

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner

v.

CHARGELOGIC LLC,
Patent Owner

Inter Partes Review Case No. IPR2026-00382
U.S. Patent No. 11,909,011

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,909,011**

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I. INTRODUCTION

Petitioner Tesla, Inc. (“Petitioner”) requests *inter partes* review (“IPR”) of Claims 1-20 (collectively, the “Challenged Claims”) of U.S. Patent No. 11,909,011 (“the ’011 Patent”).

II. THE ’011 PATENT

A. Summary

The ’011 Patent is directed to an electrical charging system for charging electric vehicles. EX1001, Abstract. The charging system includes a controller configured to establish wireless communication with a portable controller remote from the vehicle and supply electricity to the vehicle’s battery upon receiving a wireless signal from the portable controller. EX1001, Abstract, 1:64-2:8, 10:15-37, 19:21-47. During charging of the battery, the controller further estimates an amount of time remaining to charge the battery and repeatedly displays information indicative of the amount of time remaining and the level of charge of the battery. EX1001, 13:1-28, 41:14-24, FIGS. 6-9.

B. Priority

The ’011 Patent claims priority to Provisional Application No. 61/189,353 filed August 18, 2008. EX1001, (63), (60). For this Petition only, Petitioner applies August 18, 2008, as the priority date for the Challenged Claims.

C. Level of Skill

A POSITA at the time of the '011 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. EX1003-Dec., ¶¶30-32.

III. REQUIREMENTS UNDER 37 C.F.R. §42.104

A. Grounds for Standing Under 37 C.F.R. §42.104(a)

Petitioner certifies the '011 Patent is eligible for IPR.

B. Identification of Challenge Under 37 C.F.R. §42.104(b)

Petitioner requests the Challenged Claims be found unpatentable on the following grounds.

Proposed Grounds of Unpatentability of the '011 Patent	Exhibits
<u>Ground 1:</u> Claims 1-4, 6, 10-12 are obvious under §103(a) over Kelty-078, Fujita, and Suyama	EX1004-Kelty-078 EX1006-Fujita EX1007-Suyama
<u>Ground 2:</u> Claims 7-8 are obvious under §103(a) over Kelty-078, Fujita, Suyama, and Sutardja	EX1004-Kelty-078 EX1006-Fujita EX1007-Suyama EX1010-Sutardja
<u>Ground 3:</u> Claim 9 is obvious under §103(a) over Kelty-078, Fujita, Suyama, and Kelty-218	EX1004-Kelty-078 EX1006-Fujita EX1007-Suyama EX1008-Kelty-218

<u>Ground 4:</u> Claims 13-14, 5 are obvious under §103(a) over Kelty-078, Fujita, Suyama, Sutardja, and Kelty-218	EX1004-Kelty-078 EX1006-Fujita EX1007-Suyama EX1008-Kelty-218 EX1010-Sutardja
<u>Ground 5:</u> Claims 15-16 are obvious under §103(a) over Kelty-078, Fujita, Suyama, and Johnson	EX1004-Kelty-078 EX1006-Fujita EX1007-Suyama EX1011-Johnson
<u>Ground 6:</u> Claim 17 is obvious under §103(a) over Kelty-078, Fujita, Suyama, and Pollack	EX1004-Kelty-078 EX1006-Fujita EX1007-Suyama EX1013-Pollack
<u>Ground 7:</u> Claim 18 is obvious under §103(a) over Kelty-078, Fujita, Suyama, Kelty-218, and Hotta	EX1004-Kelty-078 EX1006-Fujita EX1007-Suyama EX1008-Kelty-218 EX1009-Hotta
<u>Ground 8:</u> Claims 19-20 are obvious under §103(a) over Kelty-078, Fujita, Suyama, Kelty-218, and Hobbs	EX1004-Kelty-078 EX1006-Fujita EX1007-Suyama EX1008-Kelty-218 EX1012-Hobbs

C. Claim Construction Under 37 C.F.R. §42.104(b)(3)

For all terms not included below, Petitioner applies the ordinary and customary meaning of the claim terms.

1. “*cost of power*”

Claims 5, 13-16, 18, 20: “[C]ost of power” should be construed to mean “monetary price of power.” EX1003, ¶¶27-29.

The ’011 Specification is consistent with the understanding that “cost of power” means “monetary price of power.” The Specification explains the “cost of

power” is “(e.g., \$0.50/hr., \$0.45/hr., \$0.40/hr.)” and describes a “threshold cost of power (e.g., per unit time) at or below which battery charging will begin.” EX1001, 18:16-18, 42:43-45. When describing the “charge cost per hour indicator 70,” the ’011 Patent states the “cost per kWh” can be multiplied “by an estimated kWh level at which the vehicle charging cord 22 will charge the battery 20 to display the charge cost per hour 70 for the current battery charging session.” EX1001, 13:46-59. The “total cost to the present time for a charging session” is calculated by “multiplying the values of [power used indicator] 68 and [charge cost per hour] 70 together.” EX1001, 13:56-59. Accordingly, the “cost of power” means a “monetary price of power.”

IV. SHOWING OF ANALOGOUS ART

The prior art is analogous to the claimed invention of the ’011 Patent. The prior art is from the same field of endeavor of the ’011 Patent, namely electric vehicle battery charging systems. EX1001, 1:64-5:2; EX1004-Kelty-078, Abstract, 1:63-2:14, 2:39-3:4, FIG. 3; EX1006-Fujita, 1:52-2:42, FIGS. 1, 3, 6; EX1007-Suyama, 1:50-45; 2:5-14; 5:29-5:65; 6:25-59, FIGS. 1-2; EX1008-Kelty-218, [0013]-[0014], [0023]-[0032], FIG. 2; EX1009-Hotta, 1:64-2:63, FIGS. 1-2; EX1010-Sutardja, [0008]-[028]; EX1011-Johnson, [0012], [0051]-[0055], FIG. 1; EX1012-Hobbs, [0004], [0009], [0029], FIG. 1; EX1013-Pollack, [0047], [0052], [0093], FIGS. 1-2. EX1003-Dec., ¶¶34-36, 68-104.

The prior art is also reasonably pertinent to at least one problem facing the '011 Patent's inventors, namely at least one of:

(A) establishing wireless communication with a controller remote from the vehicle. EX1001, 1:64-2:8, 2:66-3:2, 9:13-19; EX1004-Kelty-078, 2:25-30, 4:16-21, 4:53-58, 5:2-3, FIGS. 2-3; EX1010-Sutardja, [0234], [0245]-[0247], FIGS. 3A-3B; EX1013-Pollack, [0201], [0227], FIG. 22;

(B) repeatedly estimate an amount of time remaining to charge the battery. EX1001, 41:14-24, 42:31-50; EX1006-Fujita, 4:27-34, 4:39-49, FIGS. 4-5; EX1009-Hotta, 2:9-30, 7:21-35, 8:43-56, FIGS. 3-4;

(C) display the amount of time remaining to charge the battery. EX1001, 3:22-24, 13:14-25, FIGS. 6-9, 12, 14, 19; EX1006-Fujita, 4:27-34, 4:59-64, FIGS. 5-6; EX1007-Suyama, 7:43-51, 9:6-19, FIGS. 4-5; EX1011-Johnson, [0076];

(D) display the level of charge of the battery. EX1001, 12:40-53, 13:1-7, FIGS. 6-9, 12; EX1007-Suyama, 7:43-45, 8:4-5, 9:13-15, 12:13-17, FIG. 5; and/or

(E) using a controller/processor to perform processing operations. EX1001, 1:64-2:22, 8:64-9:19, 12:23-47, FIGS. 15, 17, 25; EX1004-Kelty-078, 7:44-64, FIG. 2; EX1006-Fujita, 3:9-13; 3:54-4:49, FIG. 2; EX1007-Suyama, 6:18-7:42, 8:4-19, 14:34-15:17, FIGS. 1-2; EX1008-Kelty-218, [0035], FIG. 3; EX1009-Hotta, 3:45-4:11, 5:30-45, 7:15-50, FIG. 1; EX1010-Sutardja, [0241]-[0244], FIG. 4A; EX1011-

Johnson, [0051], [0060], FIG. 1; EX1012-Hobbs, [0049], [0051], [0055], [0070], FIG. 1; EX1013-Pollack, [0119], [0133], FIG. 8. EX1003-Dec., ¶¶37-42, 68-104.

V. GROUND 1: CLAIMS 1-4, 6, 10-12 ARE OBVIOUS OVER KELTY-078, FUJITA, AND SUYAMA

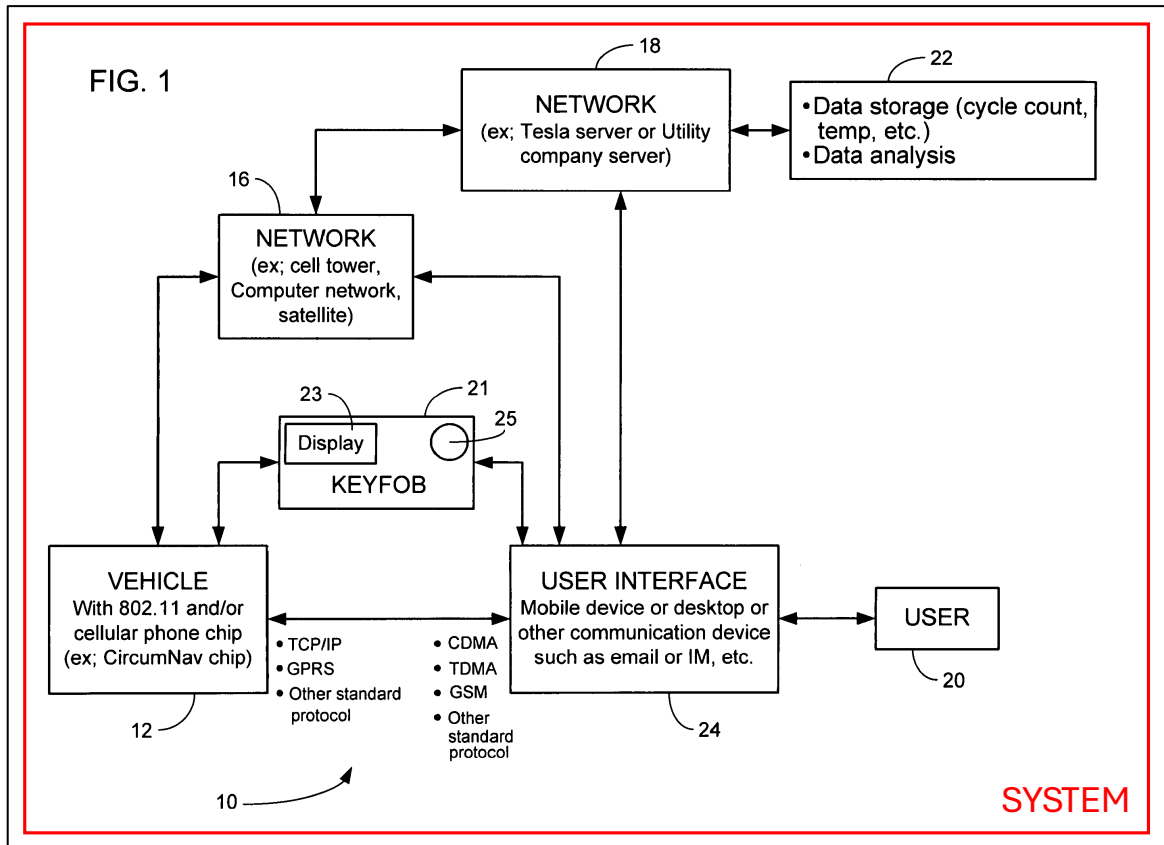
A. Claim 1

1. Claim 1[Pre]

To the extent the preamble is limiting, Kelty-078 teaches a *system for charging a battery of a vehicle*¹, namely the components of FIGS. 1-2, including interface 10, vehicle 12, user interface device 24², display 30, networks, 16, 18, and communication chip 14 form *a system for charging a battery*.... EX1004-Kelty-078, Abstract, 3:47-48, FIGS. 1-2.

¹ 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 (REOS) provided in the cross-referenced section. All REOS include the benefits described for the respective MTC.

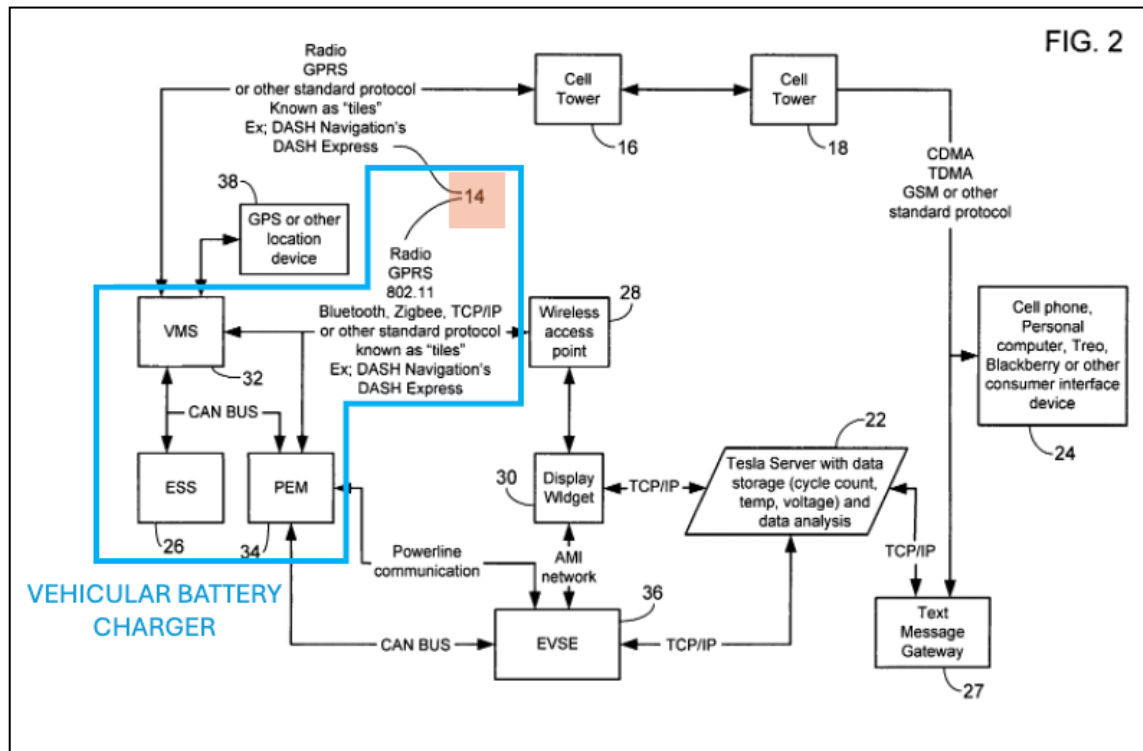
² Kelty-078's user interface device 24 is hereafter referred to as "device 24." EX1004-Kelty-078, 4:16-39.



EX1004-Kelty-078, FIG. 1, 3:16-17; EX1003-Dec., ¶105. Kelty-078 teaches interface 10 of the *system* is “specifically designed for use in an all electric vehicle 12” that “will operate completely on battery power for all propulsion and other automotive related needs” and using “a battery pack made of sheets of cells of lithium ion batteries.” EX1004-Kelty-078, 3:27-35.

Interface 10 performs steps for “controlling and monitoring a battery in the electric vehicle,” including *charging* electric vehicle 12’s battery 26 and powering on/off battery charging operations. EX1004-Kelty-078, Abstract, 3:49-54, FIG. 3 (Step 317).

Kelty-078 teaches charging the vehicle using *a vehicular battery charger*, namely the collective vehicle management system (VMS) 32, power electronics module (PEM) 34, energy storage system (ESS; battery) 26, and communication chip 14, which collectively control charging of battery 26. EX1003-Dec., ¶107.



