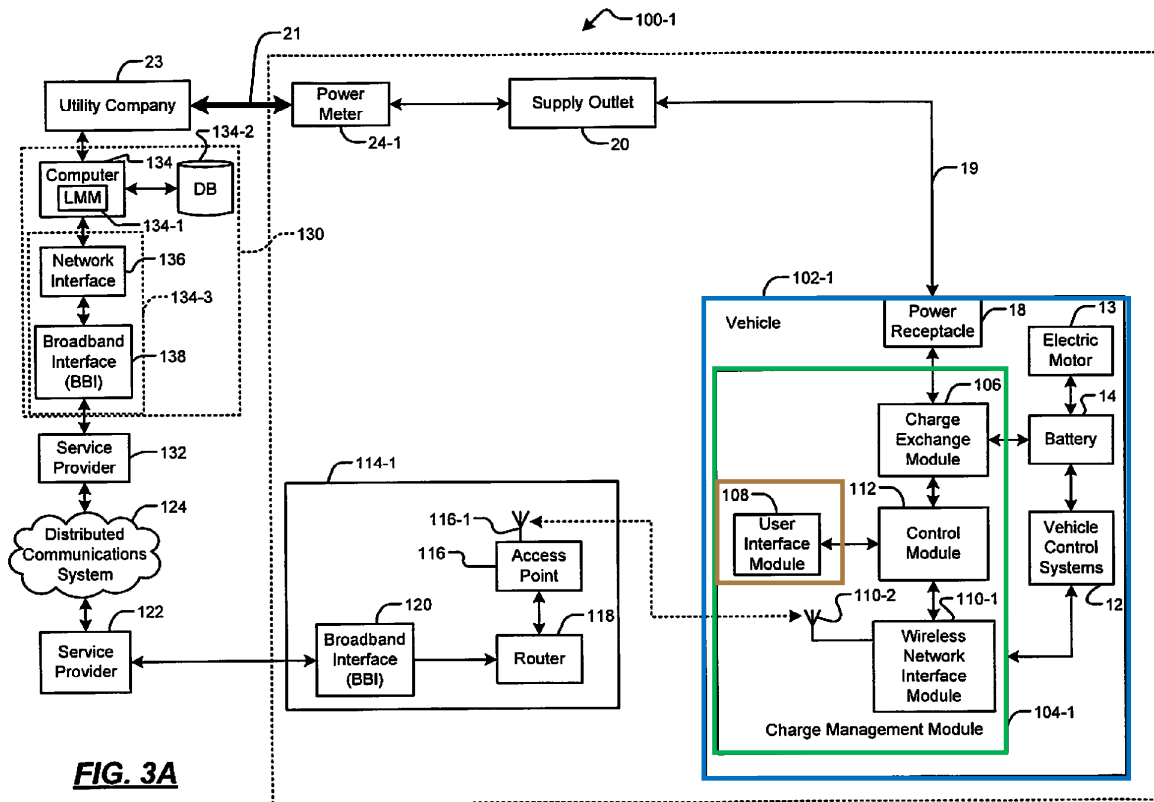
“controls[s] the operation of CMM 104-1.” EX1004-Sutardja, [0243]. As discussed in Claim 1[Pre], a POSITA would have understood that Sutardja’s description of CMM 104-1 applies to CMM 104-2, and vice versa. Therefore, a POSITA would have understood that when a user connects the vehicle to supply outlet, communication between **third controller (modules 112/106)** of **CMM 104-2** and **LMM of computer 134** is automatically established. EX1004-Sutardja, [0243], claim 1; [0069], Abstract; *see also* EX1001, 10:4-7 (“Communication between processors established automatically upon their connection are well known to those skilled in the art”). A POSITA would have understood that the user’s act of plugging the vehicle into supply outlet 20 is the triggering event for this communication sequence. After that connection is made, CMM 104-2 automatically transmits its previously stored charging parameters to utility company 23 without requiring the user to issue a separate communication command. EX1004-Sutardja, [0262].

**C. Claim 3: “The vehicle charger of claim 1, further comprising a display coupled to the third controller, the display displaying a level of charge of the battery.”**

184. Sutardja teaches a **vehicle charger** further comprising a display (part of user interface module 108) coupled to the **third controller (modules 112/106)**. Pollack further teaches a display displaying a level of charge of the battery.

a) Sutardja teaches a display coupled to the third controller

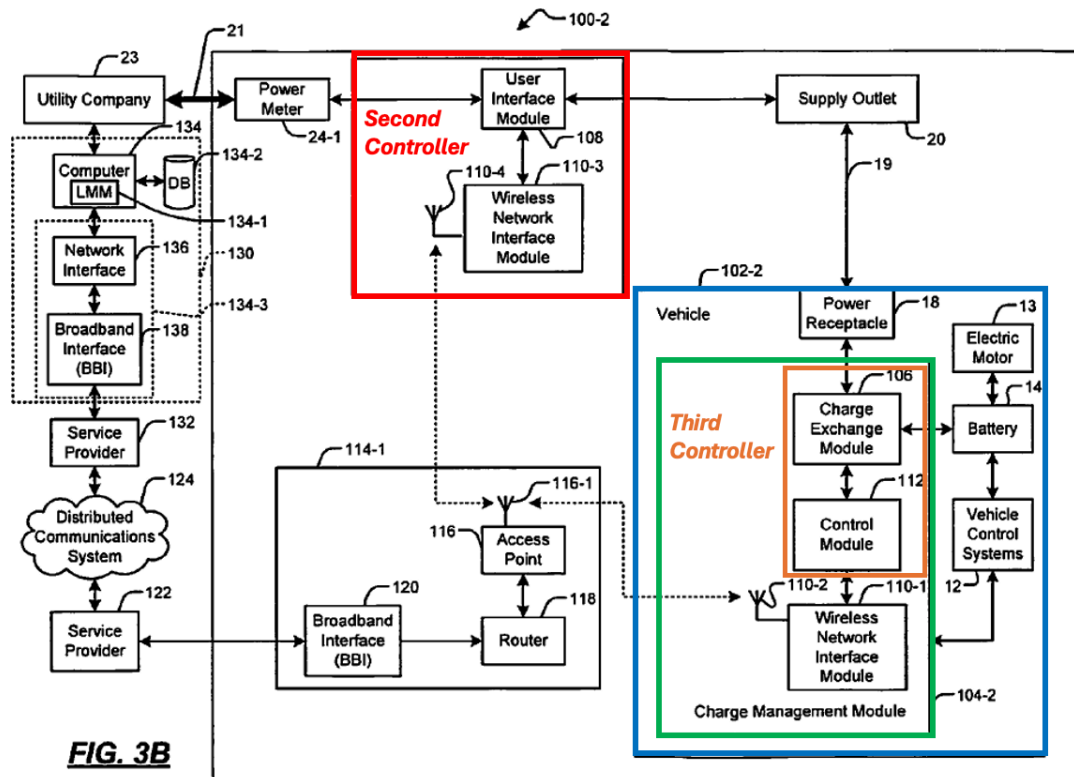
185. In the Fig. 3A embodiment, Sutardja discloses a **user interface module 108** integrated within **CMM 104-1**, and in the **vehicle** enabling local interaction with the **CMM 104-1** system:



EX1004-Sutardja, Fig. 3A, [0239], [0241].

186. Claim 1 does not recite *a display* (part of user interface 108) *coupled to the third controller* (modules 112/106), accordingly, the mapping of Claim 1 above

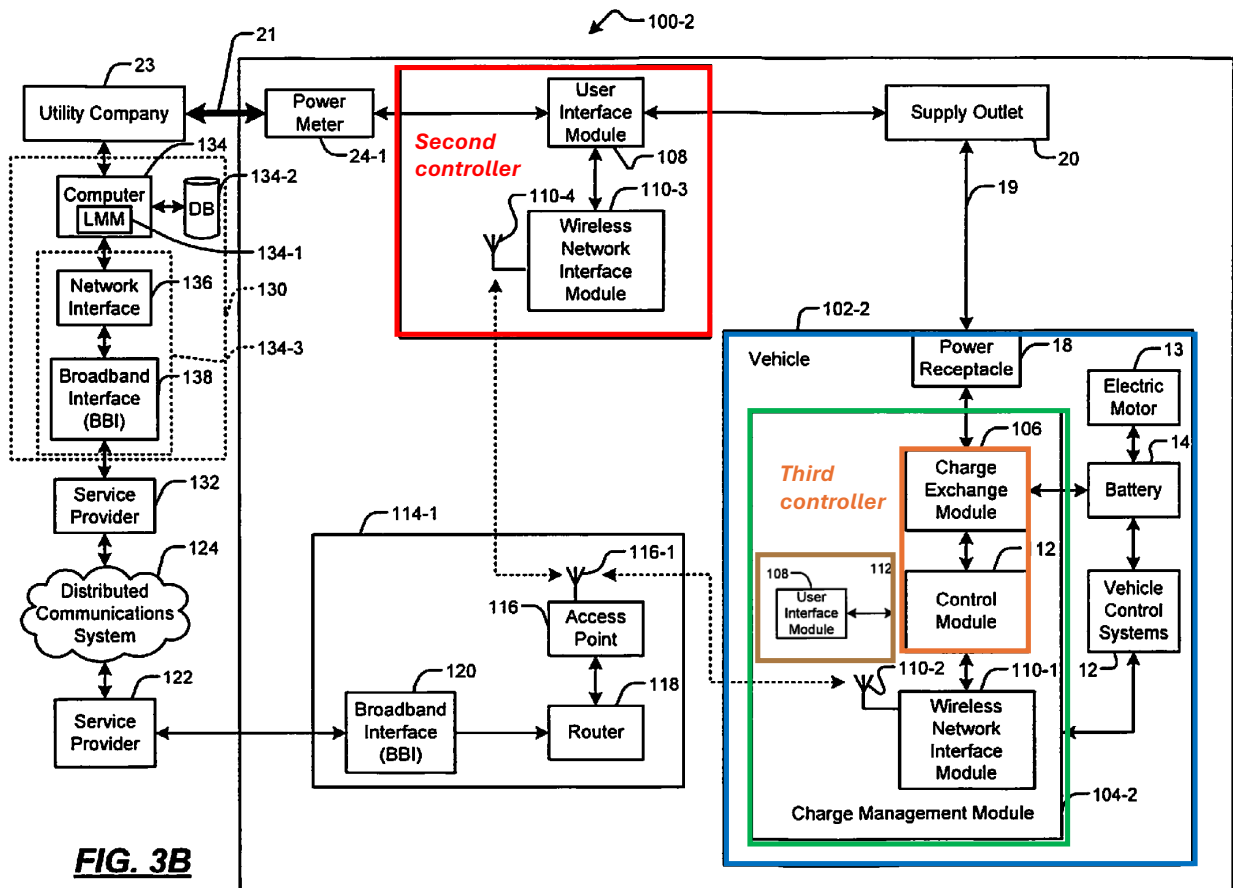
relies only on the embodiment depicted in Figure 3B of Sutardja. Claim 1[Pre]-[d][iii]. In Fig. 3B, UIM-WNIM is located outside the vehicle and vehicle charger (CMM 104-2):



EX1004-Sutardja, Fig. 3B, [0247]; Claim 1[Pre].

187. Dependent claims 3-4 and independent claims 8, and 15 require a vehicle charger comprising a controller (1) coupled to a display, and (2) adapted to communicate with another controller remote from the vehicle charger. EX1001, Claims 3-4, 8, 15. As explain in detail below, a POSITA would have been motivated to implement the local user interface module 108 of Fig. 3A within the system of

Fig. 3B, resulting in a combined system that includes both (1) a display and user interface coupled to the controller within the vehicle charger and (2) a display and user interface module outside of the vehicle for external interaction with a user. The combined system is hereinafter referred to as “Combined Fig. 3A-3B”:



EX1004-Sutardja, Combined Fig. 3A-3B; Claim 1[Pre].

**b) Motivation to Include the Display of Sutardja Fig. 3A in the Vehicle Charging System of 3B**

188. A POSITA would have been motivated and would have found it obvious to modify the charging system of Sutardja Figure 3B to include a user interface inside the vehicle, as expressly taught in Figure 3A. Sutardja explains and a POSITA would have recognized that other than the placement of the user interface and wireless network interface module, the embodiments in Fig. 3A and 3B are “substantially similar.” EX1004-Sutardja, [0247]. Both embodiments perform the same underlying functions, including receiving user-defined charging parameters, communicating with external systems (e.g., utility providers and remote computing devices), and controlling charging of the vehicle battery based on those parameters. EX1004-Sutardja, [0247], [0250]-[0253], [0261]-[0267]. A POSITA would have understood from Sutardja’s description that the different placement of user interface module 108 reflects an alternative interface configuration, rather than a difference in the underlying charging-control operation. In both embodiments, the user interface supplies user-entered information for use by the same type of charge-management system. Thus, retaining the local user interface of Fig. 3A when implementing the remote interface arrangement of Fig. 3B would not require combining incompatible charging architectures.

189. A POSITA would have recognized that the user interface module 108 of Fig. 3A (providing a local display and input interface coupled to the charger) and

the user interface outside of the vehicle configuration of Fig. 3B are complementary, and that combining them would allow both local and remote interaction with the same charging system. Such a combination would have been consistent with well-known EV charging system design practices prior to the priority date of the '567 Patent, it was well known that the user may wish to charge a vehicle away from home and sit in their vehicle during charging and would greatly benefit from a user interface inside the vehicle. Other times the user may be at home or in an office, and would want to be able to control the charging parameters locally, for example on a computer. Providing this flexible functionality would broaden the user's ability to conveniently control the charging parameters regardless of where the charging was taking place, and would substantially simplify Sutardja's charge management process. EV systems commonly provided user interfaces both at the vehicle or charging device and through remote or networked systems to allow users to monitor and control charging. For example, Witkowski teaches a system having an in-vehicle user interface circuit connected by a bus to vehicle display system 22, while a separate RF transceiver is integrated with home PC 92. EX1024-Witkowski, [0077]-[0078]. Witkowski also teaches selecting vehicle operating parameters using the owner's home computer and wirelessly transferring those parameters to the vehicle. EX1024-Witkowski, [0076]; see §V.D (Remotely Communicating Charging

Information with Vehicle) Nor further confirms that EVs were expected to be charged away from home at publicly accessible charging stations, including stations resembling conventional refueling stations and stations located in public parking lots. EX1042-Nor, 1:52-2:26.

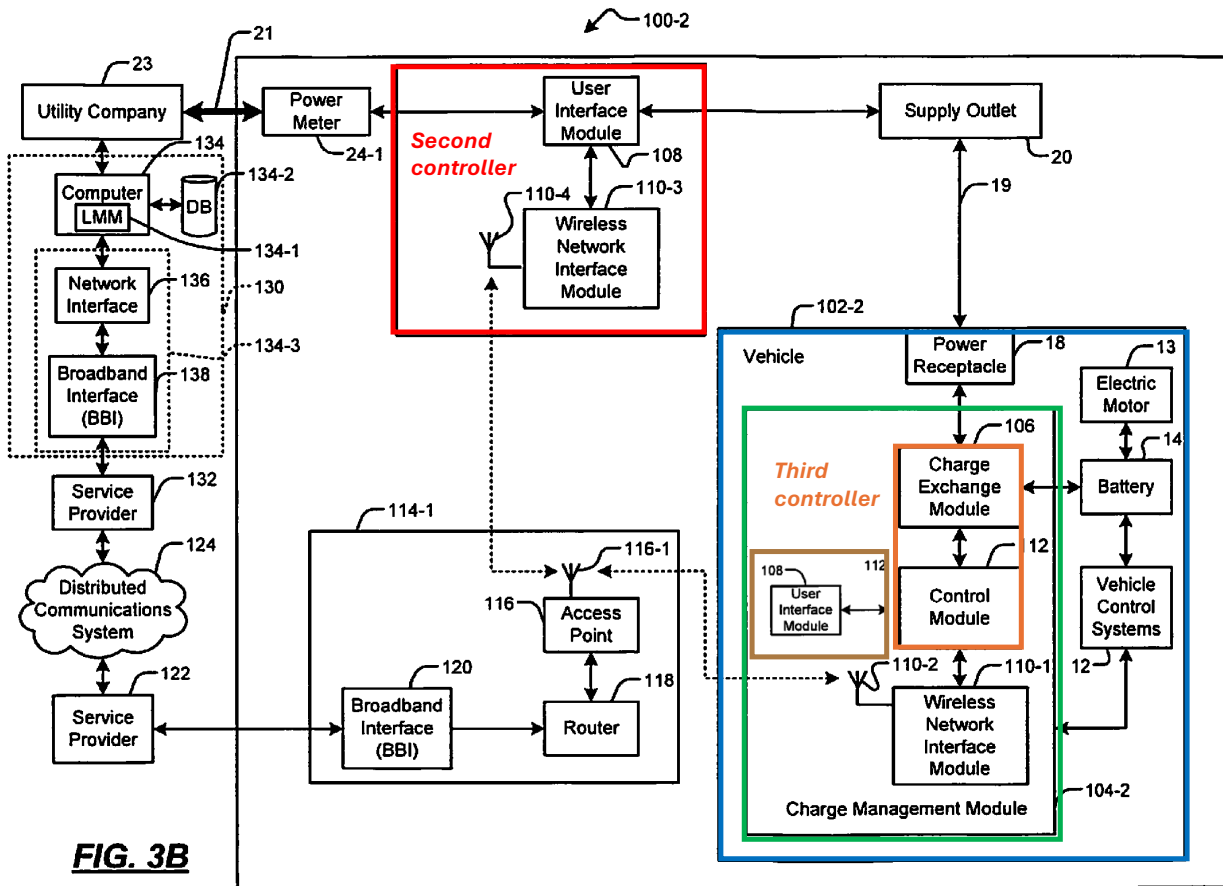
190. A POSITA would have recognized that combining the local and remote user interfaces disclosed in Sutardja would provide several predictable benefits grounded in these known systems. First, it would enhance user accessibility and convenience by allowing a user to input and monitor charging parameters directly at the charger or remotely, consistent with known systems in which users interact with charging infrastructure through interface and communication links. Users would have benefited from the option to set charging when parking their car, or to later set or change charging from outside the car and even without leaving the comfort of the inside of their home. If the user has a charging interface inside the vehicle, then the user can use that charging interface at different locations where they park their vehicle. Further, if the user has a remote charging interface, then the user can set charging even if they are in a different location than their vehicle. Therefore, having both interfaces would have been valuable to a user. Vehicle displays were also understood to improve ergonomics and to permit vehicle features to be modified, added, or upgraded. EX1045-Cramer, [0307]; see §V.B.3 (Displays)

191. Second, it would improve system flexibility by enabling both local control and remote coordination with utility systems, which were known to manage charging based on load and cost considerations. Third, it would facilitate more efficient implementation of user-defined charging preferences—such as scheduling and cost-based charging—which were known to depend on both user input and communication with external systems.

192. A POSITA would have had a reasonable expectation of success in making this modification because it merely combines known components performing their known functions within the same system architecture. Sutardja's embodiments already disclose the same core system and control logic, and combining their interface configurations would require only routine implementation without altering the underlying operation of the charging system. Such a modification would have involved only routine design choices, such as configuring the control module 112 to communicate with both local and remote interface components, each performing its known function. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA. The local user interface would be connected to control module 112 through a conventional vehicle

communication bus, while the outside user interface would retain the wireless communication path already disclosed in Sutardja's Fig. 3B. Controller-to-display bus connections were conventional. For example, Hanssen teaches an EV display that receives information from the battery and communicates through the vehicle communication bus, and Canedy teaches a microprocessor controlling an in-vehicle display through control bus 111. EX1020-Hanssen, 5:7-13, 12:5-7; EX1021-Canedy, 4:6-12; see §V.B.3 (Displays).

193. In the Combined Fig. 3A-3B, a user would have the option to control charging through either the in-charger **user interface module 108** or **Kelty's computer implementing Sutardja's UIM-WNIM**, each in communication with the control module 112:



EX1004-Sutardja, Combined Fig. 3A-3B. Because the **user interface module 108** includes “a keypad, a display, a microphone, and/or a speaker (all not shown),” and allows a user to input charging parameters for the battery, in the combination, Sutardja teaches *a display* (part of user interface module 108) *coupled to the third controller* (modules 112/106). EX1004-Sutardja, [0243].

### c) Pollack’s Teachings

194. Pollack teaches displaying an electric vehicle “state-of-charge” EX1006-Pollack, claims 1-4, [0066], [0089]-[0091], [0095], [0100]. In particular, Pollack teaches “displaying parameters of the power aggregation system on the user interface” and expressly identifies “a vehicle state-of-charge” as one of the parameters displayed. Id., claim 1. Pollack further teaches that the user interface “inputs and displays information regarding the electric vehicle.” Id., claim 3. A POSITA would have understood that the displayed vehicle state-of-charge represents the amount of charge present in the vehicle battery and therefore is a “level of charge of the battery.”

**d) Motivation to Combine**

195. A POSITA would have been motivated and would have found it obvious to modify Sutardja’s display coupled to the third controller (modules 112/106) in the Combined Fig. 3A-3B to display a level of charge of the battery (state of charge), as taught by Pollack.

196. Sutardja already teaches a vehicle charger including a third controller (modules 112/106) coupled to a user interface module 108 having a display for presenting charging-related information to a user. Claims 3[a]-[b], 4, 8[b], 15[a]. Sutardja further teaches monitoring the battery charge level and provide charge-status information to the control module 112. EX1004-Sutardja, [0270]. A POSITA

would have understood that displaying the battery charge level allows a user to monitor charging progress and battery status during charging operations. Battery charge-level displays were conventional before the priority date of the '567 Patent. For example, Myslinski teaches that a microprocessor periodically polls battery-pack circuitry to determine the battery's charge level and sends signals to a battery charge-level indicator, which displays that information to the user. EX1040-Myslinski, 3:32-53, Figs. 1-4; see §V.B.3 (Displays).

197. A POSITA would have been motivated to modify Sutardja per Pollack's teachings because it was well known to display the state of charge of an electric vehicle battery, so that the driver would know when it was time to charge the battery (same reason fuel powered vehicles have fuel level gauges) to improve user monitoring and system usability. Such a modification would have beneficially allow a vehicle user to visually see the amount of battery charge, and how much remaining capacity was available so that they would better understand where the battery is in the charging cycle. Modifying Sutardja's display to show a battery state of charge as taught by Pollack would have involved use of a known technique (presenting battery charge-status information to a user through a charging-system display) to improve similar devices (EV charging systems) in the same way. For example, Myslinski explains that it was desirable to display a battery's charge level

in a manner that permits easy determination of that level. EX1040-Myslinski, 1:46-49. Kawaguchi similarly teaches that displaying remaining battery energy through a bar-graph meter permits a user to “visually recognize quickly an approximate value” of the remaining energy and to recognize the remaining operating time. EX1046-Kawaguchi, 3:43-4:15. For an electrically operated vehicle, Kawaguchi explains that displaying the remaining battery energy enables the driver to recognize the distance that the vehicle can travel. EX1046-Kawaguchi, 11:14-38.

198. Such a combination would have yielded predictable results, and a POSITA would have had a reasonable expectation of success since such a modification would have required only reprogramming of Sutardja’s software using ordinary skill of a POSITA and hardware already present. No additional battery sensor, charging circuit, controller, or display would have been required. Charge monitoring module 150 already obtains the relevant charge-level information, control module 112 already receives battery-related data and controls operation of the charging system, and user interface module 108 already includes a display coupled to control module 112. EX1004-Sutardja, [0243]-[0244], [0268], [0270]. A POSITA would merely have programmed control module 112 to retrieve or receive the existing charge-level value, convert it into a selected display format, and periodically refresh the displayed value as charging progressed. Those were routine

display-programming operations, as confirmed by Myslinski's conventional arrangement in which a microprocessor receives battery charge-level information and provides corresponding signals to a charge-level indicator. EX1040-Myslinski, 3:32-53.

**D. Claim 6: “The vehicle charger of claim 1, wherein the third controller automatically changes the charging state of the vehicle charger based at least in part upon a time of day.”**

199. As explained above, Sutardja teaches that *the third controller (modules 112/106)* automatically starts charging at a predetermined time in response to a signal from the *first controller (LMM of computer 134)*. See Claims 1[c]-[d].

200. Sutardja's *third controller* further *automatically changes the charging state of the vehicle charger based at least in part upon a time of day*. Sutardja's *charge exchange module 106* in the *CMM 104-2* includes a charge monitoring module 150, a charging module 152, and a charge retrieval module 154. EX1004-Sutardja, [0242], [0268] (“Referring now to FIG. 7, the charge exchange module 106 may comprise a charge monitoring module 150, a charging module 152, and a charge retrieval module 154.”), Figs. 3A-5B, 7. “[W]hen the battery 14 is being charged, the *charge monitoring module 150* may activate a converter 156 and the charging module 152 based on the charging parameters received from the control module 112. For example, **the charge monitoring module**

**150** may activate the converter 156 and the charging module 152 when the time for charging the battery 14 has arrived.” *Id.*, [0269], [0262] (“The user may use the user interface module 108 to generate charging parameters comprising the time at which the battery 14 may be charged, etc. For example, the user may request a full charge daily between 9 pm and 6 am.”); *see also id.*, [0275]-[0278] (explaining that under method 200 for supplying power, the charging system “**wait[s] until time to supply power arrives[,]**” without user interaction, when it determines that power can be supplied as requested by the user). A POSITA would have appreciated that Sutardja’s charge monitoring module 150 which is part of charge exchange module 106, teachings of activating the battery converter when the time for charging has arrived based on the user input charging parameters time, such as between 9 pm and 6 am, means that Sutardja’s *third controller* automatically changes the charging state of the vehicle charger based at least in part upon a time of day.