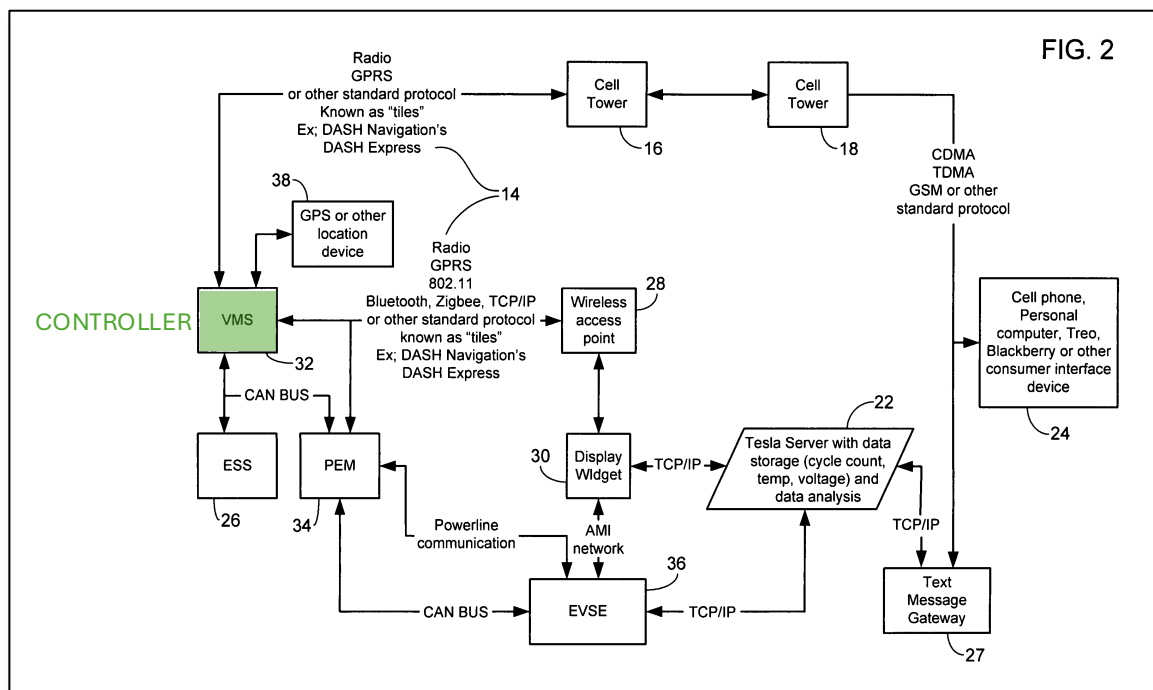
EX1004-Kelty-078, FIG. 2; EX1003-Dec., ¶108. VMS 32 “is the onboard computer that monitors, controls and coordinates various systems in the electric vehicle 12 including” PEM 34 and ESS 26. EX1004-Kelty-078, 7:47-51; EX1003-Dec., ¶¶108-109. ESS 26 “includes the battery pack of the electric vehicle 12 which is used to provide the power necessary to propel the electric vehicle 12,” and PEM 34 “house[s] a DC to AC inverter for a traction motor, a AC to DC rectifier for charging and the control PCB’s for drive and charge of the electric vehicle energy storage

system.” EX1004-Kelty-078, 7:53-64. Vehicle 12’s communication chip 14 communicates with VMS 32 and PEM 34. EX1007-Kelty-078, 3:53-59, 7:44-53; EX1003-Dec., ¶¶108-109. PEM 34 charges the batteries of energy storage system 26 based on control from VMS 32. EX1004-Kelty-078, 7:59-64.

2. Claim 1[a]

a) “controller”

Kelty-078 teaches *a controller*, namely VMS 32, “which is the onboard computer that monitors, controls and coordinates various systems in the electric vehicle.” EX1004-Kelty-078, 7:44-51. VMS 32 as an “onboard computer” satisfies *a controller*, as the ’011 Patent equates controller with computer. EX1001, 28:31-32, 21:51-52; EX1003-Dec., ¶110.



EX1004-Kelty-078, FIG. 2.

b) “controller configured to” Perform Claimed Functionality

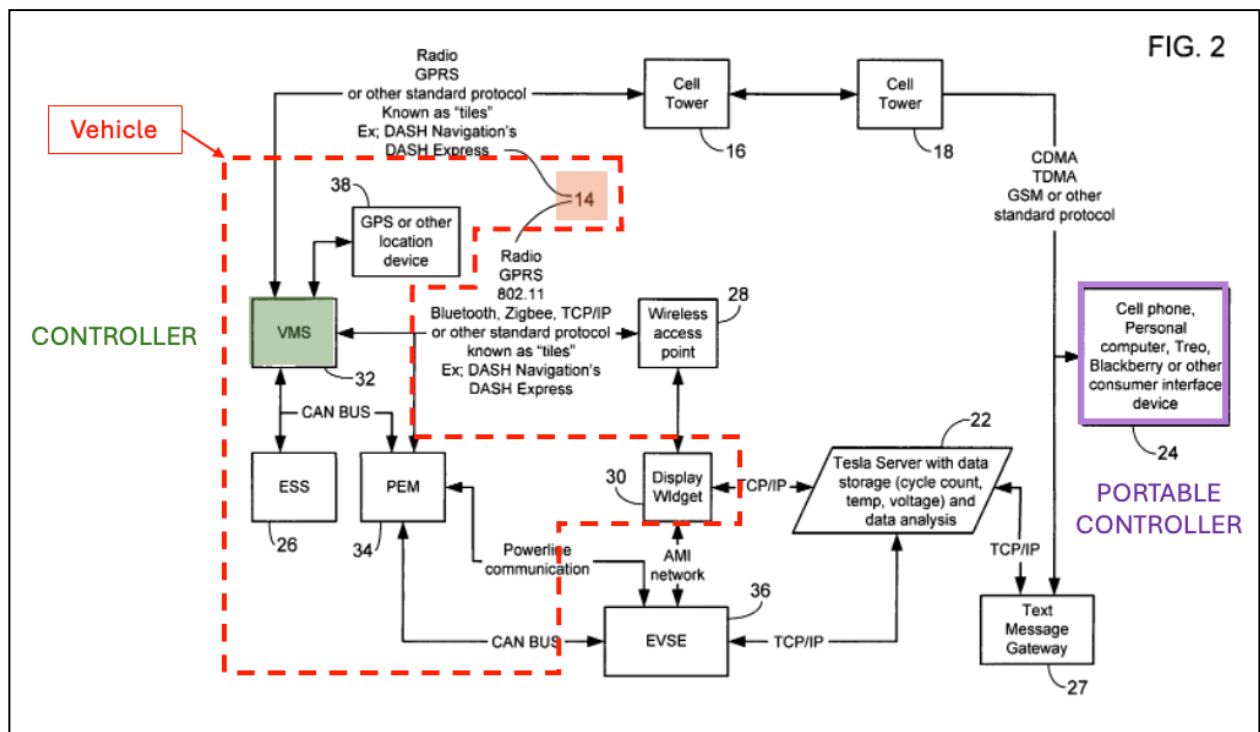
Because Kelty-078’s VMS (*controller*) performs all control, monitoring, and coordination of the electric vehicle’s systems, the VMS, alone or as modified for all claim limitations reciting the controller is *configured* to perform a function, *is configured* to perform each of the claimed functions. EX1004-Kelty-078, 7:43-53; EX1003-Dec., ¶111. Petitioner’s mappings for the remaining claim limitations reciting the *controller is configured* to perform a function should be understood to expressly rely on Kelty-078’s teachings of controlling, monitoring, and coordinating the vehicle’s systems, including PEM and ESS. EX1004-Kelty-078, 7:43-53.

3. Claim 1[b]

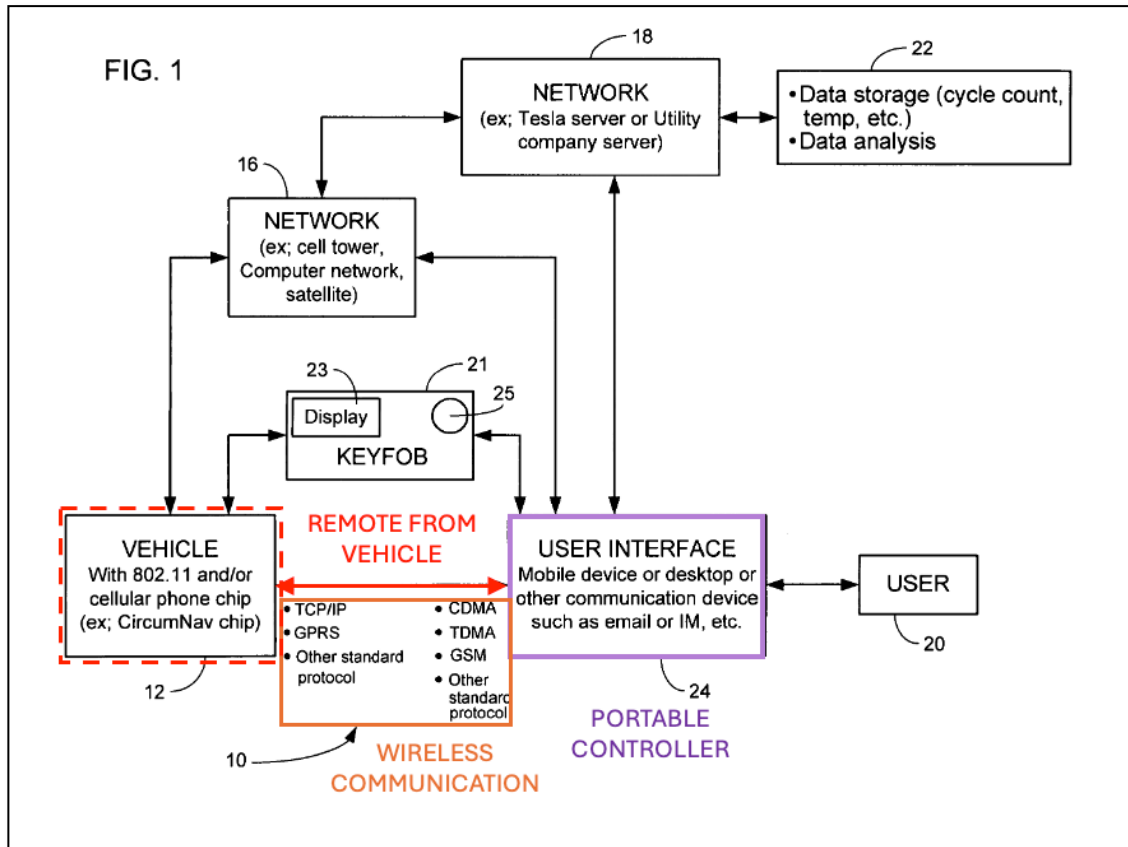
a) “portable controller”

The ’011 Patent states a “controller can be one or more **processors** of a personal computer, **phone**, PDA, or other processor-based device associated with a user....” EX1001, 9:8-10. Dependent Claim 10 of the ’011 Patent recites “the portable controller is defined at least in part by a phone.” EX1001, 48:3-4. Therefore, the claimed *portable controller* is at least a processor of a cellphone.

Kelty-078 teaches *a portable controller of a user*; namely, a processor of **device 24** that is a “**portable device**....”³ EX1004-Kelty-078, 4:58-65, 5:2-5, 8:40-44. Kelty-078 teaches “user 20 will be capable of communicating...directly with the vehicle 12 via any **user interface device 24** (step 305). Contemplated devices 24 may include...mobile devices, such as **cellphones**.” EX1004-Kelty-078, 4:16-21, FIG. 3. Kelty-078 provides “Blackberry” and “Treo” as examples of device 24. EX1004-Kelty-078, FIG. 2; EX1003-Dec., ¶¶112-113.



³ Mappings referencing Kelty-078's device 24 and disclosed functionality should be understood as referencing device 24's **processor**.

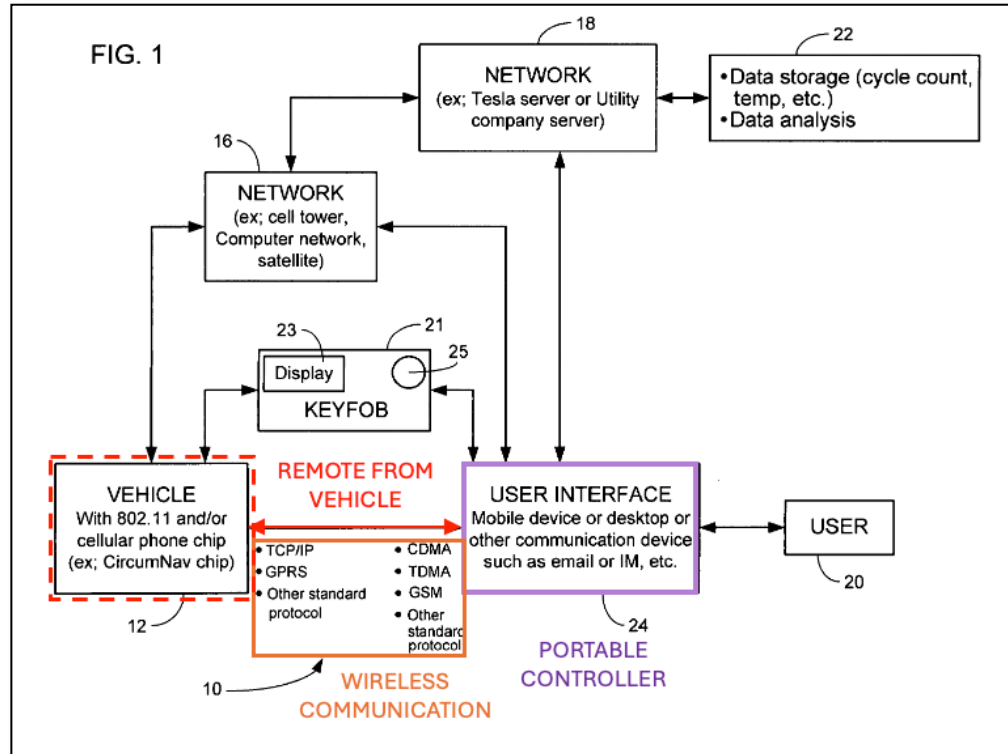


EX1004-Kelty-078, FIGS. 1-2.

Kelty-078's **device 24** comprises a *controller*, e.g., a processor. EX1003-Dec., ¶¶113-114; EX1001, 9:8-10. Kelty-078 discloses exemplary devices 24 (Blackberry and Treo), which each included a processor. EX1003-Dec., ¶¶113-114 (*citing* EX1019-PalmTreo700p). Kelty-078 repeatedly describes functionality performed by **device 24** requiring a processor, such as “**controlling** and monitoring the battery for charging the vehicle,” communicating with networks or the vehicle via **device 24**, remotely powering on/off the vehicle’s battery, implementing functionality “via programming by [] **device 24**,” and storing location data in device 24. EX1004-Kelty-078, 4:58–5:1, Claim 1, 4:16-39, 5:40-44, 8:32-37, 9:3-8.

Additionally, cellphones were well known to include processors. EX1003-Dec., ¶115. Because (1) the '011 Patent claims the portable controller is defined at least in part by a phone (Claim 10) and Kelty-078 describes cellphones as exemplary devices 24; (2) Kelty-078 teaches an exemplary device 24 is a commercially-available device known to have a processor; (3) Kelty-078's device 24 performs functionality requiring a processor; and (4) cellphones were well known to include processors, Kelty-078 teaches a *portable controller*.