**IX. OPINIONS REGARDING GROUND 2: CLAIMS 4, 15-17, AND 19 ARE OBVIOUS OVER SUTARDJA, KELTY, POLLACK, AND BOLL**

- A. **Claim 4: “The vehicle charger of claim 1, further comprising a display coupled to the third controller, the display displaying an amount of time for the battery to be fully charged based upon information regarding the battery received by the third controller.”**

201. Sutardja teaches a *vehicle charger (CMM)* comprising *a display (part of user interface 108)* coupled to the *third controller (modules 112/106)*. See Claim 3. Boll further teaches an EV charging system including a *display displaying an amount of time for the battery to be fully charged based upon information regarding the battery*.

**a) Sutardja’s Teachings**

202. Sutardja teaches *third controller (modules 112/106)* “receive[s] data relating to the amount of charge present in the battery 14 (i.e., **a charge level of the battery 14**) from the charge exchange module 106.” EX1004-Sutardja, [0244], [0268] (The charge monitoring module 150, in the charge exchange module 106, “inform[s] the control module 112 when the amount of **charge in the battery 14 is less than or equal to a predetermined threshold** and that the battery may need to be recharged.”), [0270]. Sutardja also teaches that user-defined charging parameters (e.g., full charge requests within a specified time window) are processed by the

**control module 112.** *Id.*, [0262]. To the extent Sutardja does not provide detail on what is displayed on **user interface module 108**, a POSITA would have looked to related art such as Boll.

**b) Boll's Teachings**

203. Boll teaches “a charge information and control system for an electric or hybrid vehicle” that includes a computing unit (microcomputer 5), an input unit (e.g., keyboard 6), and a display unit 7. EX1007-Boll, 1:8-9; 2:28-32.

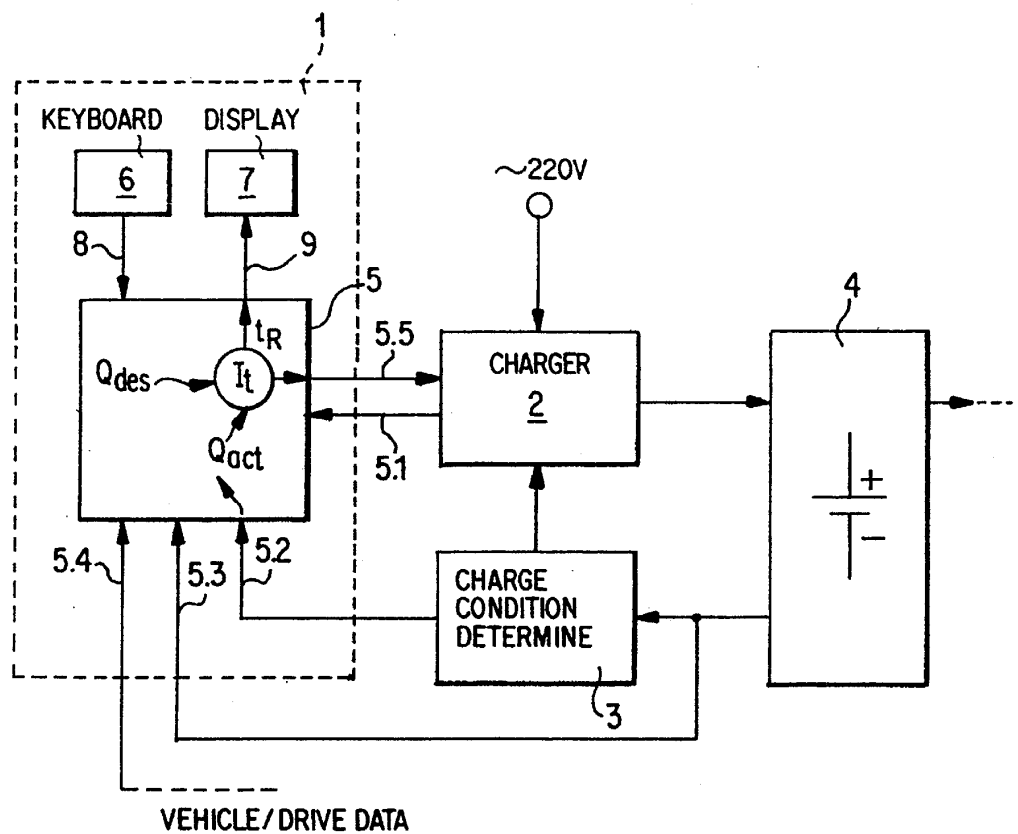


**FIG. 1**

EX1007-Boll, Fig. 1. Boll's computing unit determines charging-related parameters based on battery information and user inputs, including the battery's present charge condition and desired final charging condition. *Id.*, 2:57-65. Based on this information, Boll calculates the remaining charging time required to bring the battery to the desired charge state. Boll teaches:

“The important monitoring function is *the display* of the remaining required *charging time*  $t_R$ ; that is, *the time required to bring the battery from its present actual charging condition to* a desired final charging condition ... As a rule, *a full charge* ... will be desired.”

EX1007-Boll, 2:57-65.

204. Boll's computing unit calculates the remaining charging time based on battery condition and charging parameters and outputs a signal to display unit 7 so that the remaining charging time  $t_R$  is presented to the user. *Id.*, 2:55-3:41.

### c) Motivation to Combine Sutardja and Boll

205. A POSITA would have been motivated and would have found it obvious to further modify Sutardja's vehicle charger to display an amount of time required to fully charge the battery, as taught by Boll. In the combination, control module 112 would use the battery charge-level information received from charge exchange module 106, together with applicable charging information such as the desired final charge condition and charging current, to calculate the remaining

charging time according to Boll's teachings. Control module 112 would then provide the resulting time value to the display of user interface module 108. EX1004-Sutardja, [0243]-[0244], [0262], [0268]-[0270]; EX1007-Boll, 2:57-3:41. The modification would add a calculation and display function to information flow already present in Sutardja's system; it would not change the manner in which charge exchange module 106 supplies power to battery 14.

206. A POSITA would have been motivated to make such a combination as it was well known that charging an electric vehicle is not instantaneous, it takes some amount of time because charging a battery is a chemical process that a) does not occur instantaneously, and b) generates heat, which is proportional to the charging rate, this to maintain thermal control the charging rate is limited and thus the time to fully charge a battery is non-zero. For example, Sandeep explains that charging reforms the battery electrodes to their original chemical state and that charging nickel-metal-hydride cells involves exothermic reactions that generate heat throughout the charging process. EX1015-Sandeep, 4, 74; see §V.A-B. A POSITA would have understood that, depending on the state of charge of the battery when charging begins, and the available charging rate, a full charge may take a few minutes up to several hours. EX1015-Sandeep 137-140 (explaining that thermal management is important during EV-battery charging and provides examples in

which normal charging extends for many hours); Ishii [0051]-[0052] (explain the conventional relationship between charging time and state of charge of the battery by calculating charging time from battery capacity, remaining capacity, and charging current.). Because of these time limitations, a POSITA would have found it highly beneficial to understand how long the battery would take to charge under the current charging conditions to plan accordingly. For example, Ishii explains that calculating and displaying charge-completion time improves prediction accuracy, time management, and ease of use, particularly for electric vehicles. EX1047-Ishii, [0005]-[0009].

207. Modifying Sutardja's system to (1) calculate an amount of time for the battery to be fully charged, and (2) display that amount of time on a display in Sutardja's vehicle would have involved the use of known technique (calculating and displaying charge completion time based on battery condition) to improve similar devices (EV charging systems) in the same way. Such techniques were well known prior to the priority date, as EV charging systems commonly processed battery state information to determine charging characteristics and present that information to users. For example, Ozawa teaches an electric-vehicle display that presents the remaining time needed until the battery is fully charged in hours or minutes. EX1048-Ozawa, Abstract, 3:62-67, Fig. 3. Ozawa's management ECU first detects

the battery's remaining capacity, determines whether the battery is fully charged, and calculates the charging time before presenting the selected charging information on the display. EX1048-Ozawa, Fig. 5, 5:24-6:5. Ishii similarly calculates the time required to charge based on the battery's total capacity, remaining capacity, charging current, and charging efficiency, and displays that time to the user. EX1047-Ishii, [0051]-[0057]. A POSITA would have recognized that displaying remaining charging time would improve user awareness and planning, provide more informative feedback on charging progress, and enable more effective use of user-defined charging parameters. *See* EX1048-Ozawa, Abstract, 6:18-53; Ishii, [0007]-[0009].

208. A POSITA would have had a reasonable expectation of success when modifying Sutardja's vehicle charger to display an amount of time required to fully charge the battery, as taught by Boll. Claim 1[d]. Boll's charger, charge condition detector, and associated components are "of a conventional type known to those skilled in the art." EX1007-Boll, 2:38–40. More specifically, Boll explains that microcomputer 5 processes charger-related data 5.1 from charger 2, charge-condition data 5.2 from charge condition detector 3, battery-related data 5.3 such as battery temperature, and vehicle- and driving-condition-related data 5.4, and identifies charger 2, charge condition detector 3, and the other sensors supplying that

information as conventional. EX1007-Boll, 2:32-40. Boll's charging-time calculation algorithms may be modified using techniques "known per se," reflecting that such calculations were well understood in the art. EX1007-Boll, 3:25-26, 4:66-5:3. Incorporating Boll's known algorithms into Sutardja's control module 112 to calculate and display, via the user interface module 108 coupled to the control module 112, the remaining charging time would predictably present the user with the time required to fully charge the battery based on battery condition and charging parameters. A POSITA would have understood that implementing such time-to-charge calculations using these conventional components would have required only routine programming and system integration. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA. Sutardja already provides the battery-monitoring hardware, control module, charging circuitry, communication paths, and display. The modification would therefore require neither an additional battery-measurement system nor a redesign of the power-conversion circuitry. It would require ordinary software instructions for performing the known time calculation, formatting the result as hours and minutes or another conventional representation, and periodically updating the display as the battery charge level changed. Ozawa's

display process and Ishii's successive updating of charging time demonstrate that these operations were conventional before the priority date. EX1048-Ozawa, 5:56-6:17; EX1047-Ishii, [0065], [0080].

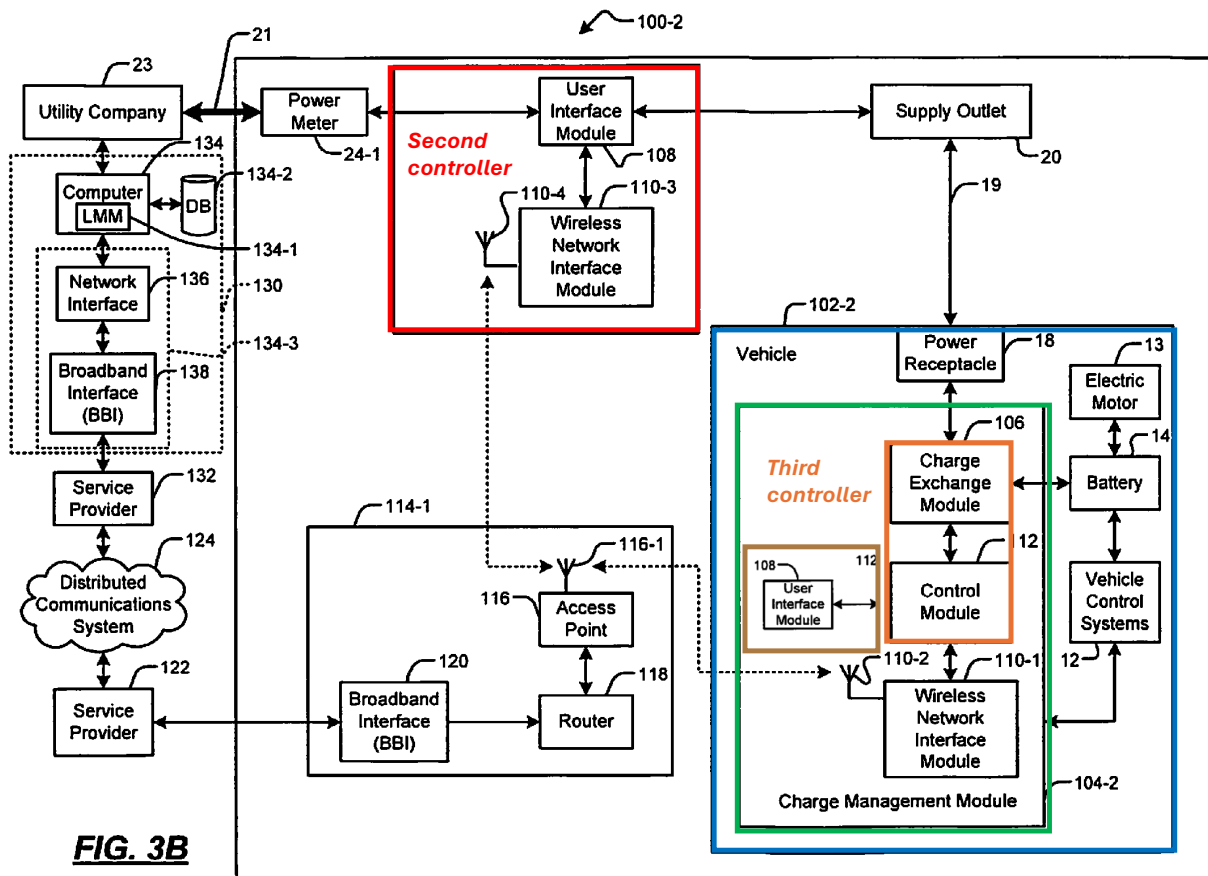
**B. Claim 15**

1. *Claim 15[Pre]: "A vehicle charger for charging a battery of a vehicle, the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller, the vehicle charger comprising:"*

209. See Claim 1[Pre].

2. *Claim 15[a]: "a display mounted within the vehicle within reach of a user seated within the vehicle;"*

210. Sutardja teaches a display (part of user interface module) mounted within the vehicle. As explained in Claim 3, Sutardja's Combined Fig. 3A-3B teaches vehicle charger (CMM 104-2) comprising a controller (modules 112/106) coupled to a display (part of user interface module 108), where vehicle charger (CMM 104-2) is within the vehicle:



EX1004-Sutardja, [0241], [0243]. See Claim 3.

### a) Boll's Teachings

211. Boll teaches a vehicle charging system comprising a display mounted *within a vehicle within reach of a user seated within the vehicle.*

212. Boll discloses “a charge information and control system for an electric or hybrid vehicle” that includes a computing unit (microcomputer 5), an input unit (e.g., keyboard 6), and a display unit 7. EX1007-Boll, 1:7–8; 2:28–32.

213. Boll teaches that “[t]he display unit 7 and the input unit 6 may advantageously be arranged in the interior of the vehicle **in proximity to the driver**. *Id.*, 5:18-20. A POSITA would have understood that arranging Boll’s display unit and keyboard in the vehicle interior “in proximity to the driver” places those components where a driver seated in the vehicle can view the displayed charging information and operate the input unit. This placement is consistent with Boll’s stated functions for those components: the driver uses input unit 6 to enter desired charging parameters, and display unit 7 presents charging information such as the remaining charging time. EX1007-Boll, 2:28-32, 2:45-65.

**b) Motivation to Combine**

214. A POSITA would have been motivated and would have found it obvious to modify Sutardja’s system such that the display of user interface module 108 is mounted within the vehicle within reach of a user seated within the vehicle, as taught by Boll.

215. As explained above, Sutardja already teaches a vehicle charger including a user interface module 108 having a display, where the vehicle charger is located within the vehicle, but does not expressly disclose the specific placement of the display within the vehicle. Boll teaches that “[t]he display unit 7 and the input unit 6 may advantageously be arranged in the interior of the vehicle in proximity to

the driver.” EX1007-Boll, 5:18–20. A POSITA would have understood that placing the display and input unit in proximity to the driver allows a seated user to conveniently monitor charging information and interact with the charging system. In the combination, the display and user-input portion of user interface module 108 would be mounted at a location accessible to a seated vehicle user, such as the dashboard or center console, while retaining its existing communication with control module 112. EX1004-Sutardja, [0243]. The display would continue to present charging information, and the keypad or other input mechanism would continue to receive charging parameters; only their physical placement within the vehicle would be specified according to Boll’s teaching.

216. Modifying Sutardja to incorporate Boll’s placement of the display and input unit would have involved applying a known design technique—positioning vehicle interface components within convenient reach of the driver—to a similar EV charging system. Such arrangements were well known prior to the priority date, as vehicle displays and control interfaces were commonly positioned within reach of seated users to improve accessibility, usability, and safety. For example, Pryor teaches a “[t]ouch screen 301 located on a vehicle dashboard 302” and explains that dashboard touchscreens are used for basic vehicle-control functions. EX1043-Pryor, 2:38, 13:19-21, 14:5, 39:1-2, Fig. 13B; see §V.B.3 (Displays). Nadal similarly

describes instrument panels on the vehicle dashboard and center console containing digital displays, status indicators, and switches used by the driver to start and monitor the vehicle's fuel-cell system; Nadal also places an LCD display on the front dashboard to provide status information to the driver. EX1018-Nadal, 5-6; see §V.B.3 (Displays). Vehicle displays were also recognized as improving occupant safety and ergonomics. EX1045-Cramer, [0307]. A POSITA would have understood that displays and switches installed in those locations for driver viewing and operation were accessible to the driver while seated in the vehicle.

217. A POSITA would have recognized that mounting Sutardja's user interface module 108 within reach of a seated vehicle user would improve user convenience and accessibility by allowing users to readily monitor charging information and input charging parameters from within the vehicle. For similar reasons as discussed in Claim 4, the combination would have yielded predictable results, and a POSITA would have had a reasonable expectation of success. Sutardja already provides user interface module 108, its display and input components, and its connection to control module 112. EX1004-Sutardja, [0243]. The modification would principally require selecting a conventional mounting location in the passenger compartment and routing the existing power and data connections to that location. In-vehicle displays were conventionally connected to vehicle electronics

through communication buses. For example, Canedy teaches microprocessor 100 controlling display 110 through control bus 111, and Hanssen teaches an EV display that receives battery information and communicates through the vehicle communication bus. EX1021-Canedy, 4:6-12; EX1020-Hanssen, 5:7-13, 12:5-7; *see* §V.B.3 (Displays). Thus, mounting Sutardja's existing display and input components on the dashboard or center console would not require changing the charging logic or power circuitry and would have predictably allowed a seated user to view and operate the interface.

**3. Claim 15[b]: “a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day; and”**

218. Sutardja's **user interface module 108** which includes a display and a keypad is *a user-manipulatable control*. EX1004-Sutardja, [0243]; Claim 1[d][i]-[iii]; EX1001, 8:33-46. Sutardja specifically teaches a user entering *a time of day by which the battery must be charged* (e.g., by 6 am) (EX1004-Sutardja, [0262]), claim 1[d]. Therefore, in combination, Sutardja-Kelty--Boll teaches *a user-manipulatable control within reach of the user seated within the vehicle and by which a user can enter a time of day*. Claims 1[d][i]-[iii].

**4. Claim 15[c]: “a controller coupled to the display and to the battery, the controller changing a supply of electric power to charge the battery during the course of a charging session by**

*at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user,”*

219. Sutardja teaches a vehicle charger comprising *a controller (modules 112/106)* coupled to the display (part of *user interface module 108*) and to the *battery 14* via *intervening charging circuitry* (e.g., the charge exchange module 106 and associated power path components):

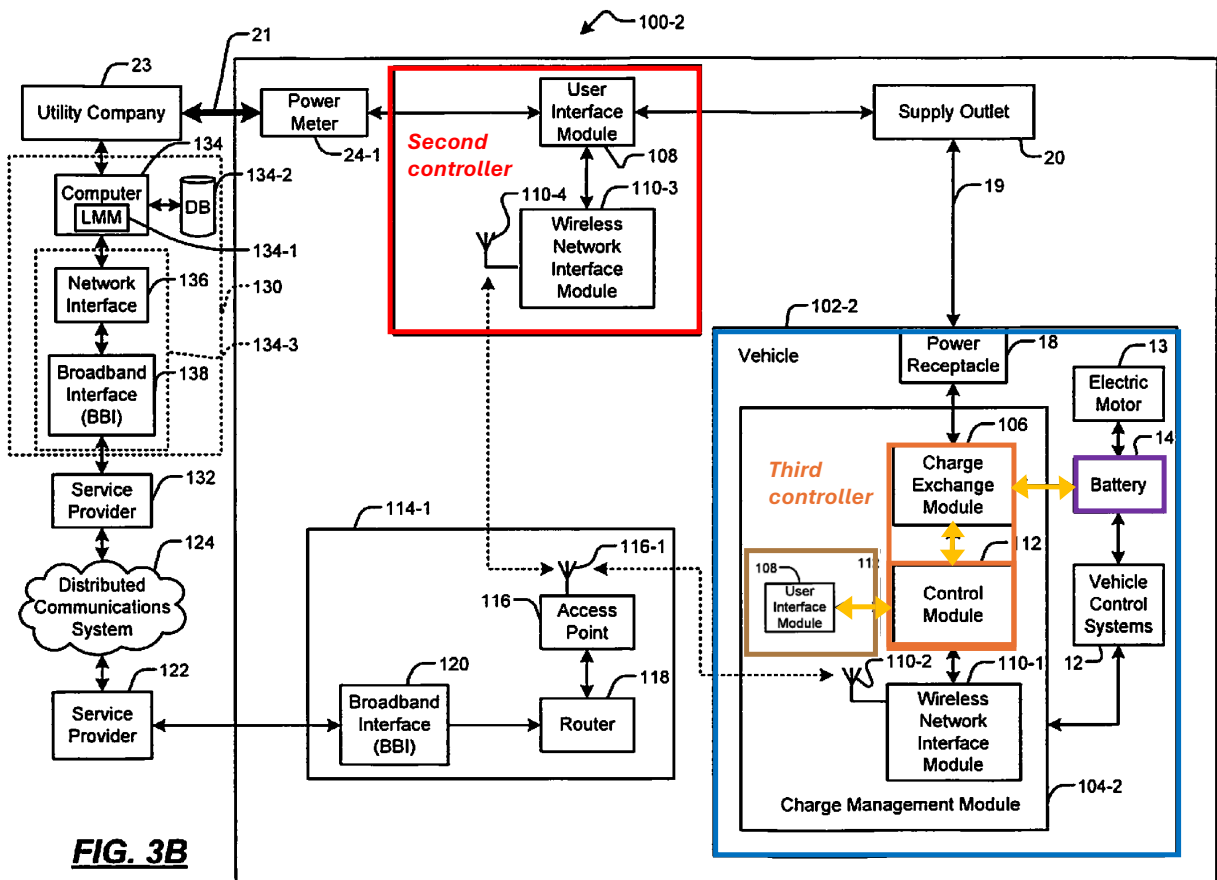


**FIG. 3B**

EX1004-Sutardja, Combined Fig. 3A-3B; Claim 4. Sutardja further teaches *controller (modules 112/106) changes a supply of electric power to charge the battery during the course of a charging session by...starting battery charging, and stopping battery charging based at least in part upon the time of day entered by the user. See Claims 3, 4, 15[b].*

5. ***Claim 15[d]: “wherein the controller supplies electric power to the battery if a level of battery charge is below a threshold level of battery charge independent of the time of day entered by the user, the controller supplying electric power to the battery at least until the threshold level of battery charge is reached,”***

220. Sutardja teaches a **vehicle charger (CMM 104-2)** comprising a **controller (modules 112/106)** wherein the **controller (modules 112/106)** supplies electric power to the battery based on user charging parameters (e.g. daily charging times). See Claim 1[Pre], 1[c].

221. Sutardja also teaches monitoring the battery charge level and informing control module 112 when the battery needs to be charged, when charging is complete, and when the battery charge level falls **below a threshold or safe level:**

The charge monitoring module 150 may monitor the amount of charge in the battery 14 when the battery 14 is being charged and may inform the control module 112 when the charging is completed....when the amount of charge in the battery 14 is less than or equal to a predetermined threshold and that the

battery may need to be recharged ...when the charge in the battery 14 is less than or equal to the safe level.”

EX1004-Sutardja, [0268].

**a) Kelty’s Teachings**

222. Kelty teaches charging an EV battery by supplying electric power to the battery if a level of battery charge is below a threshold level of battery charge (the first energy stored level), independent of the time of day entered by the user until the threshold level of battery charge is reached.

223. Kelty teaches selectively charging a battery based on charging-cost conditions and target battery charge levels. EX1005-Kelty, Abstract, [0014]. Kelty’s “*charging circuit 208 is turned on until the battery reaches a first energy stored level*” (e.g., 80% of full stored energy to improve calendar life) during a first time period when charging costs are below a threshold, and optionally charging the battery to a higher “second energy stored level” (e.g., 90% or full stored energy) during a second time period when the charging costs may be higher. EX1005-Kelty, [0014], [0027],[0031]-[0032], [0037], Fig. 4. Thus, the condition for continuing the first charging operation is whether the battery has reached the first energy stored level—not whether a user-entered time of day has arrived or expired. EX1005-Kelty, [0027] [0040], claims 1, 9. Kelty’s charging circuit continues supplying power while

the stored-energy level is below that target and discontinues that operation once the target is reached. EX1005-Kelty, [0038] (explaining that the vehicle charges to the first energy stored level and then “pause[s] at that level”), [0047] (“If the system reaches this level, it stops charging if it is during the first time period.”).