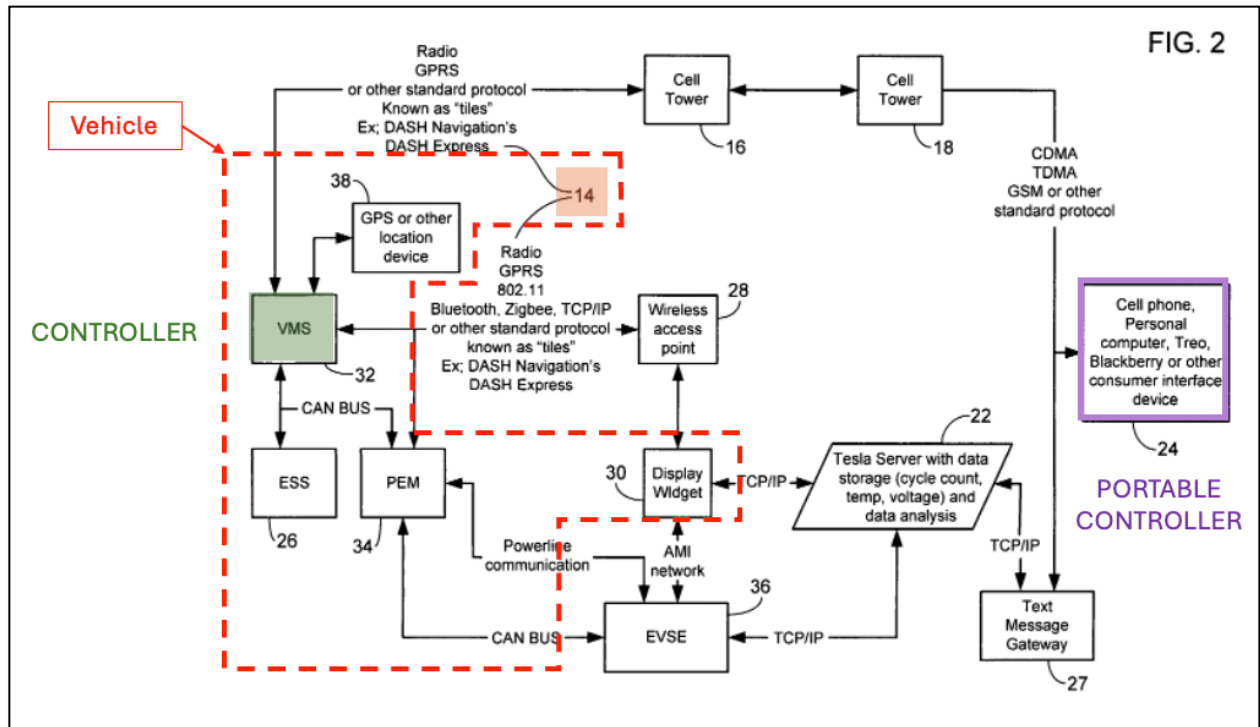
Additionally, Kelty-078 teaches “portable communication devices may be placed in a home or at another **location of the user 20**,” i.e., a location *remote from the vehicle and vehicular battery charger*. EX1004-Kelty-078, 5:2-3, FIG. 1.



EX1004-Kelty-078, FIG. 1; EX1003-Dec., ¶116.

b) “establish wireless communication”

Kelty-078 teaches *controller* (VMS 32) utilizes communication chip 14 to establish wireless communication (via Bluetooth) with the *portable controller* (device 24).

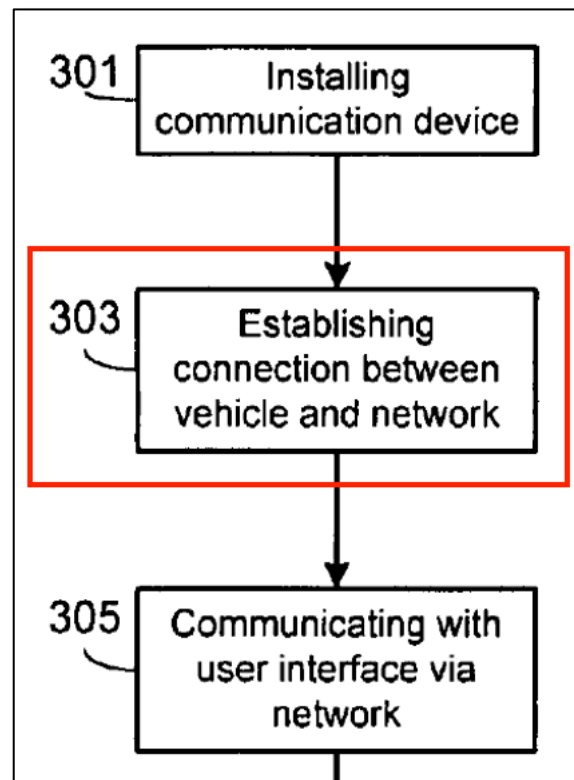


EX1004-Kelty-078, FIG. 2.

Kelty-078 teaches “the electric vehicle communication interface generally includes a communication device 14 arranged and installed within the electric vehicle (step 301).” EX1004-Kelty-078, 3:53-56, FIG. 2, FIG. 3 (Step 303). Communication chip 14 “allow[s] for communication to the first network 16 to allow for the vehicle 12 to contact the user 20 via the user interface device 24....” EX1004-Kelty-078, 4:53-58, 8:44-48. Communication between the vehicle and mobile

communication device 24 may be “**completely wireless.**” EX1004-Kelty-078, 3:43-45, 4:4-7, 4:24-39 (Bluetooth).

Kelty-078 expressly teaches VMS 32 (*controller*) *establish[es] wireless communication*. Kelty-078 teaches “[e]stablishing connection between vehicle and network” and “[c]ommunicating with user interface [24] via network”:

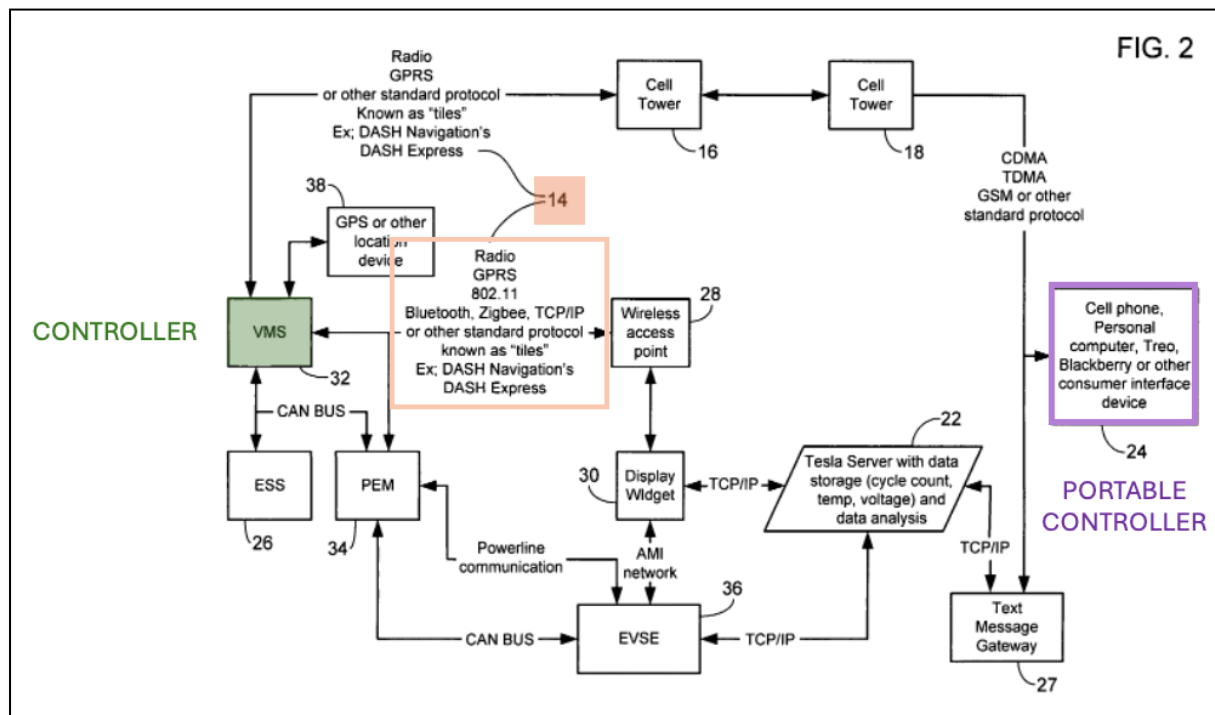


EX1004-Kelty-078, FIG. 3 (excerpt), Abstract (“establishing a connection **from** the vehicle to a network”), 2:25-30 (disclosing “establishing a connection,” including “contacting a user interface device via the network”), 9:64 (Claim 1).

Because Kelty-078 teaches (1) VMS 32 (*controller* in the vehicle) establishes a connection with a network (FIG. 3, Step 303) via communication chip 14; (2) the

connection can be established **from** the vehicle; (3) VMS 32 “controls” “various systems in the electric vehicle”; and (4) communication chip 14 is arranged in the vehicle and may “be incorporated into the computer controlling the vehicle internal network,” VMS (*controller*) is configured to establish wireless communication. EX1004-Kelty-078, Abstract, 7:44-51, 3:53-59; EX1003-Dec., ¶120.

Regarding communication with a *portable controller*, Kelty-078 further teaches “user 20 will be capable of communicating with either the first network 16, the second network 18 or directly with the vehicle 12 **via any user interface device 24** (step 305).” EX1004-Kelty-078, 4:16-19. Kelty-078 teaches establishing a Bluetooth connection through communication chip/device 14. EX1004-Kelty-078, 3:53-67, 4:24-39, 7:43-47, FIG. 2; EX1003-Dec., ¶¶120-123.



EX1004-Kelty-078, FIG. 2; EX1003-Dec., ¶¶120-123 (discussing Bluetooth).

Because Kelty-078 teaches a vehicle, via VMS 32, wirelessly communicates with device 24 via the network and the established communication (FIG. 3, Step 305), Kelty-078 teaches the *controller* (VMS 32) is *configured to establish wireless communication* through communication chip 14 over Bluetooth with *a portable controller*, namely device 24 including a processor. EX1003-Dec., ¶¶120-124

4. *Claim 1[c]*

a) '011 Specification Regarding “*signal*”

The '011 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:39-44, 10:38-53.

b) Kelty-078’s Teachings

Kelty-078 similarly sends signals (e.g., instructions) using wireless communication (e.g., Bluetooth). EX1004-Kelty-078, 4:4-39, 4:53–5:18, 8:44-48, FIG. 2.

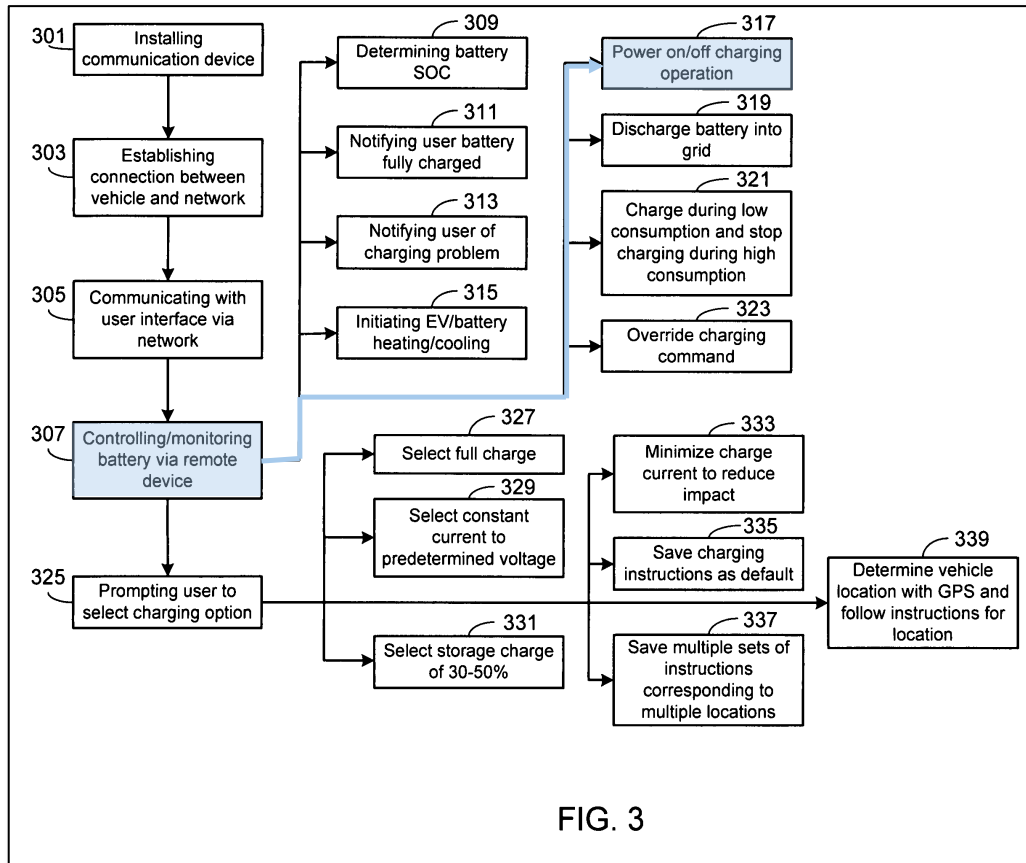
Kelty-078 teaches *receive a wireless signal from the portable controller*, namely receive instructions from device 24 via Bluetooth. EX1004-Kelty-078, 4:58–5:1; EX1003-Dec., ¶127. Kelty-078 teaches “user or driver 20 of the vehicle is [] capable of communicating with the electric vehicle 12 from their portable device such as a cell phone...to program and **send specific instructions** to the electric vehicle 12 for controlling and monitoring the battery system 26 arranged within the electric vehicle 12 (step 307).” EX1004-Kelty-078, 4:58–5:1, 4:16-19, FIG. 3; EX1003-Dec., ¶127. As discussed in Claim 1[a], VMS 32 (*controller*) “monitors,

controls and coordinates various systems in the electric vehicle 12 including” ESS 26 (electric vehicle battery). EX1004-Kelty-078, 7:44-51.

Similar to the ’011 Patent’s wireless signal transmitted via Bluetooth, Kelty-078’s instruction communicated via Bluetooth provides a *signal*. EX1001, 18:53-55; EX1003-Dec., ¶129. Therefore, wirelessly communicating using Bluetooth to “send...instructions” from device 24 to VMS 32 includes VMS 32 *receiv[ing] a wireless signal*, and VMS 32 *is configured to receive said wireless signal*. EX1004-Kelty-078, 4:53-58, 8–5:18, 8:44-48. FIG.3 depicts exemplary “instructions,” including user 20 “powering on and off” charging battery 26 and “discharging the battery 26 into the electricity or electric grid.” EX1004-Kelty-078, 4:66, 5:40-52, FIG. 3 (Steps 317, 319); EX1003-Dec., ¶129.

5. *Claim 1[d]*

Kelty-078 teaches “an interface that will allow for communication between the user and the vehicle to enable the user to control certain aspects of **charging of the battery....**” EX1004-Kelty-078, 2:41-43; Claim 1[c].



EX1004-Kelty-078, 6:16-21, FIG. 3 (Steps 307, 317), 7:44–8:6 (describing communication between device 24 and VMS 32 (*controller*) via communication chip 14). Kelty-078 teaches an embodiment including a keyfob, where “[t]he vehicle user 20 may also **control the starting and stopping of charging of the battery pack** via the means 25 of keyfob along with other communication and control of the electric vehicle 12. Furthermore, the options **may also be added to a cell phone connection or other mobile device** to follow the network connections of the first and second network 16, 18...**to allow for choosing of one the charging options**

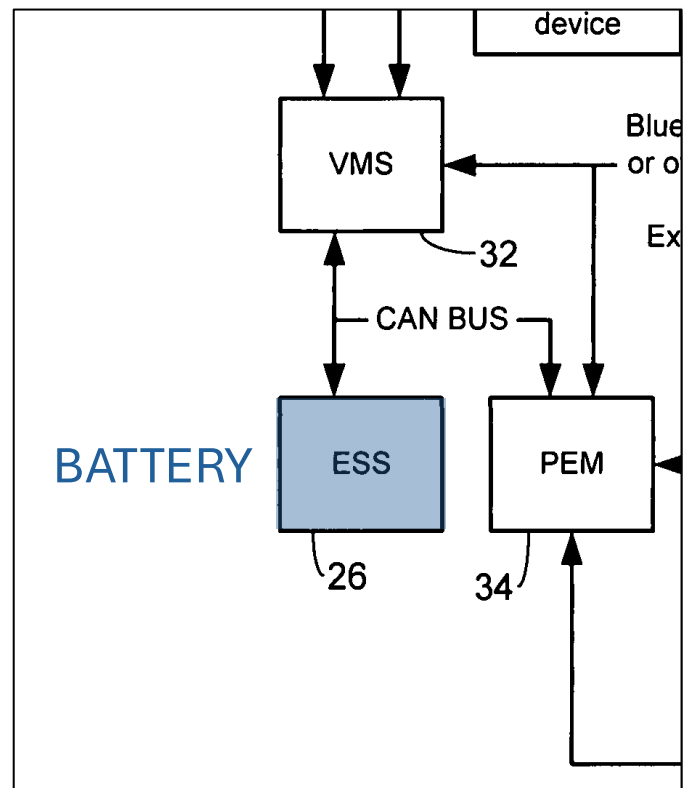
and setting any default via any user interface device 24.” EX1004-Kelty-078, 7:35-43.