**b) Motivation to Combine**

224. A POSITA would have been motivated and would have found it obvious to modify Sutardja’s *controller (modules 112/106)* to supply power to the battery if a level of battery charge is below a threshold level of charge independent of time and until the threshold battery charge level is reached, as taught by Kelty. Sutardja teaches modules 112/106 monitoring battery charge levels to make charging decisions, including charge monitoring module 150 in charge exchange module 106 notifying control module 112 when the battery charge level “is less than or equal to a predetermined threshold,” when charging is completed, and when the battery charge level is “less than or equal to the safe level.” EX1004-Sutardja, [0268], [0270]. In the combination, Sutardja’s control module 112 receives the minimum charge threshold and compares that threshold with the charge-level information supplied by charge monitoring module 150 (part of charge exchange module 106). EX1004-Sutardja, [0268]-[0270], Figs. 3A-5B, 7. When the monitored level is below the threshold, control module 112 instructs charge exchange module

106 to supply power to battery 14 notwithstanding the separate time-of-day schedule. Charge monitoring module 150 continues monitoring the battery, and the minimum-charge operation continues until the monitored level reached the threshold. EX1004-Sutardja, [0267]-[0270]; EX1005-Kelty, [0014], [0031]-[0032], [0037].

225. A POSITA would have been motivated to modify Sutardja because a user would want to always have some minimum level of charge, regardless of the time of day or the associated cost so that the vehicle would be usable at least at some minimal level, for example to drive to work, or to drive to the store or a hospital, etc. The user's desire for a minimum charge level is independent of any user-entered charging schedule, because it allows for emergency vehicle use, which is typically not planned. Therefore, the modification would improve reliability and usability of the vehicle. The importance of maintaining a useful minimum charge was well-known before the priority date of the 567 Patent. For example, Hafner identifies "a minimum amount of charge" as one of the charging preferences that an EV user may specify. EX1038-Hafner, [0049]; see §V.E (Charge Cost Consideration). Frey similarly explains that EV users desire to know when a charger has transmitted "a sufficient charge to a battery such that it is appropriate to drive the electric vehicle." EX1049-Frey, 1:5-14. Ambroziak further recognizes that adherence to a charging

schedule may render an electric automobile unusable for “protracted stretches of time” and identifies maintaining a charged vehicle as a practical concern. EX1026-Ambroziak, 9.

226. Modifying Sutardja according to Kelty’s teachings would have involved using a known technique (controlling charging based on battery charge level thresholds) to improve similar devices (similar EV charging systems) in the same way. Both Sutardja and Kelty address EV charging systems that automatically control battery charging based on user preferences, charging conditions, and utility-related considerations. Controlling charging based on battery charge level thresholds was a known before the priority date to the ’567 Patent. *See* Hafner expressly identifies a “minimum amount of charge” as a user charging preference. EX1038-Hafner, [0049]; see §V.E (Charge Cost Consideration). Frey likewise teaches determining a target charge state, comparing the battery’s charge state to that target, and providing a different indication depending on whether the charge state is below or above the target. EX1049-Frey, 6:50-56.

227. A POSITA would have had a reasonable expectation of success in modifying Sutardja’s modules 112/106 to supply power to the battery if a level of battery charge is below a threshold level of charge independent of time and until the threshold battery charge level is reached, as taught by Kelty, while preserving

Sutardja's existing charging architecture, including charge exchange module 106 and charge monitoring module 150. Sutardja's charge monitoring module 150 already monitors the amount of charge present in battery 14 and informs control module 112 when the battery charge reaches specified conditions, such as when charging is completed or when the battery charge falls below a threshold or safe level. EX1004-Sutardja, [0268]-[0270]. A POSITA would have understood that Kelty's threshold battery-charge logic would be implemented using Sutardja's existing monitoring and charging-control framework, with control module 112 using the charge-level information provided by charge monitoring module 150 to determine whether charging should continue until the desired threshold battery-charge level is reached. Implementing Kelty's threshold battery-charge logic within Sutardja's existing control module 112 would have required only routine programming and system integration. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

6. ***Claim 15[e]: “wherein the controller automatically starts battery charging when a cost of electrical power to the battery is equal to or less than a threshold cost of power to the battery, and”***

228. See Claim 15[Pre]; Claim 1[c].

7. ***Claim 15[f]: “wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by the controller in response to a user selecting a second user-manipulable control on a screen associated with the remote controller.”***

229. See Claim 15[Pre]; Claim 1[c], [d][i]-[iii].

- C. **Claim 16: “The vehicle charger of claim 15, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with the remote controller of the computer via the at least one of the transmitter and the receiver.”**

230. See Claim 15[Pre]; Claims 1[Pre], 1[d][i]-[iii].

- D. **Claim 17: “The vehicle charger of claim 15, wherein the controller is adapted for automatic establishment of communication with a second controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.”**

231. See Claim 15[Pre]; Claim 2. As explained above, Sutardja-Kelty teaches a vehicle charger (CMM 104-2) for charging a battery of a vehicle, comprising a controller (modules 112/106), the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller (Kelty’s computer implementing Sutardja’s

user interface module 108 and wireless network interface module 110-3). See Claim 15[Pre],[c]. Sutardja further teaches that the controller (modules 112/106) is adapted for automatic establishment of communication with a second controller<sup>4</sup> (LMM of computer 134) remote from the vehicle and the vehicle charger upon connection of the vehicle charger (CMM 104-2) with at least one of the battery and the source of power (supply outlet 20). Claim 2.

**E. Claim 19: “The vehicle charger of claim 15, wherein the controller is adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.”**

232. See Ground 2, Claim 4; Ground 3, Claim 8[b].

**X. OPINIONS REGARDING GROUND 3: CLAIMS 8 AND 10-12 ARE OBVIOUS OVER SUTARDJA, KELTY, POLLACK, AND GALE**

**a) Claim 8**

**2. Claim 8[Pre]: “A vehicle charger for charging a battery of a vehicle in the course of a charging session, the vehicle charger adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a remote controller, the vehicle charger comprising:”**

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<sup>4</sup> To be clear, the *second controller* in Claim 1 is mapped to Kelty’s computer implementing Sutardja’s UIM-WNIM, while the recited *second controller* in dependent Claims 11 and 17 is mapped to LMM of computer 134.

233. *See* Claim 1[Pre]. In the Sutardja-Kelty combination, Sutardja's *vehicle charger* (CMM 104-2) is adapted for communication with Kelty's computer which includes *a remote controller* (Kelty's computer processor implementing Sutardja's UIM-WNIM).

**3. Claim 8[a]: “a controller;”**

234. *Sutardja* teaches a *vehicle charger* (CMM 104) comprising *a controller* (modules 112/106). *See* Ground 1, Claim 1[Pre].

**4. Claim 8[b]: “a display coupled to the controller and adapted to display a time; and”**

235. Sutardja-Kelty-Pollack teaches *vehicle charger* (CMM 104-2) comprising *a display* (part of *user interface module 108*) *coupled to the third controller* (modules 112/106). EX1004-Sutardja, [0243]. *See* Claim 3.

**a) Sutardja's Time Display Teachings**

236. Sutardja teaches that “the user may use the user interface module 108” to “to input a request for charging at 5 pm on a given day.” EX1004-Sutardja, [0264], [0262]-[0263] (requesting charge by 6 am). Therefore, Sutardja teaches a user inputting a time via the user interface module 108, which includes a display. EX1004-Sutardja, [0243] (“The user interface module 108 may comprise a keypad, a display, a microphone, and/or a speaker (all not shown).”).

**b) Pollack's Time Display Teachings**

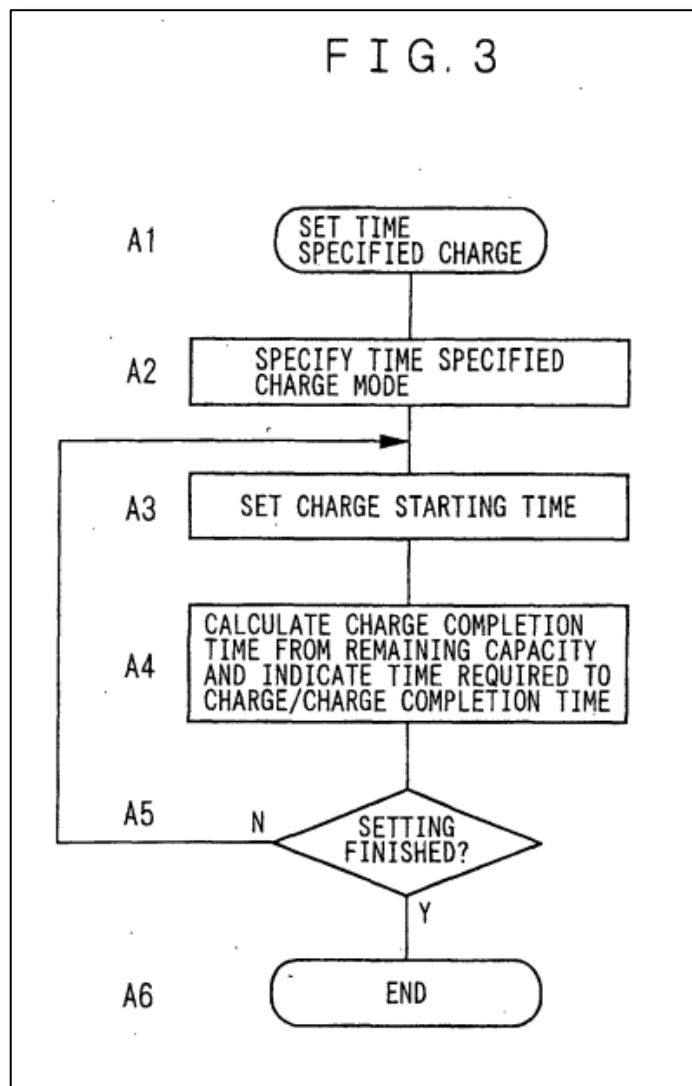
237. To the extent it is argued that Sutardja does not expressly state that the charging time is displayed when input by the user, Pollack provides an express teaching that “the parameters to be **displayed** include...a predicated amount of **time**” until the user’s vehicle “disconnects from a power grid.” EX1006-Pollack, Claim 4, [0095].

**c) Motivation to Combine Sutardja and Pollack**

238. It would have been obvious and a POSITA would have been motivated to display a time on Sutardja’s display (part of user interface module 108), connected to the third controller (modules 112/106), as taught by Pollack. It would have been obvious to apply Pollack’s user-interface teachings to Sutardja for the reasons discussed above at claim 1[d]. Specifically, it would have been obvious to implement Pollack’s express teaching of displaying the time that the user expects to disconnect from the power grid (e.g., the time the user wants their vehicle charged by or expects to leave their home) on Sutardja’s display. EX1006-Pollack, Claim 4.

239. Modifying Sutardja according to Pollack’s teachings would have involved applying a known display technique—displaying charging-related time information through a charging-system interface—to a similar EV charging system. This was well known in the prior art. For example, Ishii teaches after the charging

time is calculated, the display and operation unit 13 indicates “a time required to charge and/or the inputted charge starting time, or a...charge completion time.” EX1047-Ishii, [0057], FIG. 3. Then, “the completion of the setting operation is confirmed (pressing down a confirmation key is detected), setting of the time-specified charge is finished.” EX1047-Ishii, [0058], FIG. 3.



EX1047-Ishii, FIG. 3. Displaying a charging completion time was well known, and EV charging systems commonly displayed time-based charging information to improve user monitoring and charging coordination. As another example, Hayashi teaches, when displaying the time required to charge (also referred to by Hayashi as “charging time”), “the **charging time displayed** on the display unit 24 should be **incrementally reduced** in accordance with progress in the charging process to indicate the remaining time until charging is complete.” EX1050-Hayashi, [0170].

240. A POSITA would have recognized that implementing Pollack’s time-display teachings in Sutardja’s user interface module 108 would improve the operation and usability of Sutardja’s charging system by allowing users to readily view charging-related timing information, including the time by which charging is requested or expected to complete. It was known that the time required to charge a vehicle would be displayed and provided to the user of the vehicle. *See e.g.*, EX1006-Boll, 3:36-41 (“...the computing unit 5 determines the required remaining charging time  $t_R$  to complete the charging operation, and emits a corresponding signal 9 to the display unit 7 so that the remaining charging time  $t_R$  is displayed.”); EX1051-Izuno, [0013] (“This enables the user to receive information such as the battery charge level, charge status, time remaining until full charge, remaining capacity...”), [0014] (“The communication terminal 50 may also be a display device or audio

device installed in the vehicle system of the user's vehicle.”). Further, it was known that the display of the time required to charge the battery was important for monitoring purposes. EX1006-Boll, 2:57-62 (“The important monitoring function is the display of the remaining required charging time  $t_R$ ; that is, the time required to bring the battery from its present actual charging condition to a desired final charging condition, under defined charging parameters.”). Such information would have allowed users to more effectively coordinate charging operations with anticipated vehicle usage and utility-controlled charging schedules. For similar reasons as explained above in Claim 1[d], the Sutardja-Pollack modification would have yielded predictable results, and a POSITA would have had a reasonable expectation of success. *See* Claim 1[d].

5. ***Claim 8[c]: “a user-manipulatable control coupled to the controller and operable by a user to enter a time of day at which the charging session will end,”***

241. In Sutardja's Modified Fig. 3A-3B, a user interface module 108 is coupled to the controller (modules 112/106). Therefore, Sutardja teaches a user-manipulatable control (Sutardja's keyboard) coupled to the controller (modules 112/106). Claim 1[Pre], Claim 1[d], Claim 3. EX1004-Sutardja, [0243]. Sutardja further teaches that the user-manipulatable control (Sutardja's keypad) is operable by a user to enter a time of day at which the charging session will end. EX1004-

Sutardja, [0262] (“The user may use the user interface module 108 to generate charging parameters comprising the **time at which the battery 14 may be charged**. For example, the user may request a full charge daily between 9 pm and 6 am.”), [0235] (“The charging parameters **may specify a time of the day to charge the batteries, a charge completion time**, a priority at which the batteries may be charged, and an **expected time** when the vehicles will be used next.”).

6. *Claim 8[d]: “wherein the controller automatically changes the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of increasing a rate of charge of the battery, decreasing the rate of charge of the battery, starting battery charging, and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user,”*

242. As explained above Sutardja teaches that **the controller (modules 112/106)** automatically changes the supply of electric power to the vehicle battery during the course of the charging session by...starting battery charging. See Claims 1[c]-[d].

243. Sutardja in view of Gale teach wherein the controller **(modules 112/106)** automatically changes the supply of electric power to the vehicle battery during the course of the charging session by at least one of a group consisting of

starting battery charging and stopping battery charging based at least in part upon the time needed to charge the vehicle battery by the time of day entered by the user.

**a) Sutardja's Teachings**

244. Sutardja further teaches *stopping battery charging based at least in part upon battery by the time of day entered by the user*. Sutardja teaches the “users may plug in their vehicles at 6 pm and request recharging by 6 am.” EX1004-Sutardja, [0231], [0262] (“The user may use the user interface module 108 to generate charging parameters comprising the time at which the battery 14 may be charged, etc. For example, the user may request a full charge daily between 9 pm and 6 am. Accordingly, the user may input charging parameters that include the daily charging times using the user interface module 108.”) Therefore, Sutardja teaches *the time of day entered by the user*.

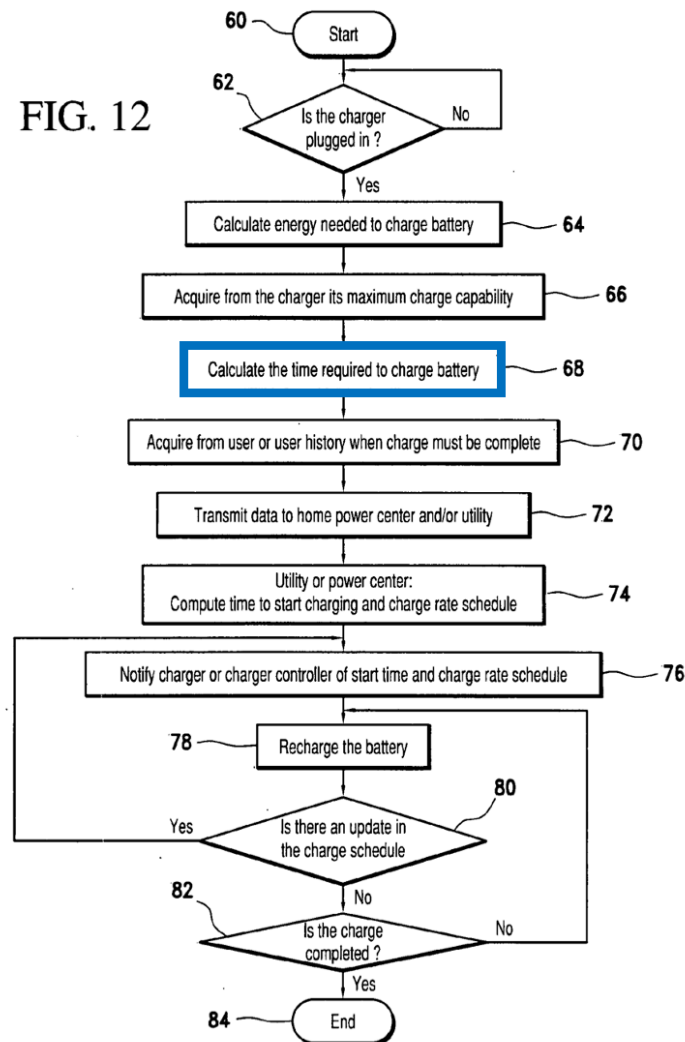
245. When the vehicle is charged to the desired level in the users desired time, Sutardja teaches “the charge monitoring module 150 may **stop** charging the battery 14 by deactivating the converter 156 and the charging module 152.” EX1004-Sutardja, [0270], [0267] (“**The control module 112** in the **CMM 104** may **control the charging** of the battery 14...**based on the charging parameters**”), [0235] (“The charging parameters may specify **a time of the day to charge** the batteries, **a charge completion time**, a priority at which the batteries may be

charged, and an expected time when the vehicles will be used next.”); EX1004-Sutardja, [0007] (“The **recharging time of the battery 14 may vary depending on many factors**. The factors may include the type of the battery 14, the amount of charge consumed by the vehicle 10 before recharging, **the rate at which power is supplied** by the supply outlet 20, etc.”). Therefore, Sutardja teaches to *automatically change the supply of electric power to the vehicle battery during the course of the charging session by stopping battery charging based at least in part upon battery by the time of day entered by the user.*

**b) Gale’s Teachings**

246. In related art, Gale provides additional detail regarding using *the time needed to charge the vehicle* to determine when to start and stop charging. Gale teaches an electric vehicle “determin[ing] the **length of the period required to fully recharge the battery 28** from its current state of charge.” EX1008-Gale, [0041], Abstract. Gale further teaches using that period of time (and other data, such as “user input” relating to “the time when the recharge is directed to be completed”) in order to “compute time to start charging.” EX1008-Gale, [0042], Fig. 12.

FIG. 12



EX1008-Gale, Fig. 12.

**c) Motivation to Combine**

247. It would have been obvious and a POSITA would have been motivated to consider the time required to charge the battery when determining charge start and stop times based on the express teachings of Gale. EX1008-Gale, [0041]

(“At 68, controller 30 uses information from steps 64 and 66 to determine the length of the period required to fully recharge the battery 28 from its current state of charge.”) Abstract. The time required to charge the battery was a well-understood concept. As an example, Suyama teaches the “time required to charge the electric vehicle is normally between seven and ten hours.” EX1012-Suyama, 1:24-26, Fig. 4, 108. Sutardja already teaches a user inputting charging parameters comprising the time at which the battery 14 may be charged and that the recharging time varies depending on the rate at which power is supplied. EX1004-Sutardja, [0007], [0262], [0235].

248. Modifying Sutardja-Kelty to incorporate Gale’s time it takes to charge the vehicle would have involved applying a known technique—considering charging-related time information time—to a similar EV charging system. Gale provides an example of a battery that requires “10 hours to be fully recharged.” EX1008-Gale, [0034]. If the vehicle is plugged in when the battery is “partially discharged the length of the period required to fully recharge the PHEV would be less than 10 hours.” EX1008-Gale, [0034]. As another example of the well known concept of factoring in the time to recharge the battery. Ishii teaches after the charging time is calculated, the display and operation unit 13 indicates “a time required to charge...” EX1047-Ishii, [0057], FIG. 3. Then, “the completion of the

setting operation is confirmed (pressing down a confirmation key is detected), setting of the time-specified charge is finished.” EX1047-Ishii, [0058], FIG. 3. A POSITA would have appreciated that by factoring how long it takes to charge the battery, a user would be able to understand when their car is able to finish charging.

249. A POSITA would have recognized that incorporating Gale’s time it takes to charge the vehicle into Sutardja’s scheduled time the user wishes their vehicle to charge would have improved overall efficiency of Sutardja’s system since as an example in order to charge between 9-6pm, it would be necessary to know how long the car must charge and a POSITA would have had a reasonable expectation of success. EX1004-Sutardja, [0262]. A POSITA would have appreciated that Gale similarly takes into consideration cost when recharging the battery. EX1008-Gale, [0038]. “FIG. 11 shows the variation with start time of the cost reduction in the second example relative to the first example. The second example would reduce the cost to recharge the PHEV battery 28 by nearly six percent compared to the first example.

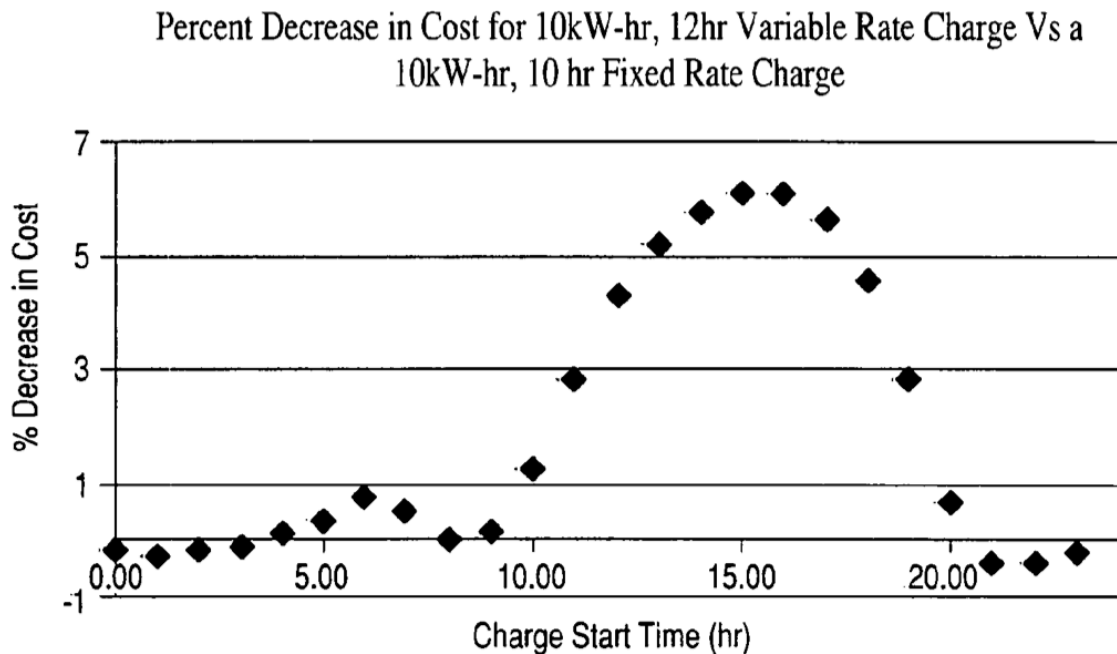


FIG. 11

xfEX1008-Gale, Fig. 11.

7. *Claim 8[e]: “wherein the controller automatically changes the supply of electric power to the vehicle battery at a time associated with a cost of power to the battery reaching a threshold cost of power to the battery, wherein changing the charging state of the vehicle charger includes automatically starting charging when the cost of power to the battery is equal to or less than the threshold cost of power, and”*

250. *See Claim 1[c].*

8. *Claim 8[f]: “wherein the controller is responsive to at least one signal from the remote controller by changing the supply of electric power to the vehicle battery to start charging, the at least one signal from the remote controller being received by*

*the controller in response to a user selecting a second user-manipulable control on a screen associated with the remote controller.”*

251. See Claim 1[c], [d].

**B. Claim 10: “The vehicle charger of claim 8, further comprising at least one of a transmitter and a receiver, wherein the controller is adapted for wireless communication with the remote controller of the computer via the at least one of the transmitter and receiver.”**

252. See Claim 1[Pre], 1[b].

**C. Claim 11: “The vehicle charger of claim 8, wherein the controller is adapted for automatic establishment of communication with a second controller remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power.”**

253. As explained above, Sutardja-Kelty teaches a **vehicle charger (CMM 104-2)** comprising **a controller (modules 112/106)** adapted for wireless communication with a computer remote from the vehicle and vehicle charger, the computer including a **remote controller (Kelty’s computer implementing Sutardja’s UIM-WNIM)**. Claim 8[pre]-[a]. Sutardja further teaches that the **controller** is adapted for automatic establishment of communication with a **second controller (LMM)** remote from the vehicle and the vehicle charger upon connection of the vehicle charger with at least one of the battery and a source of power. Claim 8[pre]-[a]; Claim 2.

**D. Claim 12: “The vehicle charger of claim 8, wherein the controller is also adapted to display a level of charge of the battery on the display.”**

254. *See* Claim 3, Claim 8[b].