Kelty-078’s teaching of “charging” the battery pack (7:34-38), powering on/off charging of the battery (5:40-44), or powering on/off charging operation (FIG. 3, Step 317) individually or collectively teaches *supply[ing] electricity from a source of power to the battery of the vehicle*, namely ESS 26 comprising a battery pack. EX1003-Dec., ¶¶131-133. Kelty-078 expressly associates *supply[ing] electricity* with charging and discharging the battery, teaching (1) “**charging** the battery pack of the electric vehicle 12” when “cost of **electricity**” is low (8:65–9:3); and (2) “discharging the battery 26 into the electricity or electric grid (Step 319) of the locale in which the electric vehicle 12 is either **charged** or stored” (5:44-52). EX1004-Kelty-078, FIG. 3 (Step 321); EX1003-Dec., ¶¶134-135.

Kelty-078 teaches supplying electricity *from a source of power*, namely a utility company controlling an electricity grid. Kelty-078 teaches “a vehicle to [electricity] grid application” for “allowing [] certain operations to be performed by the **utility company** and the user 20 on the electric vehicle 12” such as controlling vehicle “charging.” EX1004-Kelty-078, 5:48-52, 5:58-67; EX1003-Dec., ¶¶136-137.

Kelty-078 teaches supplying power *to the battery with the vehicular battery charger*. Per Claim 1[Pre], the *vehicular battery charger* comprises the collective

VMS 32 (*controller*), PEM 34, and ESS 26 (*battery*). Claim 1[a]. Kelty-078 teaches ESS 26 “is controlled by the vehicle management system 32 via a CAN BUS or any other known communication interface or path” and includes the battery pack for the vehicle. EX1004-Kelty-078, 7:53-59.



EX1004-Kelty-078, FIG. 2 (excerpt). PEM 34 (part of *vehicular battery charger*) “house[s] a AC to DC rectifier for **charging** and the control PCB’s for drive and **charge of the electric vehicle energy storage system**” (battery 26). EX1004-Kelty-078, 7:59-64. An AC to DC rectifier was a common component of on-board vehicle chargers for converting AC electrical power from a *source of power* (e.g., an electrical grid) into DC electrical power to charge the vehicle battery. EX1003-Dec.,

¶133. Therefore, the *supply* [of] *electricity...to charge the battery of the vehicle* (ESS) is performed *with the vehicular battery charger*, namely Kelty-078's collective VMS 32, PEM 34, and ESS 26 charging a lithium-ion battery. EX1003-Dec., ¶¶133-135.

The battery charging (*supply electricity*) is *responsive to receiving the wireless signal* because the charging is in response to an instruction (*wireless signal*) to begin charging VMS 32 receives from device 24 over Bluetooth. EX1003-Dec., ¶¶132; Claims 1[b]-1[c] (Kelty-078 receiving signal with instructions to begin charging).

6. Claim 1[e]

Kelty-078 in combination with Fujita alone or in further combination with Suyama teaches Claim 1[e].

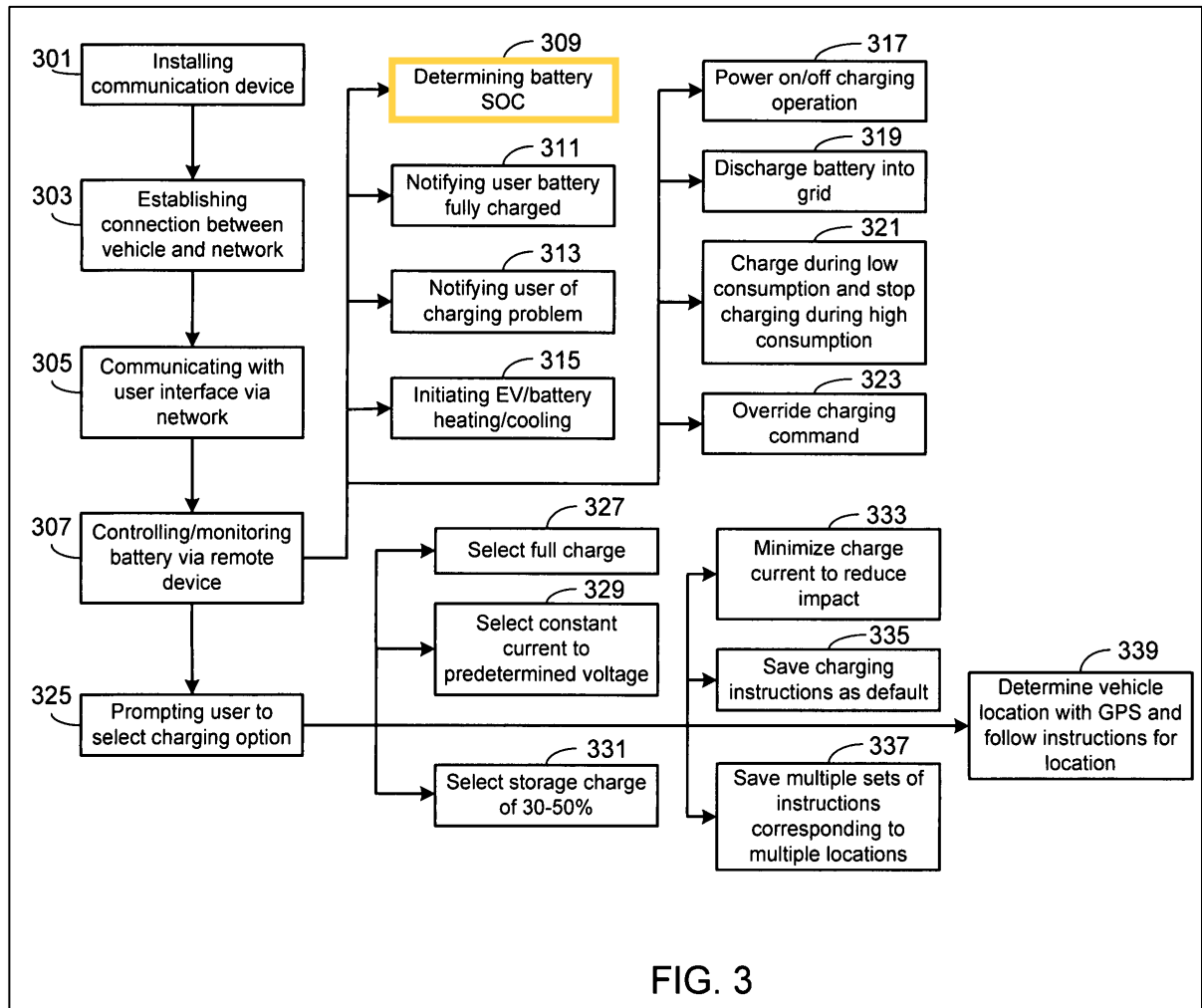
a) '011 Specification Regarding “repeatedly”

The word “repeatedly” does not appear in the '011 Specification. The closest support (EX1001, 13:60-14:13) generally describes “continually” or “periodically” updating, “such as every second, minute, or other time interval.” EX1003-Dec., ¶139.

b) Kelty-078's Teachings

Kelty-078 teaches “user 20 may be capable of querying or monitoring the electric vehicle's battery pack and cells 26 for its state of charge (SOC) (step 309). This will allow the user 20 to determine if the battery 26 is capable of driving the

distance the user 20 must travel.” EX1004-Kelty-078, 5:9-15, FIG. 3. Thus, Kelty-078 teaches SOC (*level of charge*) is capable of being queried or monitored.



EX1004-Kelty-078, FIG. 3.

c) Fujita's Teachings

Petitioner provides an overview of Fujita's teachings before mapping Fujita for Claim 1[e].

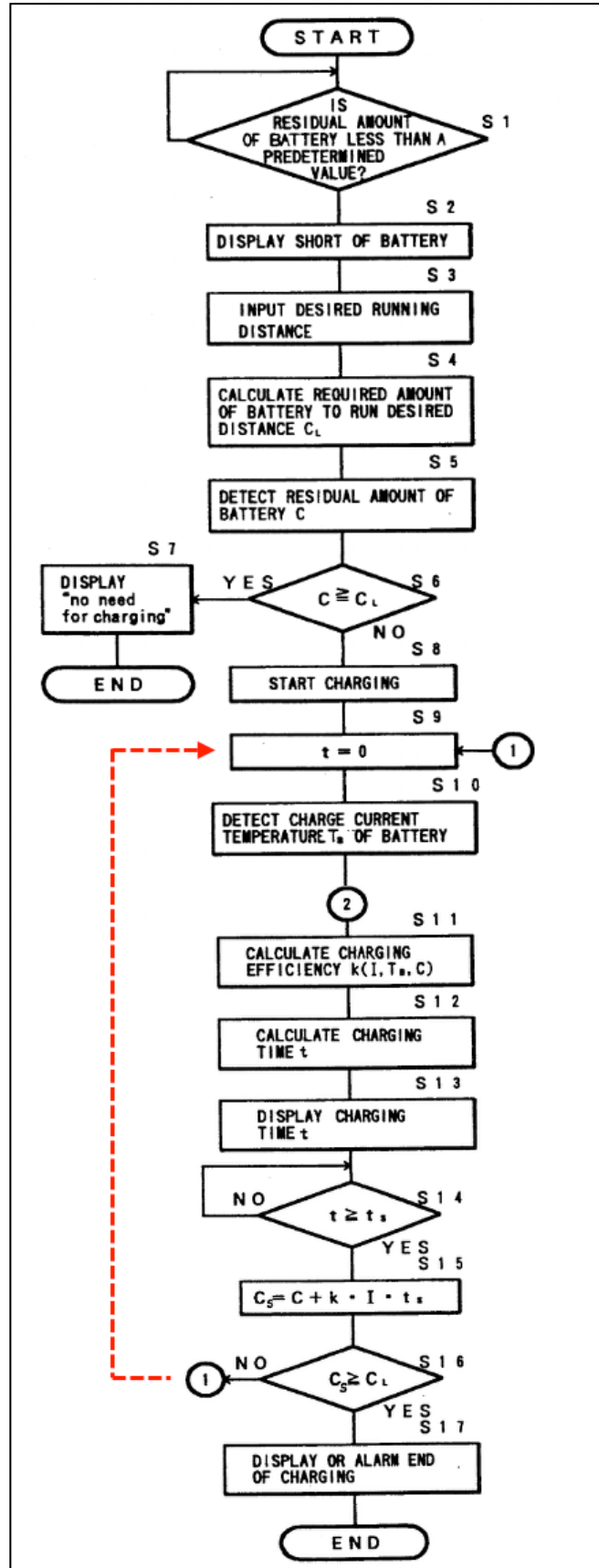
Like Kelty-078, Fujita is directed to an electric vehicle. EX1006-Fujita, Abstract, 1:7-10. Fujita teaches “a battery charging device” comprising electronic

control unit (ECU) 16 of electric vehicle 10 that “monitors constantly” the “residual amount of electric energy” (C ; e.g., charge level) of battery 30 (Steps S1-S2). EX1006-Fujita, 3:54-56. When charge level (C) is less than the amount of charge required to travel a “desired distance inputted by the driver” (C_L ; Steps S3-S6, S8), the driver connects vehicle 10 to “a high-voltage power source” to begin charging battery 30 (Step S8). EX1006-Fujita, 2:24-25, 3:29-31, 3:64-65. ECU 16 then begins calculating “a time required for charging the battery” (t) by setting the required charge time to zero (“ $t=0$ ”; Step S9) to initiate the following calculations. EX1006-Fujita, 3:45-46.

ECU 16 “calculates a charging efficiency” of the battery (k ; Steps S10-S11) based on battery 30’s temperature (T_B), current (I), and charge level (C). EX1006-Fujita, 3:46-47. Based in part on the charging efficiency (k), ECU 16 then calculates and displays “the time required to charge” (t ; Steps S12-S13) battery 30 on “the alarm/display means.” EX1006-Fujita, 4:59-60, FIGS. 3, 6. Said “charge time t represents the required time after the charge current I , temperature T_B and residual amount C of the battery are revised.” EX1006-Fujita, 4:19-21.

After a predetermined amount of time (t_s) elapses “during the charging,” ECU 16 refreshes the value of the battery’s charge level (C_s ; Steps S14-S15). If the “revised” residual charge in the battery (C_s) is not enough to travel the user’s desired distance (C_L), “the operations after the step of S9 are repeated” (Step S16). EX1006-

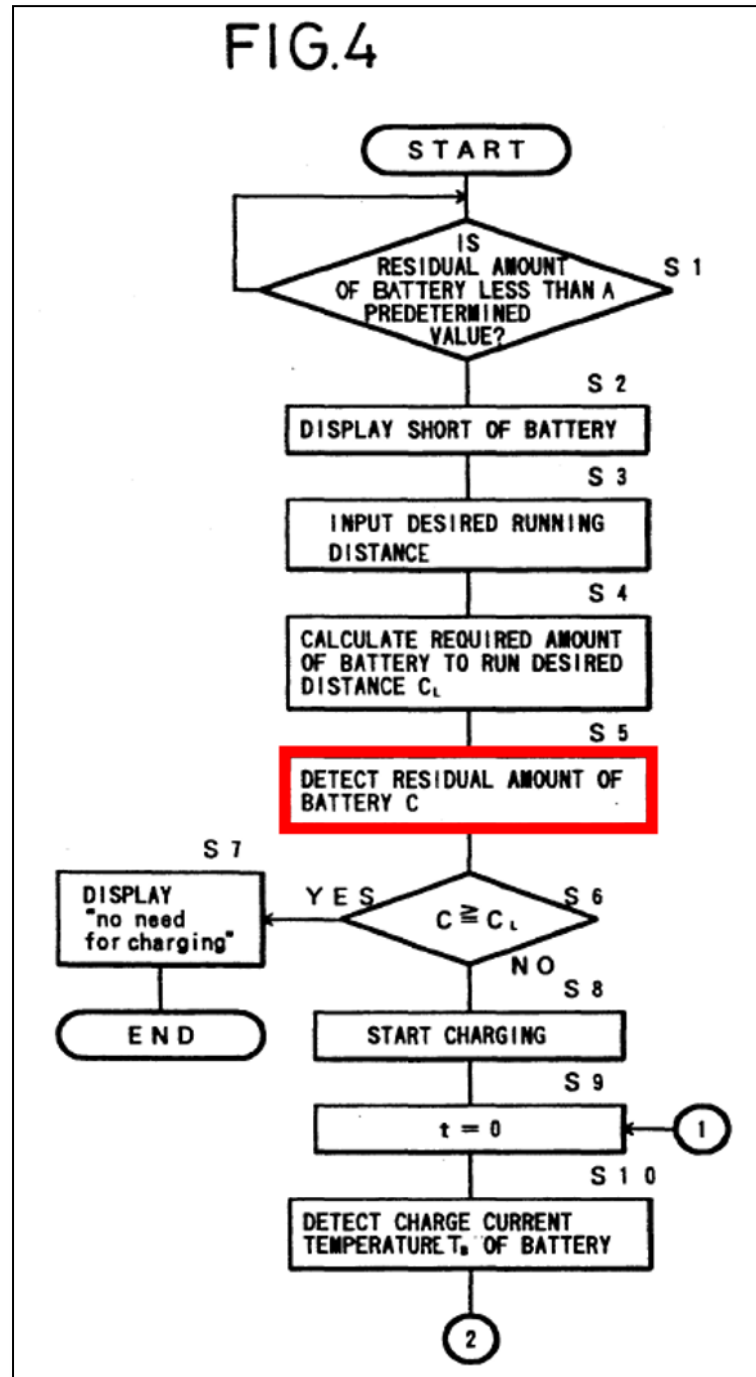
Fujita, 4:48-49. The required charge time is again set to zero (“t=0”) to restart the timer for the cycle calculating the time to charge (Steps S9-S16; depicted with the red arrow in FIGS. 4-5, below). EX1006-Fujita, 4:15. Conversely, if there is enough charge, “ECU 16 terminates the operation after displaying the completion of charging” (Step S17). EX1006-Fujita, 4:41-42.



EX1006-Fujita, FIGS. 4-5 (combined to show the collective “operations performed by the battery charging device”). EX1006-Fujita, 2:62-63; EX1003-Dec., ¶¶141-144.