**XI. OPINIONS REGARDING GROUND 4: CLAIM 5 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK AND UCHIDA**

**A. Claim 5: “The vehicle charger of claim 1, further comprising a display displaying a total power cost of a charging session.”**

255. Sutardja teaches the vehicle charger of claim 1, comprising a display (part of **user interface module 108**) coupled to the **third controller (modules 112/106)**. *See* 1[Pre], Claim 3, Claim 8[b].

256. Pollack also teaches that “the user interface advertises energy prices.” EX1006-Pollack, claim 13. Uchida further teaches *a display displaying a total power cost of a charging session*.

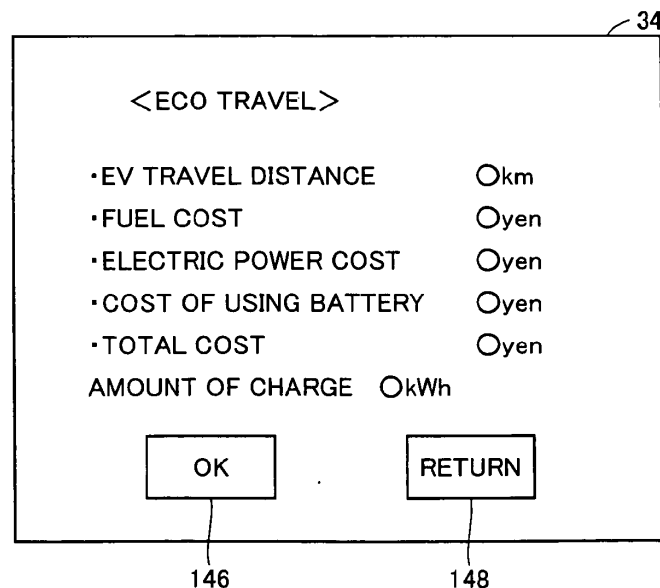
**a) Uchida’s Teachings**

257. Uchida discloses a charging control system for an electrically powered vehicle that predicts “energy cost” and “cost of using the power storage device” associated with charging the vehicle battery and presents such information to a user through a display device. EX1009-Uchida, [0008]-[0010], [0052], Fig. 1, Fig. 8, Fig. 11. Uchida discloses a charge ECU 32 including an “energy cost prediction unit 114,” a “usage cost prediction unit 118,” and a “display control unit 120” coupled to

a display device 34. EX1009-Uchida, [0098]-[0109]; Fig. 8. Uchida's energy cost prediction unit predicts fuel cost and electric power cost associated with charging and vehicle operation, while the usage cost prediction unit predicts the cost of using the power storage device. EX1009-Uchida, [0105], [0108]. The predicted charging-related costs are then output to display device 34 for presentation to the user. EX1009-Uchida, [0109].

258. Uchida further discloses that display device 34, depicted in Fig. 12 below, presents "the EV travel distance, respective predicted values of the fuel cost, the electric power cost (charge cost), the cost of using power storage device B, and **the total cost**":

FIG.12



EX1009-Uchida, Fig. 12, [0114]. As shown above, Uchida expressly teaches displaying “TOTAL COST” together with charging-related cost information through display device 34. *See also* EX1009-Uchida, [0115], (“display device 34 presents to the user the cost (energy cost and cost of using power storage device B) for the next travel.”).

**b) Motivation to Combine Sutardja and Uchida**

259. A POSITA would have been motivated and would have found it obvious to modify the Sutardja-Kelty-Boll combination such that the display of user interface module 108 coupled to control module 112 displays a total power cost of a charging session, as taught by Uchida. As explained above, Sutardja already teaches a vehicle charger including a control module 112 coupled to a user interface module 108 having a display for presenting charging-related information to a user. Claim 8[b]; Claim 15[a]. Sutardja further teaches controlling vehicle charging operations based on charging costs, user preferences, and utility pricing information. EX1004-Sutardja, [0006]-[0008]; [0021]-[0024]; [0240]-[0243] but does not specifically teach displaying the total power cost of a charging session.

260. A POSITA would have understood that displaying a total power cost of a charging session would allow users to evaluate and monitor the overall cost associated with charging operations before or during charging since incorporating

Uchida's total-cost display into Sutardja's user interface module 108 would improve user convenience and charging transparency by allowing users to readily monitor the overall cost associated with a charging session. Uchida specifically explains that providing users with charging-related cost information allows users to select charging amounts and charging operations "in consideration of the cost." EX1009-Uchida, [0007]-[0010], [0025] ("allows a user to select an amount of charge to be supplied from a power supply outside the vehicle to the power storage device in consideration of the cost of using the power storage device together with the energy cost."), [0126]-[0127]. Modifying Sutardja-Kelty-Boll to incorporate Uchida's total-cost display functionality would have involved applying a known display technique—presenting charging-session cost information to a user through a charging-system display—to a similar EV charging system. Such charging-cost displays were well known prior to the priority date, as EV charging systems commonly presented charging-related pricing and cost information to improve user awareness and charging decisions. As an example, Johnson teaches when the meter "reads zero continuity, proving charging cord connection has been removed, CPU displays, "\_\_\_\_\_ kwh delivered, Your cost\_\$\_\_\_\_\_ Dollars. Thank you. Please come again." EX1039-Johnson, [0115].

261. The combination would have yielded predictable results, and a POSITA would have had a reasonable expectation of success. Incorporating Uchida's known charging-cost display functionality into Sutardja's user interface module 108 would predictably allow users to monitor the total power cost associated with charging operations while preserving Sutardja's existing charging-control architecture and display functionality. Sutardja already teaches having a display. EX1004-Sutardja, [0243]. ("The user interface module 108 may comprise a keypad, a display, a microphone, and/or a speaker (all not shown).") Both *Sutardja* and *Uchida* already process charging-related cost information and present charging information to users through display interfaces. EX1004-Sutardja, [0240]-[0243]; EX1009-Uchida, [0105]-[0115]. A POSITA would have understood that implementing such charging-cost displays using conventional controllers, charging circuitry, and display components would have required only routine programming and system integration. Displaying charging prices was well known in the prior art. For example, Pollack teaches that "the user interface advertises energy prices." EX1006-Pollack, claim 13. Just like when a user goes to purchase an item and receives a receipt for purchased goods, a user would appreciate being able to see how much the user spent on charging their vehicle. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to

programming instructions would have been required, which would have been well-within the skillset of a POSITA.

## **XII. OPINIONS REGARDING GROUND 5: CLAIM 7 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK AND ZHANG**

- A. Claim 7: “The vehicle charger of claim 1, further comprising a battery of the vehicle charger, the battery of the vehicle charger coupled to the third controller and the electrical power cord, and supplying power to charge the battery of the vehicle in at least one state of the vehicle charger.”**

262. The combination of Sutardja and Zhang renders Claim 7 obvious. Sutardja teaches *vehicle charger* (CMM 104-2) including a *third controller (modules 112/106)* coupled to an electrical power cord and configured to control charging of the vehicle battery. Claim 1[Pre], 1[c].

### **a) Zhang’s Teachings**

263. Zhang discloses “electric car charging systems” that include an AC electric grid power supply system, an electric car charging equipment, a battery power system, and an electrical energy control module. EX1010-Zhang, Abstract; [0009]; Fig. 1. Zhang’s battery power system 4 includes “**battery packs 42**” and a “battery charging module 41,” where the battery charging module receives energy from the AC electric grid power system to charge the battery packs. *Id.*, [0028], [0035]. Zhang teaches “[e]ach **battery power system** is controlled through its

corresponding electrical energy control module and then **it is coupled to the corresponding electric car charging equipment.**” EX1010-Zhang, [0025].

264. Zhang teaches the **battery packs in the battery power system (battery of the vehicle charger)** are coupled to the battery charger (DC/DC Electric Car Charging Equipment) during charging, as depicted in Fig. 1. As shown in Fig. 1 below, Zhang’s charging system includes **battery packs 42** within a **battery power system 4** coupled to an electrical energy control module 7, which in turn is **coupled** to electric car charging equipment 8 (similar to Sutardja’s *third controller (modules 112/106))* for charging electric car 9:

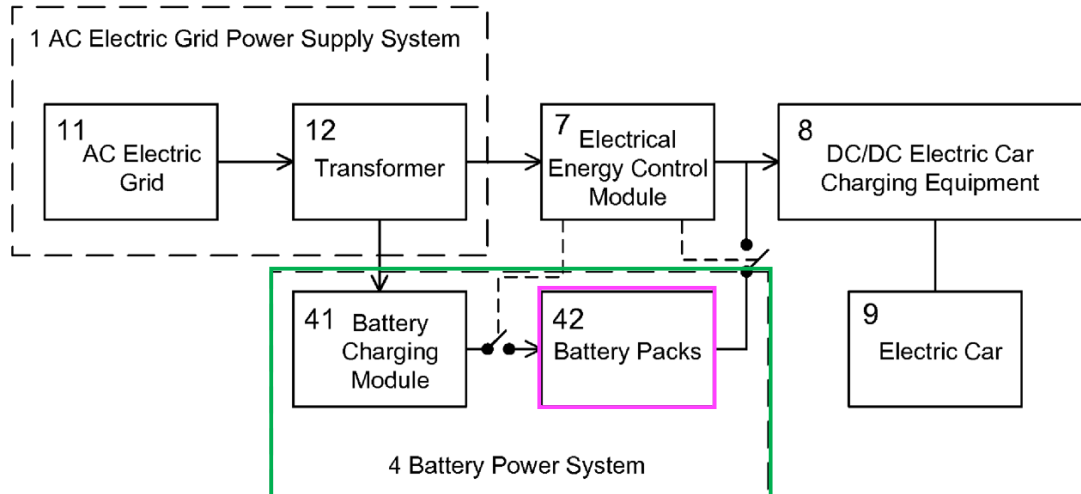


Figure 1

EX1010-Zhang, Fig. 1. When charging demand is high or when the electric grid fails, “the electrical energy control module 7 joins the battery power system 4 with the AC electric grid power supply system 1 to simultaneously charge the electric cars 9.” EX1010-Zhang, [0038]. (*supplying power to charge the battery of the vehicle in at least one state of the vehicle charger*) Zhang teaches this is advantageous to do so that if “the exterior electric power grid is cut off, it can rely on the battery packs to charge the electric car and resolve urgent charging demands.” EX1010-Zhang, [0032]; Abstract.

**b) Motivation to Combine Sutardja and Zhang**

265. A POSITA would have been motivated and would have found it obvious to further modify Sutardja to include an additional battery as part of Sutardja’s vehicle charger, as taught by Zhang. In the combination, the modified vehicle charger of Sutardja includes CMM 104-2, connector/cable 19, and Zhang’s battery packs 42. Further, in the combination Zhang’s battery packs 42 would be electrically coupled to *the third controller (Sutardja modules 112/106)* and connector/cable 19 just as in Zhang battery packs 42 are coupled to Zhang’s Electric Car Charging Equipment 8. In the resulting combination, battery packs 42 supply power to charge the battery of the vehicle (Sutardja’s battery 14) when the connector/cable 19 is connected to the battery packs 42 and, for example, the electric

power grid is cut off or the user has urgent charging demand, as expressly taught by Zhang.

266. A POSITA would have understood that incorporating Zhang's battery packs 42 into Sutardja's charging system would improve charging reliability and flexibility by allowing the charging system to supplement grid power during high-demand conditions and continue charging operations during grid interruptions. As an example, Zhang teaches "when the external electric grid fails, it can rely on the battery packs to charge electric cars and thus resolving any urgent charging needs." EX1010-Zhang, Abstract. As another example, Zhang teaches "when the exterior electric power grid is cut off, it can rely on the battery packs to charge the electric car and resolve urgent charging demands." EX1010-Zhang, [0032]. A POSITA would have appreciated in the combination that Sutardja's battery charger CMM 104-2 would benefit from the same scenario of being able to rely on battery packs to charge the user's vehicle if the grid fails. Zhang specifically explains that the battery packs alleviate demand on the electric grid, reduce instantaneous overload conditions, and permit charging to continue when the external electric grid fails. EX1010-Zhang, Abstract; [0032]; [0037]-[0038].

267. Incorporating Zhang's integrated battery packs would have involved applying a known charging-system architecture technique—using integrated battery

packs controlled through a charging controller to supplement charging power—to a similar EV charging system. Such battery-assisted charging arrangements were well known prior to the priority date of the '567 Patent, as EV charging systems commonly used supplemental battery systems to manage charging demand, improve charging availability, and reduce stress on the electric grid as demonstrated by Zhang.

268. The combination would have yielded predictable results, and a POSITA would have had a reasonable expectation of success. Incorporating Zhang's known battery packs into Sutardja's charging architecture would predictably allow the vehicle charger to supply power to charge the vehicle battery in at least one operating state while preserving Sutardja's existing charging-control functionality. As an example, Zhang teaches "when the external electric grid fails, it can rely on the battery packs to charge electric cars and thus resolving any urgent charging needs." EX1010-Zhang, Abstract. Zhang's battery packs, electrical energy control module, and charging circuitry use conventional charging-system components and known control techniques. EX1010-Zhang, [0028]-[0030]; [0043]-[0055]. A POSITA would have understood that implementing such a battery-assisted charging configuration using conventional controllers, charging circuitry, and battery components would have required only routine system integration and programming.

Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

### **XIII. OPINIONS REGARDING GROUND 6: CLAIM 9 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK, GALE AND EVANS**

#### **A. Claim 9: “The vehicle charger of claim 8, wherein the display is mounted in a console within the vehicle.”**

269. Sutardja does not expressly disclose the position of *the display* (part of *user interface module 108*) within the vehicle. *See* Claims 3, 8[b].

#### **a) Evans’s Teachings**

270. Evans discloses an “Electric Vehicle Monitoring System (EVMS)” for an electric vehicle that includes an “operator display 100” for displaying vehicle operating information to the vehicle operator. EX1011-Evans, Abstract; 2:62-3:1.

271. As shown in Fig. 2 below, Evans’s operator display 100 includes multiple display elements for presenting vehicle operating information, including battery information, speed, temperature, and current draw information:

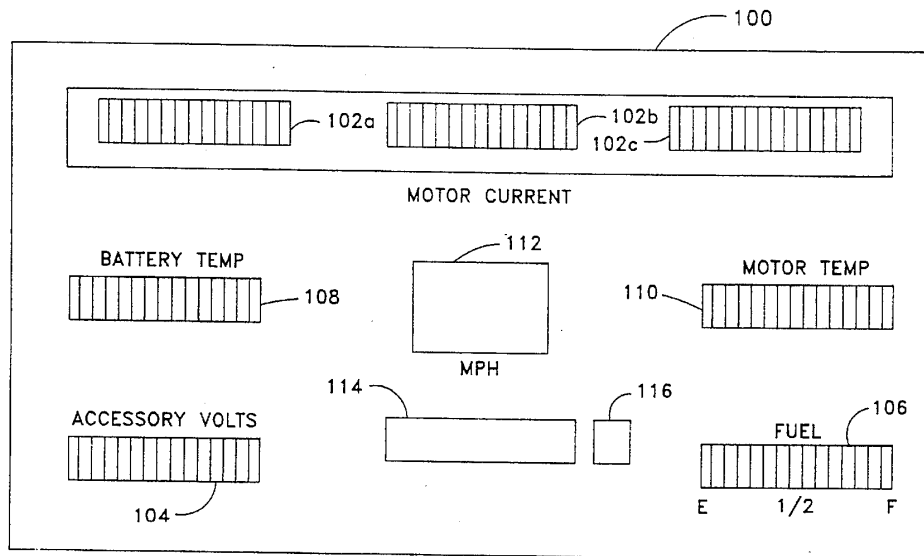


FIG. 2

EX1011-Evans, Fig. 2, 3:38-4:11. Evans teaches that “operator display 100 is a replacement dashboard” that “replaces the standard internal combustion engine dashboard display and mounts in the conventional dashboard location.” EX1011-Evans, 3:42-47. Evans further explains that “operator display 100 is positioned in the conventional dashboard location.” EX1011-Evans, 4:19-20. Evans also discloses that rack 120 “is constructed so as to mount to front console 122 of EV 12.” EX1011-Evans, 4:27-28, 4:12-35.

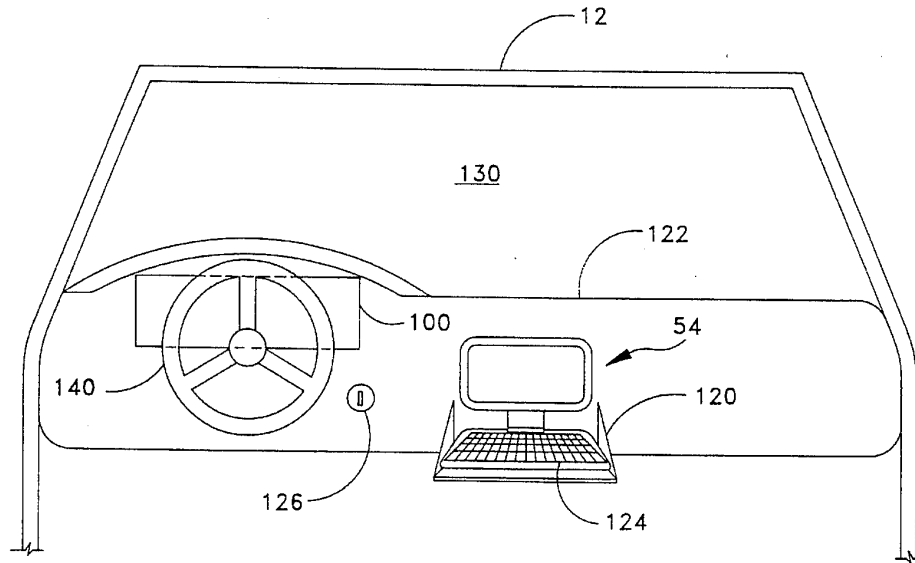


FIG. 3

EX1011-Evans, Fig. 3. Evans teaches a *display* (operator display 100) *mounted in a console within the vehicle* because the operator display is mounted in the conventional dashboard location within the vehicle interior and integrated with the vehicle dashboard and console area.

**b) Motivation to Combine Sutardja and Evans**

272. A POSITA would have been motivated and would have found it obvious to further modify Sutardja's display coupled to control module 112 to be mounted in a console within Sutardja's vehicle, as taught by Evans. Evans explains

that “operator display 100 is positioned in the conventional dashboard location.”

EX1011-Evans, 4:19-20.

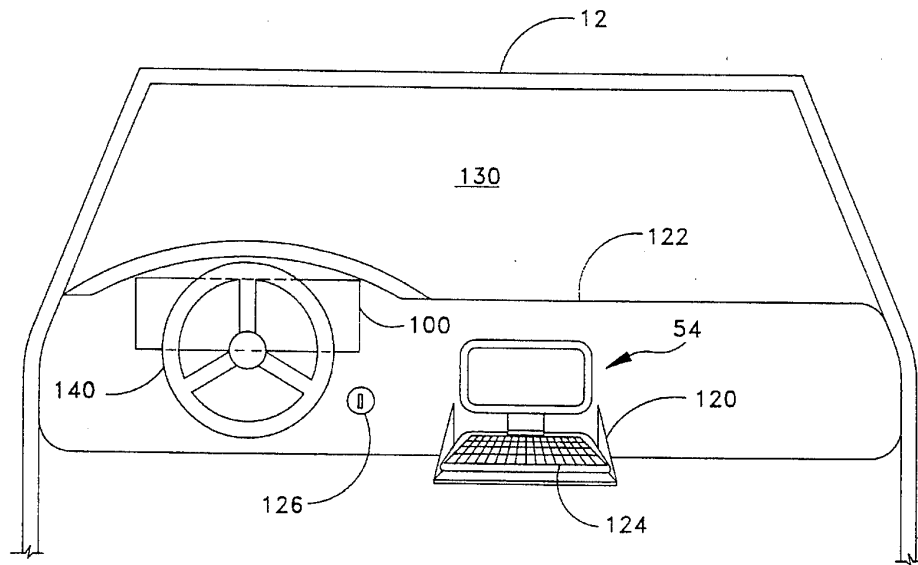


FIG. 3

EX1011-Evans, Fig. 3.

273. Sutardja already teaches a vehicle charger including a control module 112 coupled to a user interface module 108 having a display, where the vehicle charger is located within the vehicle. Claim 8[b]. A POSITA would have understood that mounting the display in the dashboard or console area allows the driver to conveniently monitor charging and vehicle information from the vehicle, thereby improving usability, accessibility, and safety. Instrument panels to display vehicle-related information within view of the user have been employed in vehicles well

before the '107 Patent. For example, Drummond discusses an “instrument panel 10” that is “on the dashboard of the automobile immediately in front of the driver so that it will attract his attention without any effort on his part.” EX1027-Drummond, 2:26-30; *see also* EX1045-Cramer, [0307]. Evans expressly explains that positioning the display in the conventional dashboard location “provides all important operating information together in the proper location to promote safe vehicle operation and ease of use.” EX1011-Evans, 3:47-49.

274. Placing Sutardja’s display in Evans’s dashboard-mounted display arrangement is application of a known vehicle-interface design technique—mounting vehicle information displays in the dashboard/console area—to a similar EV charging and monitoring system. Such arrangements were well known prior to the priority date of the '567 Patent, as vehicle displays and operator interfaces were commonly mounted in dashboard and console locations to improve visibility and driver access to vehicle information. An on-board vehicle display was known to be beneficial “for displaying information for the driver[,]” as vehicle displays “improve[d] occupant safety, environmental friendliness, ergonomics, and compatibility to modify, add, or upgrade vehicle features.” EX1045-Cramer, [0307].

275. The combination would have yielded predictable results, and a POSITA would have had a reasonable expectation of success. Incorporating Evans’s known

dashboard-mounted display arrangement into Sutardja's charging architecture would predictably allow users to monitor charging and vehicle information through a display mounted in the vehicle console area while preserving Sutardja's existing charging-control functionality. Evans's display already teaches the display "provid[es] the vehicle operator with information on vehicle operational parameters." EX1011-Evans, 5:2-3. Evans's display system uses conventional display components, dashboard mounting arrangements, and vehicle-monitoring interfaces. EX1011-Evans, Abstract; 3:37-53; Fig. 2; Fig. 3. A POSITA would have understood that implementing such a dashboard- or console-mounted display configuration using conventional display and mounting components would have required only routine system integration and design modification. Dashboard displays in the console were well known in the prior art. *See* §V.B.3. For example, "instrument panels on the [electric] vehicle dashboard and center console contain [] digital meter displays, status and warning indicator lights" so that the user may "monitor the fuel cell." EX1018-Nadal, 5-6. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

**XIV. OPINIONS REGARDING GROUND 7: CLAIM 14 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK, GALE, AND UCHIDA**

- A. Claim 14: “The vehicle charger of claim 8, wherein the controller is also adapted to display on the display a total power cost of the charging session.”**

276. *See* Claim 8[b]; Claim 5.

**XV. OPINIONS REGARDING GROUND 8: CLAIMS 13 AND 18 ARE OBVIOUS OVER SUTARDJA, KELTY, POLLACK, GALE, AND BOLL**

- A. Claim 13: “The vehicle charger of claim 8, wherein the controller is also adapted to display upon the display an amount of time for the battery to be fully charged based upon information regarding the battery received by the controller.”**

277. *See* Claim 15; Claim 3; Claim 8[b].

- B. Claim 18: “The vehicle charger of claim 15, wherein the controller is adapted to display a level of charge of the battery on the display.”**

278. *See* Claim 15; Claim 3; Claim 8[b].

**XVI. OPINIONS REGARDING GROUND 9: CLAIM 20 IS OBVIOUS OVER SUTARDJA, KELTY, POLLACK, BOLL, AND UCHIDA**

- A. Claim 20: “The vehicle charger of claim 15, wherein the controller is adapted to display on the display a total power cost of the charging session.”**

279. *See* Claim 15; Claim 5; Claim 8[b].

**XVII. CONCLUSION**

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

Dated: 16 June, 2026

By:  \_\_\_\_\_

# Scott Andrews

(650) 279-0242

scott@cogenia.com

Petaluma, CA

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## Summary

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

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

## Experience

### 12/2001-Present      Cogenia Partners, LLC

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

#### Current Engagements:

- Expert witness for patent litigation, contracts and trade secrets:
  - Audi AG, related to automotive systems integration
  - Lordstown Motors, related to infotainment systems
  - Uber, related to location based systems
  - Toyota, related to vehicle-mobile device interfaces
  - Cummins Diesel, related to cloud based vehicle data collection

#### Prior Engagements/Projects:

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

(BMW, Chrysler, Daimler Benz, Ford, GM, Honda, Nissan, Toyota, VW); A connected vehicle research program funded by U.S. DOT FHWA.

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

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

#### **4/2000 to 12/2001 Cogenia, Inc.**

President and Chief Executive Officer, Founder

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

#### **1996 to 4/2000 Toyota Motor Corporation, Japan**

Project General Manager, R&D Management Division

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

#### **1983 to 1996 TRW, Inc.**

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

1993 to 1996 TRW Automotive Electronics Group

Director, Advanced Product Planning/Development

Specific responsibilities included leadership and overall management of advanced

Scott Andrews

Page 3

IPR2026-00377

Tesla EX1003 Page 183

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

1983 to 1993 TRW Space & Electronics Group

Manager, MMIC Products Organization

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

### **1979-1983 Teledyne Microwave**

Developed high reliability microwave components. Developed CAD tools.

### **1977-1979 Ford Aerospace, Advanced Development Operation**

Designed, tested and delivered microwave radar receiver systems

## **Education**

MSEE Stanford University, 1982

BSEE University of CA, Irvine 1977

TRW Senior Leadership Program 1992

## **Publications**

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

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

## **Patents**

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