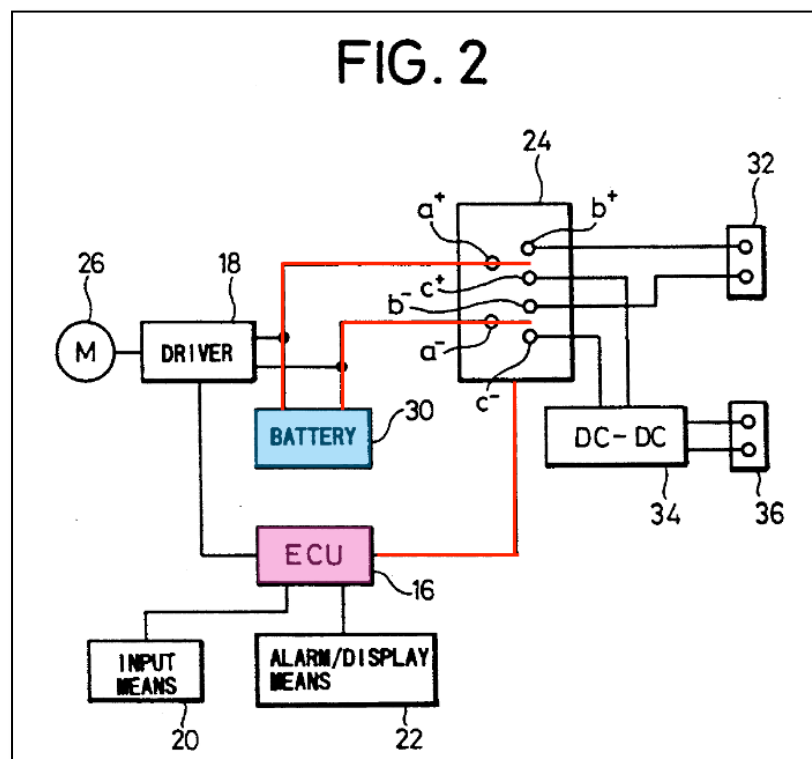
Turning to Claim 1[e]’s mapping, Fujita teaches a *controller configured to* receive a signal indicative of the level of charge, namely Fujita’s electronic control unit (ECU) 16. EX1006-Fujita, 3:9-13. ECU 16 controls the charging process (3:9-13, 3:22-25) and informs the driver of the charging state via display 46. EX1006-Fujita, 3:9-13, 3:22-25, 3:54–4:14. ECU further connects the vehicle’s battery 30 with a “high-voltage power source” “to rapidly charge the battery.” EX1006-Fujita, 3:27-31, 3:18-37, 4:5-14 (describing a battery charger). In the combination with Kelty-078, it would have been obvious for Kelty-078’s VMS to be configured to receive Fujita’s residual amount C of the battery. *See* §V.A.6.e, below.

Fujita teaches *receive at least one signal indicative of a level of charge of the battery*, namely “DETECT RESIDUAL AMOUNT OF BATTERY C” when calculating charge time (t):



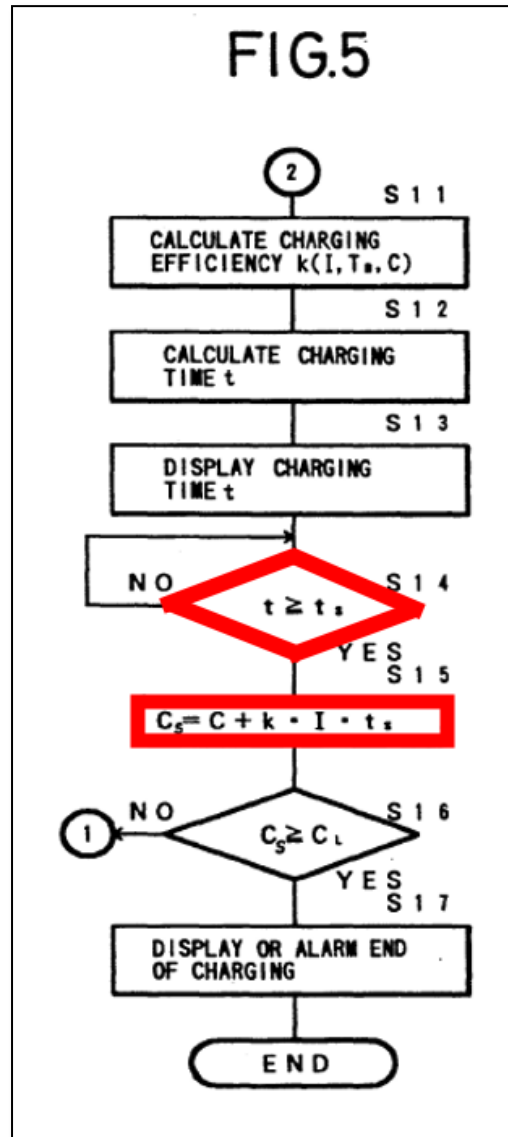
EX1006-Fujita, FIG. 4 (Step S5). Fujita teaches ECU communicates with battery 30 via terminals a^+ and a^- to “calculate a current residual amount C of electric energy of the battery (Step S5)....” EX1006-Fujita, 3:18-25, 3:65–4:2, FIGS. 2, 4. Fujita

teaches a broad embodiment where a switching means comprises a control circuit and switch, and a more specific embodiment where the switching means comprises ECU and switch 24. *Cf. id.*, 2:8-13, *with id.*, 3:22-25. Fujita discloses and claims “a control circuit connected to the battery, said control circuit comprising first calculating means for calculating a residual amount of electric energy of the battery.” EX1006-Fujita, 6:18-22 (Claim 8), 5:41-45 (Claim 3), 2:14-19 (disclosing calculating circuit for calculating residual amount of energy of battery). Similarly, Fujita provides a more specific disclosure that ECU “monitors constantly during navigation whether the residual amount of electric energy of the battery is beyond a predetermined level...” and “calculates a current residual amount C of electric energy of the battery (step S5)....” EX1006-Fujita, 3:54-68; EX1003-Dec., ¶147.



EX1006-Fujita, FIG. 2. Because the ECU (via control circuit) is communicating with the battery 30 and receiving information for calculating the residual charge level (C), Fujita teaches *receive at least one signal indicative of a level of charge of the battery*, namely detecting and calculating the charge level C. EX1003-Dec., ¶147.

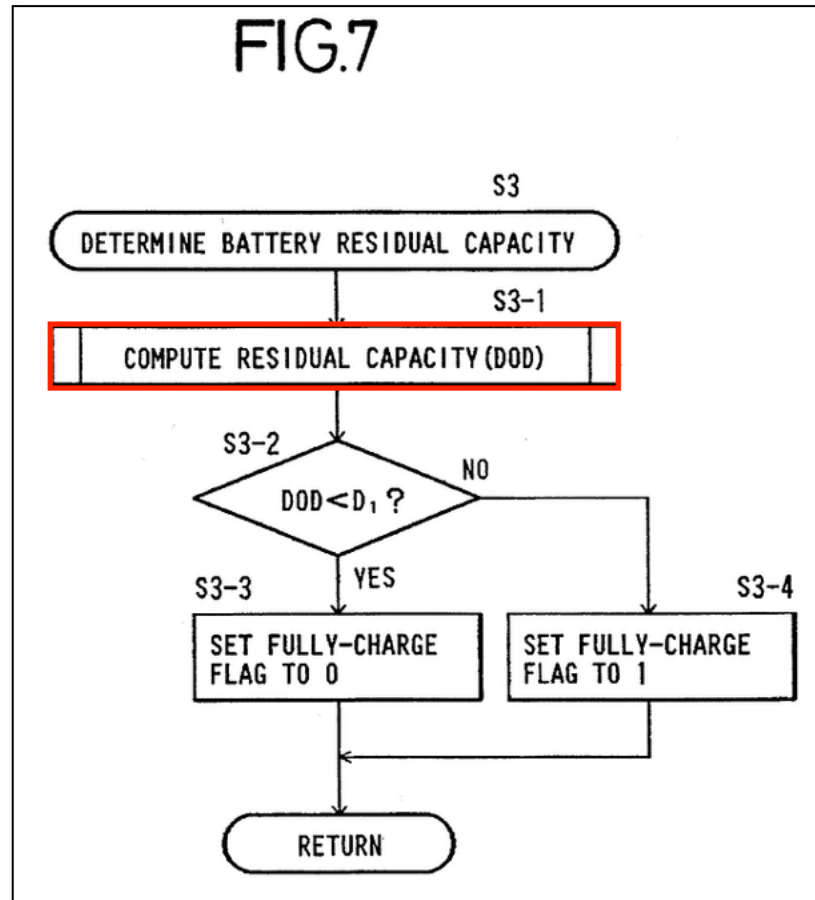
Fujita teaches *repeatedly* receiving the signal indicative of the residual charge level (C) *during charging of the battery*. Fujita teaches calculating the charge time (t) “during the charging” of vehicle 10 until battery 30’s residual charge (C) reaches at least “the required electric energy to run the desired distance” (C_L) entered by the driver. EX1006-Fujita, 2:41-42, 4:35-49, Claim 12. Charge time (t) is calculated based on charging efficiency (k), which ECU 16 of vehicle 10 determines “from the charge current I, temperature TB and **residual amount C of the battery** (step S11).” EX1006-Fujita, 4:21-24. The charge time (t) is compared with a lapse of time t_s ; after each time t_s is detected, the “residual amount C of the battery [is] renewed” to obtain a “revised” residual charge amount (C_s) according to stated formula (Steps S14-S15):



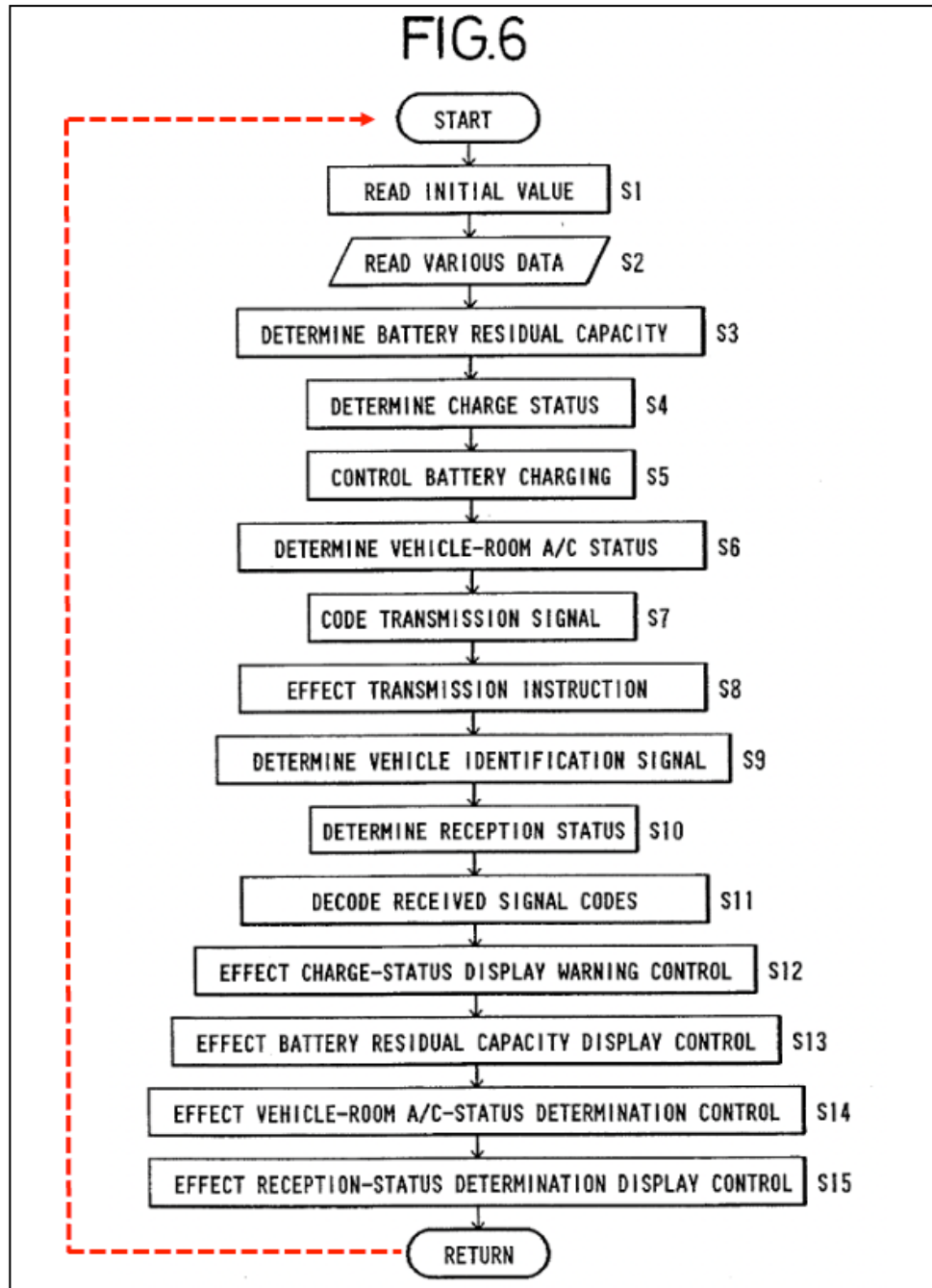
EX1006-Fujita, 4:35-40, FIG. 5. Until battery 30 has enough residual charge to drive the user's desired distance, "the operations after the step of S9 are **repeated**," where such operations are performed *during charging*. EX1006-Fujita, 4:48-49. Because the residual charge (C) is revised and renewed during charging, and because at least Step S15 is repeated, Fujita teaches *repeatedly* receiving a signal indicative of the charge level of the battery *during charging*. EX1003-Dec., ¶¶148-150.

d) Suyama's Teachings

Suyama also teaches Claim 1[e]. Suyama teaches *receive at least one signal indicative of a level of charge of the battery*, namely “determining the residual capacity of the main battery 18” from “the **signal read or detected from the battery residual capacity meter 54** (FIG. 7, Step S3-1).” EX1007-Suyama, 8:58–9:19, FIGS. 6-7; EX1003, ¶151 (opining how FIG. 7 is the sub-routine of FIG. 6, S3). The residual capacity is determined *during charging of the battery* because the residual capacity is determined while “under the charge.” EX1007-Suyama, 5:55-57. The residual capacity is *repeatedly* received because “Steps S1 through S15 are **repeatedly** executed” including *signal receiv[ing]* Step S3. EX1007-Suyama, 8:46-51, FIG. 6, Claim 1 (reciting “detecting a plurality of operating conditions of said main battery during charging” and “**repeatedly** determining a present status of charging of said main battery”); EX1003-Dec., ¶152.



EX1007-Suyama, FIG. 7.



EX1007-Suyama, FIG. 6.

e) Motivation to Combine

A POSITA would have found obvious and been motivated to modify Kelty-078 to include either Fujita's or Suyama's repeated estimating the level of charge of

the battery during charging. A POSITA would have appreciated “[a] good SOC [state of charge] calculator provides” numerous “advantages for EVs,” including the resultant improvement in the battery’s longevity. EX1014-Sandeep, 57. Indeed, Kelty-078 discusses how charging battery 26 to “30 to 50% charge” (instead of “a full charge”) “will allow for the maximum life and durability of the battery pack system 26 in the electric vehicle 12.” EX1004-Kelty-078, 6:53-59, 7:15-21; EX1003-Dec., ¶153 (discussing EX1014-Sandeep).

It would have been desirable to repeatedly receive information indicative of the level of charge, including calculating the level of charge, during charging of the battery to determine when approaching or have reached a desired battery level. Charging to a pre-set charge level that was less than 100% charged was common, and therefore, it would have been desirable for the system to know during charging when had reached the pre-set charge level to indicate such to the user and otherwise terminate charging. EX1003-Dec., ¶154; MTCs, §V.A.10.c.

A POSITA would have also valued that repeated monitoring of the level of charge would improve the user’s safety by quickly detecting charging faults. EX1004-Kelty-078, 5:21-23 (describing “vehicle 12 notifying the user or driver 20 that a problem occurred during charging of the battery 26 (step 313). . . .”), FIG. 3. The modification would have improved Kelty-078’s overall performance by

repeatedly monitoring the vehicle's battery to prevent detrimentally overcharging or discharging. EX1003-Dec., ¶155.

The modification combines prior art elements (receiving information indicative of charge remaining in an electrical vehicle battery, per Fujita alone or Fujita in combination with Suyama, and an electric vehicle charging system, per Kelty-078) according to known methods to yield predictable results (improved electric vehicle monitoring while charging, and more timely charging operation state updates to the user). EX1003-Dec., ¶156.

A POSITA would have had a REOS in making the combination. Monitoring batteries during charging, and in turn estimating and displaying information relevant to battery charging, was well-known to a POSITA at the time. EX1003-Dec., ¶¶153-157. Kelty-078 already teaches “querying or monitoring” the “state of charge (SOC)” of the battery pack 26 and notifying the user when fully charged. EX1004-Kelty-078, 5:9-21, FIG. 3; Claim 1[e]. Therefore, modifying to repeatedly receive SOC information during charging was a simple programming modification well-within a POSITA's skill. EX1003-Dec., ¶¶153-157.

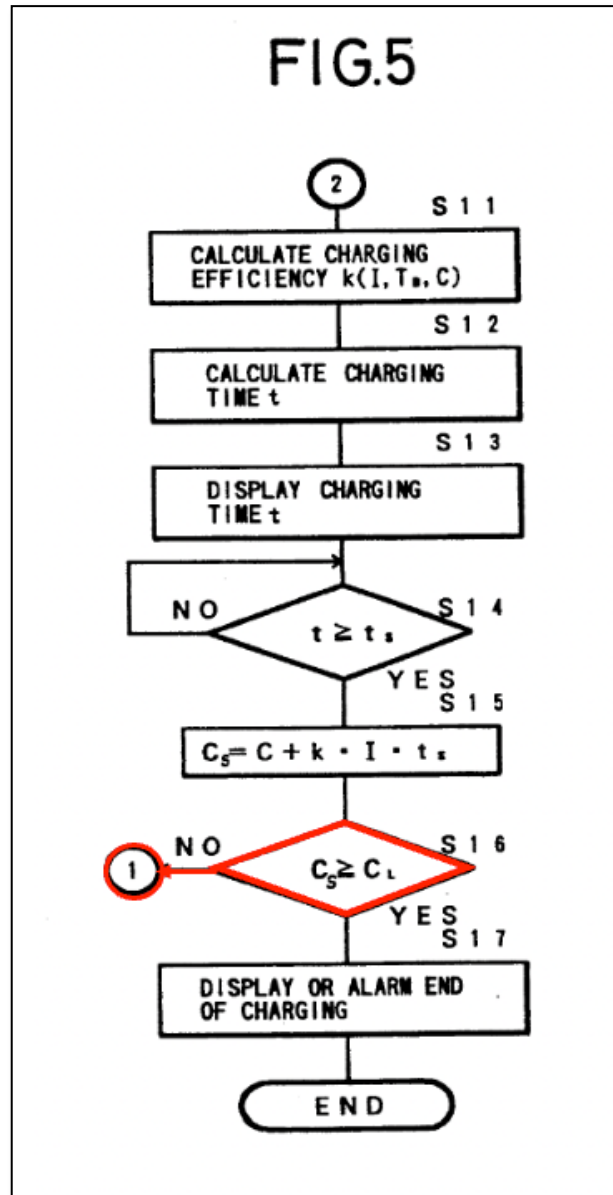
7. Claim 1[f]

a) Fujita's Teachings

Fujita teaches *repeatedly estimat[ing]* the charge time (t) (*an amount of time remaining to charge the battery*) “during the charging” of vehicle 10 until battery

30's residual charge (C) reaches at least "the required electric energy to run the desired distance" (C_L) entered by the driver. EX1006-Fujita, 2:41-42, 4:35-49, Claim 12, FIGS. 4-5; Claim 1[e].

Fujita teaches "the charge time t is calculated according to the formula (step [S]12): $t = (C_L - C)/(k \cdot I)$ " based on the battery's charging efficiency (k) (calculated using temperature (T_B), current (I), and charge level (C)). EX1006-Fujita, 4:21-30, FIG. 5. When a predetermined time (t_s) lapses, "values of the charge current I , temperature T_B and residual amount C of the battery are **renewed**" and the residual amount of battery is re-calculated (C_s). EX1006-Fujita, 4:35-40. If C_s is less than the required charge to travel (C_L), the *estimat[ion]* steps after S9 "are repeated" as shown in FIG. 5's Step S16. EX1006-Fujita, 4:40-49, FIGS. 4-5. Because the residual amount of electric energy of battery 30 is revised after a lapse of time t_s , Fujita teaches repeatedly calculating the charge time t at a periodicity of t_s (i.e., after every t_s period of time). Fujita teaches displaying charge time t on display 44 and 50, included on alarm/display means 22 and 49. Claim 1[h].



EX1006-Fujita, FIG. 5.

b) Motivation to Combine

A POSITA would have found obvious and been motivated to modify the modified Kelty-078 system to further repeatedly estimate an amount of time remaining to charge during charging. It was well-known the level of charge (SOC) of an electric vehicle's battery fluctuates in response to environmental variables

(e.g., temperature changes, the user drawing power during charging by running the A/C or radio, age of the battery, grid load and “charging of the vehicle during periods of low power consumption”). EX1004-Kelty-078, 6:1-2. Thus, repeatedly monitoring the battery and estimating charging time ensures a driver is alerted with minimal delay when the time remaining to charge is extended or otherwise altered due to changing charging conditions. Further, a user would have appreciated being alerted quickly when the electric vehicle was sufficiently charged for use. Claims 1[h]-1[i]. Repeatedly estimating and updating the time to charge also allows the user to plan their trip, e.g., determine whether the user has time to wait until the vehicle is fully charged. Kelty-078 also at least suggests the modification in teaching the user may monitor the SOC. EX1004-Kelty-078, 5:9-21; Claim 1[e]; EX1003-Dec., ¶¶160-172; MTCs, §V.A.10.c.

The combination would have been use of a known technique (Fujita’s repeatedly estimating the time (t) to charge during charging) to improve Kelty-078’s similar charging system in the same way as Fujita’s (i.e., user is informed of the time to charge). EX1003-Dec., ¶¶160-172.

A POSITA would have had a REOS in making the combination for at least the reasons provided for Claim 1[e], §V.A.6.e. The modification is simple programming of repeatedly monitoring the time to charge, where Kelty-078 already teaches monitoring the level of charge and sophisticated techniques for controlling

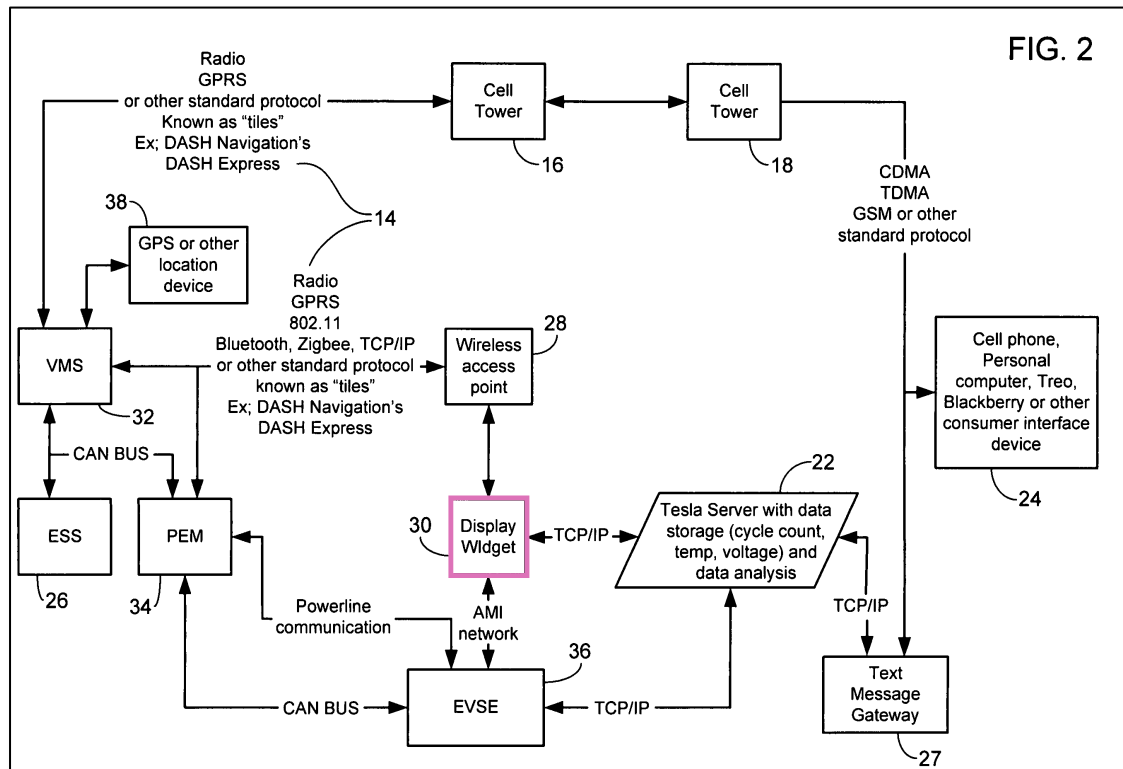
battery charging, including time-based charging. EX1004-Kelty-078, 5:9-57, pinpoint at 5:40-44. Therefore, the modification requires programming well-within the POSITA's skill. EX1003-Dec., ¶¶160-172.

8. ***Claim 1[g]: “repeatedly display on a display mounted within the vehicle and within view of a user seated in the vehicle:”***

a) **Kelty-078's Teachings**

Kelty-078 teaches “electric vehicle communication interface 10 also may include an **in vehicle display 30**,” which is further taught as “**dashboard display 30...arranged in any part of the vehicle 12** including but not limited to sun visors, **heads up displays**, [and] anywhere **in the instrument panel...**” (*mounted within the vehicle*). EX1004-Kelty-078, 6:32-39, FIG. 2. “[T]he user 20 may be prompted via the display device 30 in the vehicle 12 to choose or select one of a plurality of predetermined charging options for the electric vehicle battery pack 26 (step 325)” when turning off the vehicle. EX1004-Kelty-078, 6:40-45, FIG. 3. Kelty-078's display 30 is *within view of a user seated in the vehicle*, as it is (1) taught by Kelty-078 to be on the “dashboard,” a “heads up display,” and “in the instrument panel”; and (2) prompts users (specifically including the “driver of the vehicle”) to “select” charging options, indicating users view the display for selecting while seated in the vehicle. EX1004-Kelty-078, 6:35-45; EX1003-Dec., ¶175 (opining dashboard displays, instrument panel displays, and heads up displays were known to be *within view of a user seated in the vehicle*).

VMS 32 controls display 30 via “CAN BUS” through PEM 34 and electric vehicle service equipment module (EVSE) 36. EX1004-Kelty-078, 7:64–8:2, FIG. 2; Claim 1[a]. Thus, Kelty-078 teaches *the controller (VMS 32) is configured to perform Claim 1[g]-[i]’s functionality*. EX1004-Kelty-078, 7:44-64.



EX1004-Kelty-078, FIG. 2.

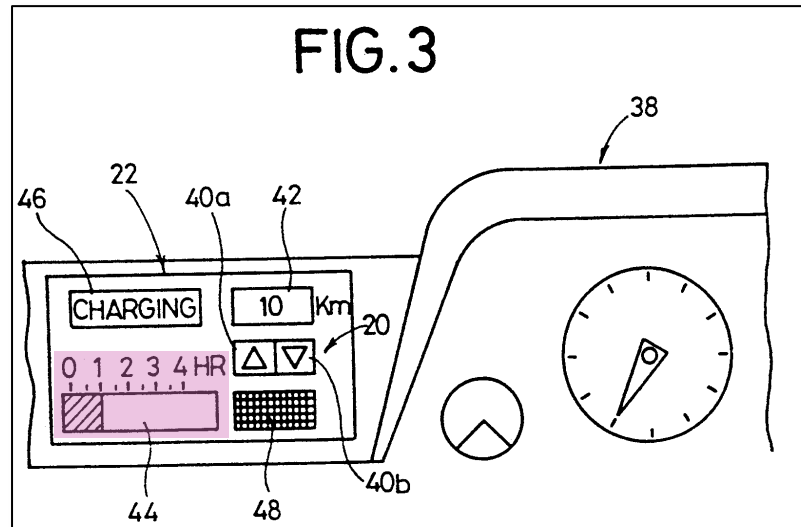
Claim 1[g]’s mapping for *during charging...repeatedly display* is discussed for Claims 1[h]-[i] in the combination.

9. ***Claim 1[h]: “during charging ... repeatedly display ... information indicative of the amount of time remaining to charge the battery based at least in part upon the estimating step, and”***

a) Fujita’s Teachings

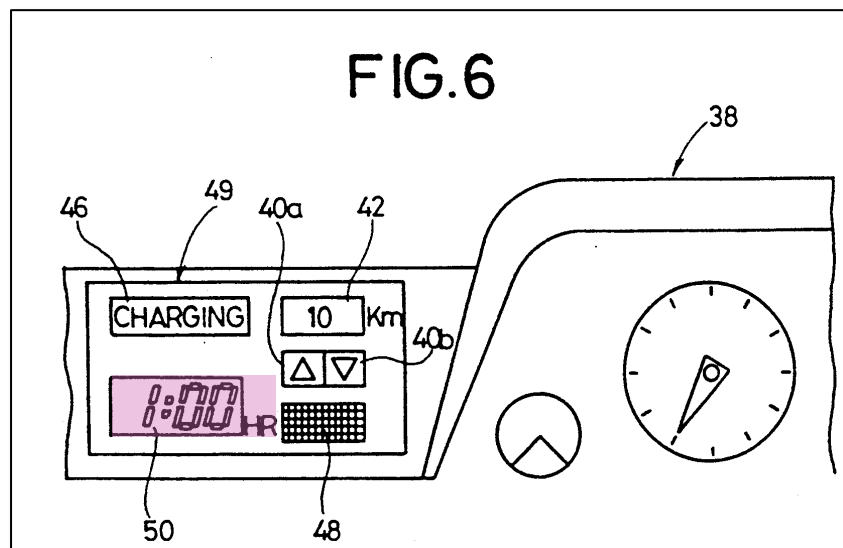
Fujita teaches *during charging...repeatedly display...information indicative of the amount of time remaining to charge the battery based at least in part upon the estimating step*, namely charge time display 44 and/or 50. EX1006-Fujita, 4:31-33, 4:59-64.

Fujita teaches repeatedly estimating, during charging, a charge time (t) remaining to charge the battery. Claim 1[f]. Fujita teaches “**charge time t is displayed on the charge time display 44** of the alarm/display means 22, as the residual time **before the completion of charging** (step [S]13).” EX1006-Fujita, 4:31-33; EX1003-Dec., ¶180 (*citing* EX1006-Fujita, 2:37-42). Fujita teaches two embodiments for displaying time to charge (t). Fujita teaches “alarm/display means 22 includes a charge time display 44 for displaying a time required for charging the battery,” as shown in FIG. 3:



EX1006-Fujita, 3:45-47, FIG. 3; EX1003-Dec., ¶180 (citing EX1006-Fujita, 4:32-34).

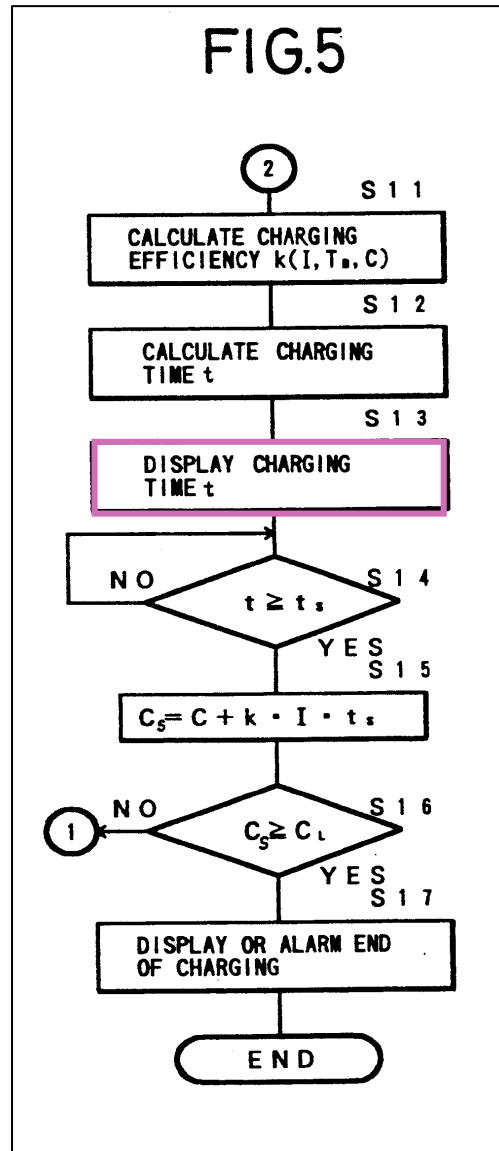
Fujita also teaches “alarm/display means 49 makes a display 50 of the charge time digitally using, for instance, a seven-element LCD display”:



EX1006-Fujita, 4:60-62, FIG. 6, *cf.* with EX1001, FIG. 14; EX1003-Dec., ¶¶181-182. A POSITA would have understood display 44 of FIG. 3 and display 50 of FIG.

6 present the same charge time t , but FIG. 6 displays the information “digitally” instead. EX1006-Fujita, 4:60-62; EX1003-Dec., ¶¶181-182. Because Fujita teaches displaying the charge time t (e.g., 1 hour as shown in both FIGS. 5-6) on display 30 “before the completion of charging,” Fujita teaches *during charging...display information indicative of the amount of time remaining to charge the battery*). EX1006-Fujita, 4:32-34.

Further, Fujita teaches “operations after the step of S9 are **repeated**” (including *display* Step S13) until “residual amount C of the battery” reaches the level required to drive the user’s desired distance (C_L). EX1003-Dec., ¶183.



EX1006-Fujita, FIG. 5. Calculation of charge time t is performed at Step S12, and display of charge time t is performed at Step S13, so the estimation and display of the updated charge time t is repeated, per Step S16, when the required charge level C_L is not reached. EX1006-Fujita, 4:48-49 (“If $C_s < C_L$, the operations after the step of S9 are **repeated.**”); EX1003-Dec., ¶183. Therefore, Fujita teaches *repeatedly display[ing] the charge time t during charging*. EX1003-Dec., ¶¶179-184.

Fujita teaches displayed charge time (t) *is based at least in part upon the estimating step*. Claim 1[f].

b) Motivation to Combine

Claims 1[f], 1[i]; MTCs, §V.A.10.c.

A POSITA would have been motivated and found obvious to repeatedly display the remaining charge time, per Fujita's charge time display, on Kelty-078's display 30 within view of the driver in the modified Kelty-078. Providing the amount of time to charge during charging on an in-vehicle display allows the user to wait in their car while completing charging and stay repeatedly informed on the time to charge, especially considering the time to charge may fluctuate based on temperature and other power draws (such as A/C running). EX1003-Dec., ¶¶186-191. It was also well-known that visuals presented on dashboard displays were useful tools for drivers to quickly interpret information. EX1003-Dec., ¶¶186-191 (discussing EX1015-Nadal).

The modification combines prior art elements (displaying the length of time left to charge an electric vehicle, and a vehicle's display) according to known methods (displaying calculated information to a screen) to yield predictable results (providing a driver information about an electric vehicle's charging status). EX1003-Dec., ¶192.

This modification would have had a REOS and been well-within the expertise of a POSITA given the ubiquitousness of using displays to provide users information relevant to a vehicle, such as Fujita's own display means 22 and 46 "provided on an instrument panel 38 of the electric vehicle 10." EX1006-Fujita, 3:38-40; EX1003-Dec., ¶¶186-194. Further, Kelty-078 already contemplates displaying information to the user on display 30, such as "charging options" or "messages" like "servicing requirements or tips to increase the efficiency of the vehicle 12, such as checking tire pressure, battery temperature and the like." EX1004-Kelty-078, 6:40-45, 8:49-52. Therefore, the combination would be straightforward and well-within a POSITA's expertise. EX1003-Dec., ¶¶186-194.

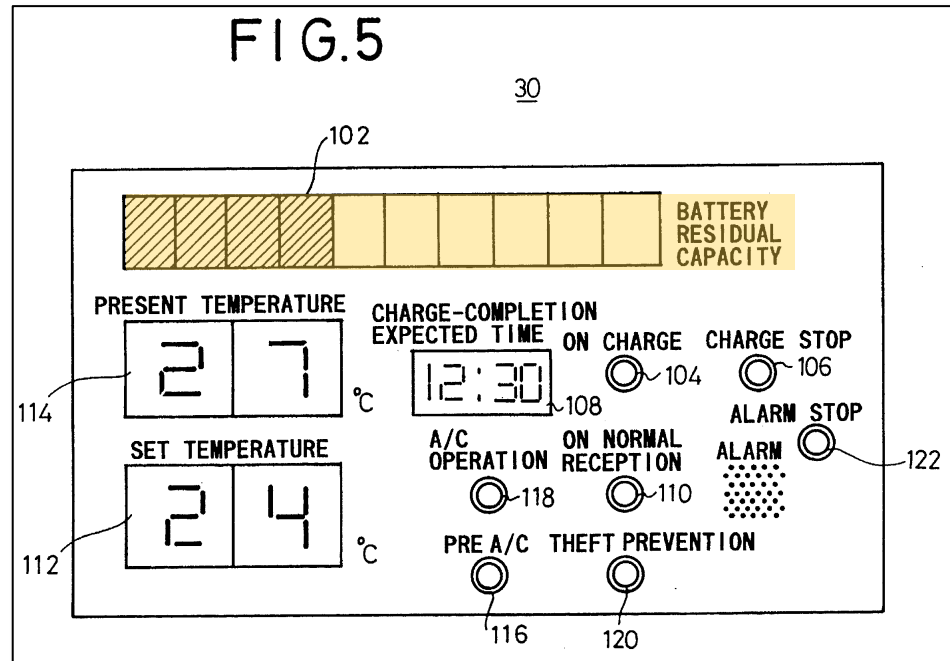
10. Claim 1[i]: "during charging ... repeatedly display ... information indicative of the level of charge of the battery."

a) Kelty-078's Teachings

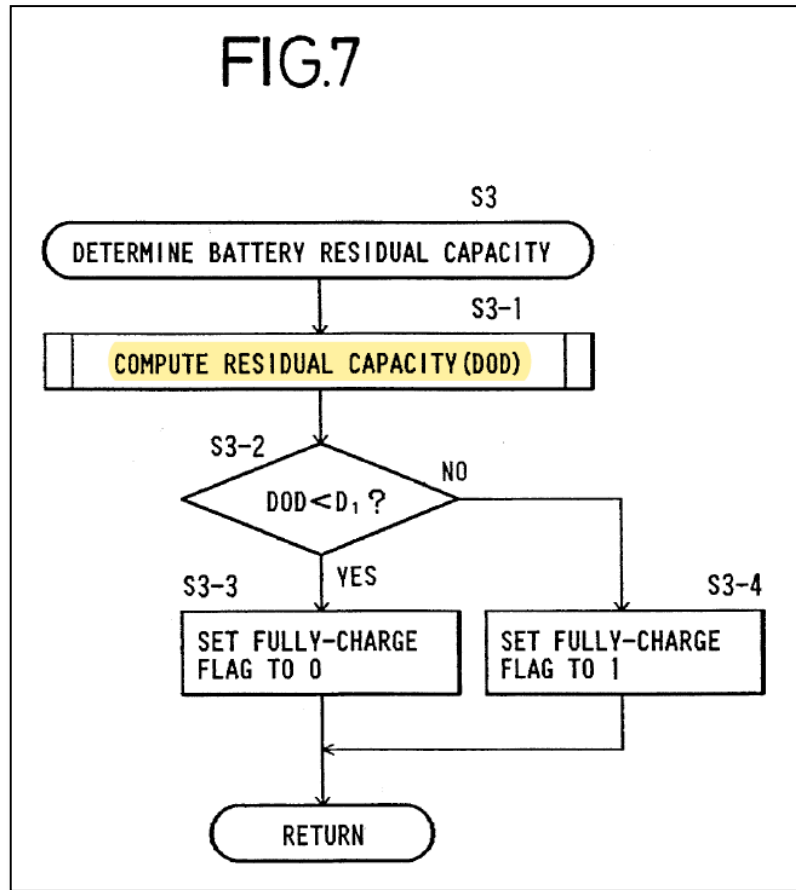
Claims 1[g]-1[h].

b) Suyama's Teachings

Suyama teaches *display[ing] information indicative of the level of charge of the battery*, namely displaying the residual capacity of the battery during charging on battery residual-capacity indicator 102:

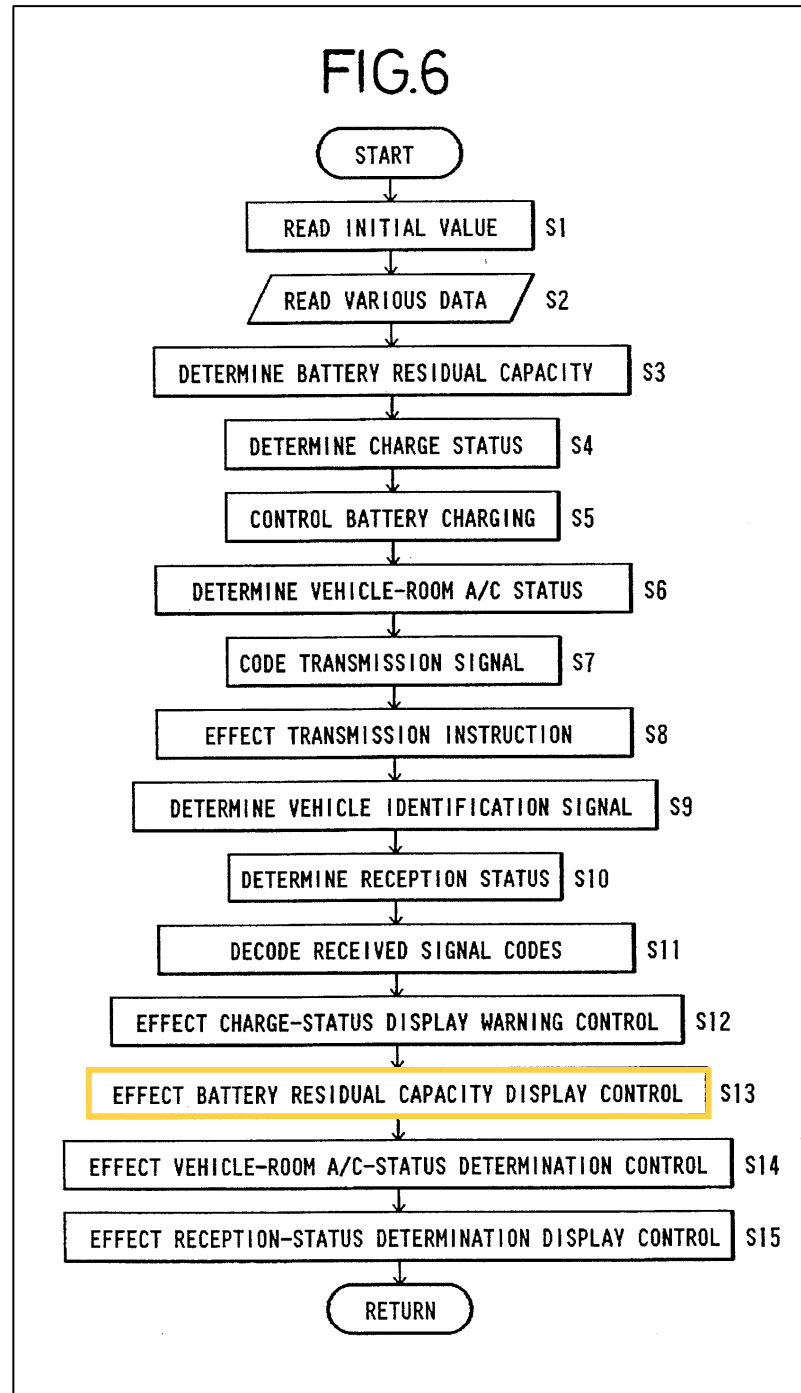


EX1007-Suyama, FIG. 5, 7:43-45. Like the '011 Patent, Suyama's indicator 102 is a bar chart "lighted so as to correspond to the computed residual capacity DOD" (depth-of-discharge), where DOD is commonly represented as a percentage in the art. *Cf.* EX1001, 12:47-51 (describing bar chart), *with* EX1007-Suyama, 8:4-5, 9:13-15; EX1003-Dec., ¶¶196-197 (*citing* EX1007-Suyama, 12:13-17, FIG. 15(a)). Suyama further teaches "[a] routine for determining the **residual capacity of the main battery 18** is executed in Step S3":



EX1007-Suyama, 8:58-59, FIG. 7, 8:36-45, FIG. 6; EX1003-Dec., ¶¶196-197.

Suyama also teaches the residual capacity is estimated *during charging* and *repeatedly display[ed]* during charging. Suyama teaches “display circuit 30 displays the state of charging of the main battery **while being charged**,” such as displaying “the remaining capacity of the main battery 18...on the residual-capacity indicator 102 (Step S13).” EX1007-Suyama, 8:36-37, 8:41-43. “Steps S1 through S15 are **repeatedly** executed,” including the *display* step S13. EX1007-Suyama, 8:50-51.



EX1007-Suyama, FIG. 6; EX1003-Dec., ¶198.

c) Motivation to Combine

Claim 1[e], §V.A.6.e, Claim 1[h], §V.A.9.b.

A POSITA would have been motivated and found obvious to repeatedly display and update Suyama's indicator 102 (depicting the residual capacity of battery 26), on Kelty-078's in-vehicle display 30 in the modified Kelty-078 system. It was well-understood prior to the '011 Patent that a "SOC calculation can be displayed in terms of useful battery capacity" and that "[a]n accurate battery state-of-charge indicator is essential to prevent stranding and to provide economical operation of" devices containing batteries that require recharging. EX1014-Sandeep, 57; EX1018-Aylor, 1; EX1003-Dec., ¶¶200-201. Providing the level of charge during charging on an in-vehicle display allows the user to wait in their car while completing charging and stay repeatedly informed on the time to charge, especially considering the time to charge may fluctuate based on temperature and other power draws (such as A/C running). EX1003-Dec., ¶¶199-207. Finally, it was well-known that using visuals (e.g., indicator 102) in dashboard displays, like display 30, are useful for drivers to quickly interpret information. EX1003-Dec., ¶¶199-207.

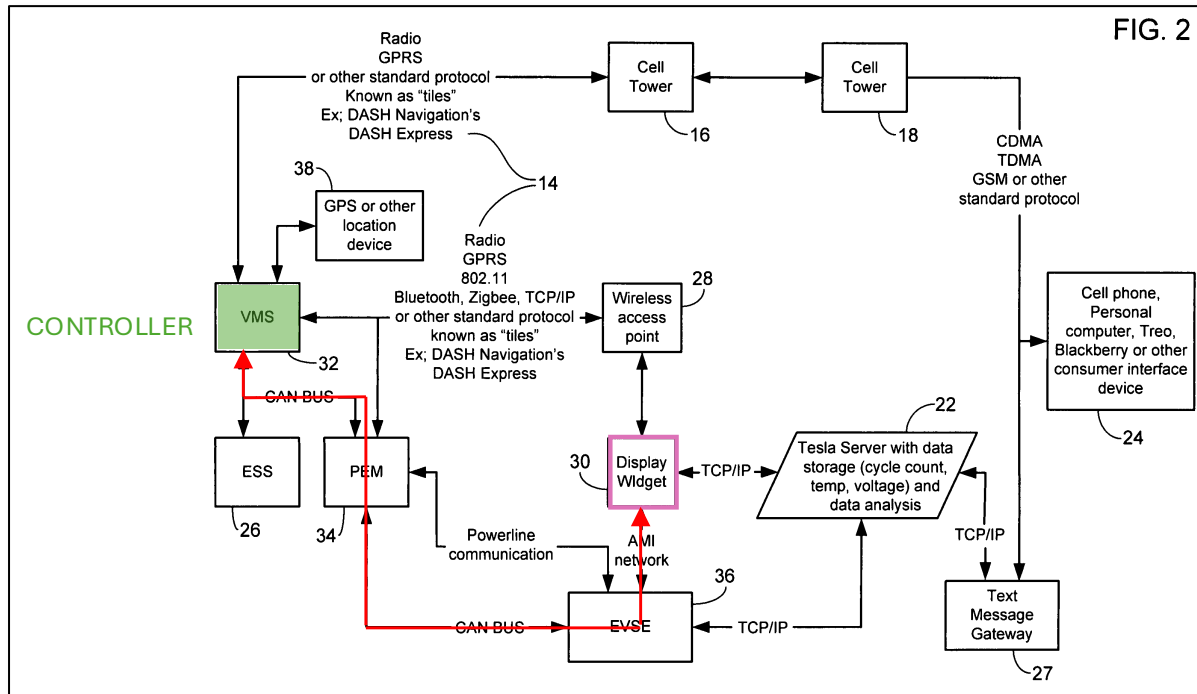
The modification combines prior art elements (a charge level indicator and a vehicle's display) according to known methods (displaying calculated information to a display screen) to yield predictable results (providing a driver information about an electric vehicle's charging status). EX1003-Dec., ¶207.

This modification would have had a REOS and been well-within the expertise of a POSITA given the ubiquitousness of using displays to provide users information

relevant to a vehicle. EX1006-Fujita, 3:38-40 (describing display means 22 “provided on an instrument panel 38 of the electric vehicle 10.” EX1003-Dec., ¶¶208-209. Also, Kelty-078 already contemplates displaying information to the user on display 30, such as “charging options” or “messages” like “servicing requirements or tips to increase the efficiency of the vehicle 12, such as checking tire pressure, battery temperature and the like.” EX1004-Kelty-078, 6:40-45, 8:49-52. Therefore, also displaying the level of charge would be straightforward and well-within a POSITA’s expertise. EX1003-Dec., ¶¶199-209.

B. Claim 2

Kelty-078’s FIG. 2 teaches VMS 32 (*controller*) is *electrically coupled* to the *display* (display 30) through PEM 34 and electric vehicle service equipment module (EVSE) 36 via CAN BUS and AMI Network. EX1004-Kelty-078, 7:59–8:2, FIG. 2; EX1001, 6:29-35; EX1003-Dec., ¶210.



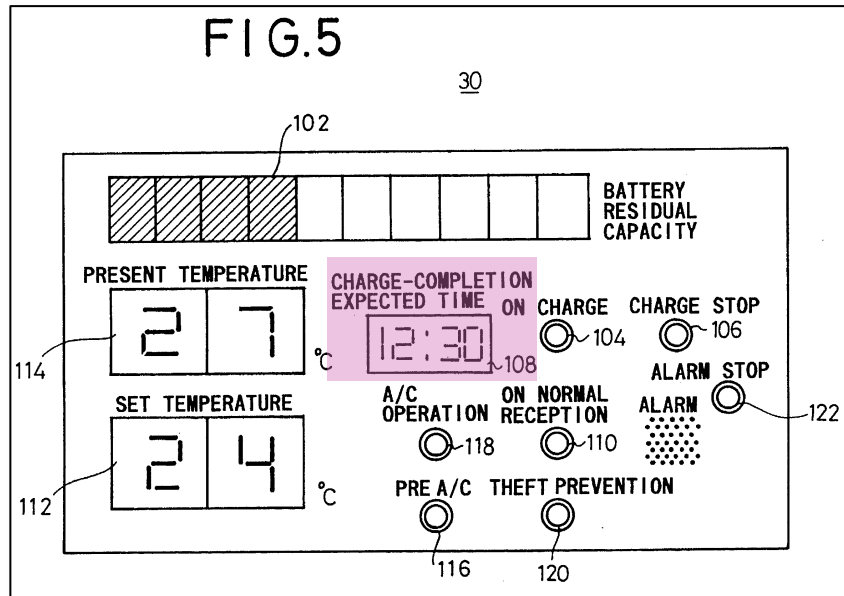
EX1004-Kelty-078, FIG. 2.

C. Claim 3

Suyama and Fujita combined with Kelty-078 teach Claim 3. Claims 1[f]-[h].

1. *Suyama's Teachings*

Suyama teaches "charge-completion expected time indicator 108" configured to *display a time of day at which charging will be completed*. EX1007-Suyama, 9:16-18, 5:66-6:13, FIG. 5; EX1003-Dec., ¶212.



EX1007-Suyama, FIG. 5. FIG. 5's "12:30" is a *time of day at which charging will be completed*.

In the combination with Fujita, Suyama's displayed *time of day* is *based at least in part upon* Fujita's calculated time to charge (*amount of time remaining to charge the battery*, per Claim 1[f]). EX1006-Fujita, 4:21-49. Suyama teaches determining the battery's residual capacity (DOD) for comparison with fully-charged capacity. EX1007-Suyama, 8:4-19, 8:58-9:5. If the battery is not fully-charged, "the charge-completion time [is] determined by computation." EX1007-Suyama, 9:6-19; EX1003-Dec., ¶¶213-214. Suyama's system is aware of both (1) the "present time" (8:58-9:5); and (2) if the battery is charging or not (9:6-19), teaching a flag set to "0" (charging) or "1" (fully-charged; not charging)). EX1007-Suyama, 9:6-19; EX1003-Dec., ¶¶213-214. Thus, if the flag is set to "0," the battery is charging and the charge completion time is computed. EX1007-Suyama, 9:6-19.

In the combination, it would have been obvious to compute the charge completion time, per Suyama, based at least in part on Fujita's time to charge, as detailed in the following section. EX1003-Dec., ¶¶213-214.

2. Motivation to Combine

A POSITA would have been motivated and found obvious to determine charge-completion expected time (e.g., Suyama's 12:30) by taking the known present time (per Suyama) and adding Fujita's charge time (e.g., 1 hour) to the present time, thus obtaining Suyama's charge-completion expected time (e.g., 12:30). In the modification, the *time of day at which charging will be completed*, per Suyama's indicator 108 displaying 12:30, is *based on the amount of time remaining to charge the battery*, per Fujita's charge time (t) calculations of 1 hour to charge. EX1007-Suyama, 8:58-9:19; EX1006-Fujita, 4:15-49; EX1003-Dec., ¶¶215-218. Indicator 108 is *display[ed]* on Kelty-078's "in vehicle display 30." EX1004-Kelty-078, 6:33; Claims 1[g]-1[i]. A POSITA would have appreciated additional convenience of viewing information relevant to charging (such as predicted time for charging finishing, e.g., 12:30) within the vehicle itself before exiting and for trip planning purposes while waiting for charging to finish. EX1003-Dec., ¶¶215-218.

The modification combines prior art elements (calculating the time a vehicle will finish charging by adding the "amount of time remaining to charge the battery" to the known "present time") according to known methods (summing time values

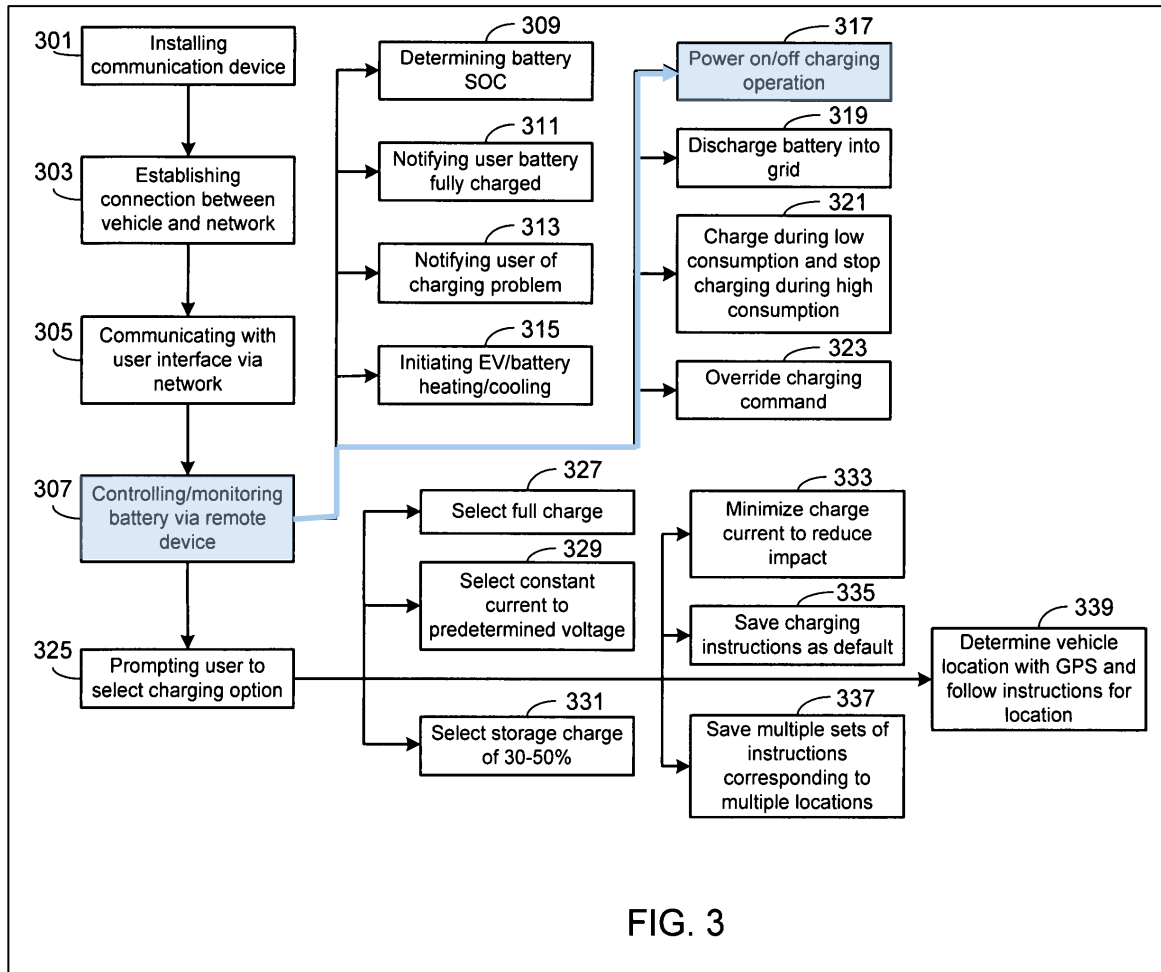
and displaying calculated information to a screen using a controller, VMS 32) to yield predictable results (providing a driver information about an electric vehicle's charging status). EX1003-Dec., ¶¶215-218.

The modification would have a REOS given Suyama teaches “charge-completion expected time [is] determined by **computation**” and Fujita provides the implementation for said “computation” of the expected charge time. EX1007-Suyama, 9:16-17; EX1006-Fujita, FIGS. 4-5; EX1003-Dec., ¶¶215-218.

D. Claim 4

Because Kelty-078's device 24 (*portable controller*) and *controller* (VMS 32) wirelessly communicate over Bluetooth, VMS 32 is configured to receive *wireless signal[s]* from portable device 24. Claims 1[b]-1[c]; EX1001, 22:39-44, 10:38-53; EX1003-Dec., ¶¶219-221.

Kelty-078 further teaches VMS receiving an instruction (*receiv[ing] a wireless signal*) to power off battery charging (*to stop charging*). EX1004-Kelty-078, 4:66, 2:41-43, 5:40-52, FIG. 3 (Steps 317, 319); EX1003-Dec., ¶¶222-223; Claim 1[d]. User 20 powers “off” the “charging operation” from portable device 24:

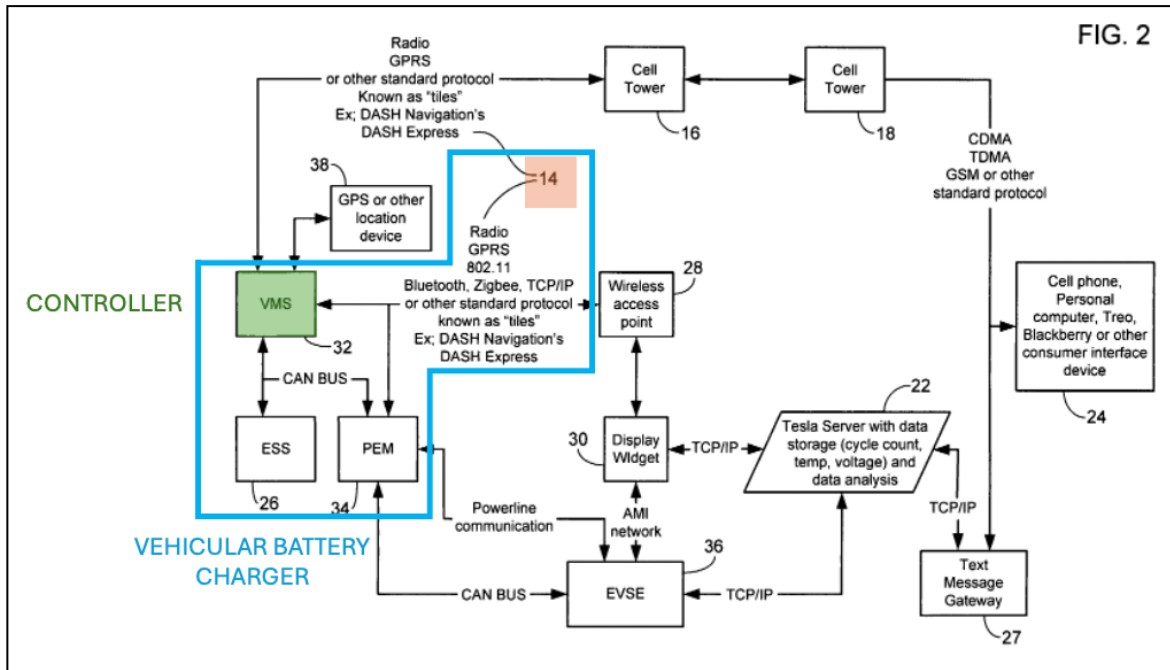


EX1004-Kelty-078, FIG. 3, 7:35-43; EX1003-Dec., ¶¶222-223.

Therefore, Kelty-078 teaches the VMS (*controller*) configured to receive an instruction from portable device (*receive a second wireless signal*) and in response, *stop charging of the battery*. EX1003-Dec., ¶¶219-224.

E. Claim 6

Controller VMS 32 is included in the vehicular battery charger (VMS 32, PEM 34, ESS 26):



EX1004-Kelty-078, FIG. 2; Claim 1[Pre]; EX1003-Dec., ¶225.

F. Claim 10

Kelty-078 teaches “user interface devices 24 may include but are not limited to mobile devices, such as **cell phones**” (*controller defined at least in part by a phone*). EX1004-Kelty-078, 4:20-21; Claim 1[b].

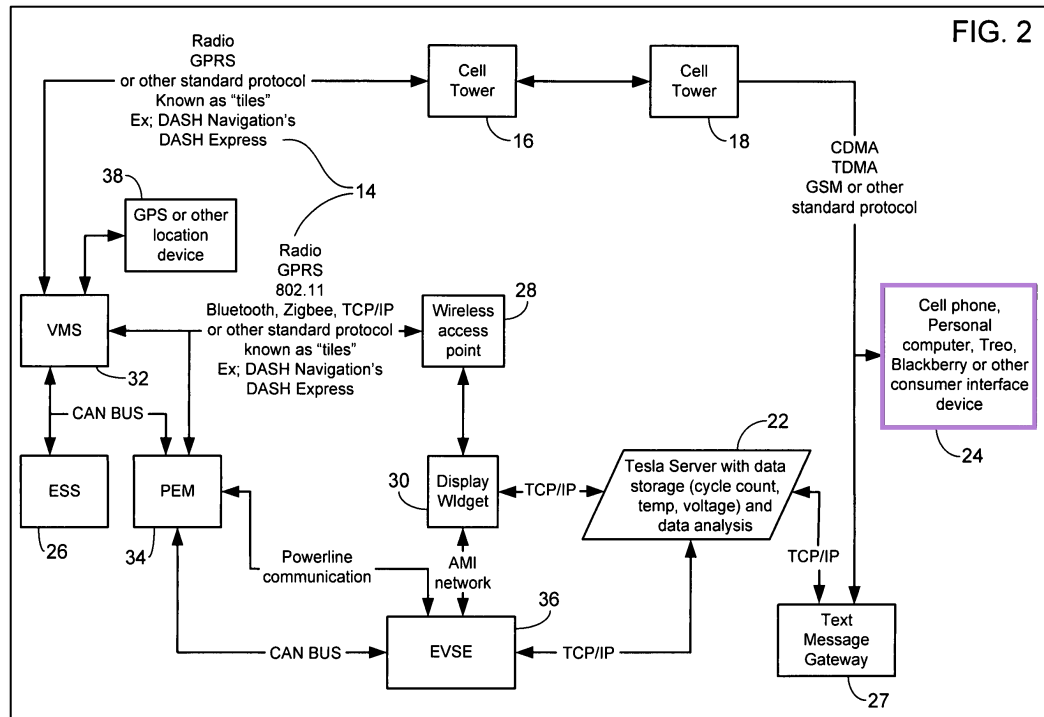
G. Claim 11

The modified Kelty-078 in combination with Suyama teaches Claim 11.

1. Kelty-078’s Teachings

Kelty-078 teaches a *first display*, namely Claim 1[g]’s *display mounted within the vehicle* in view of a user (i.e., display device 30). Claim 1[g].

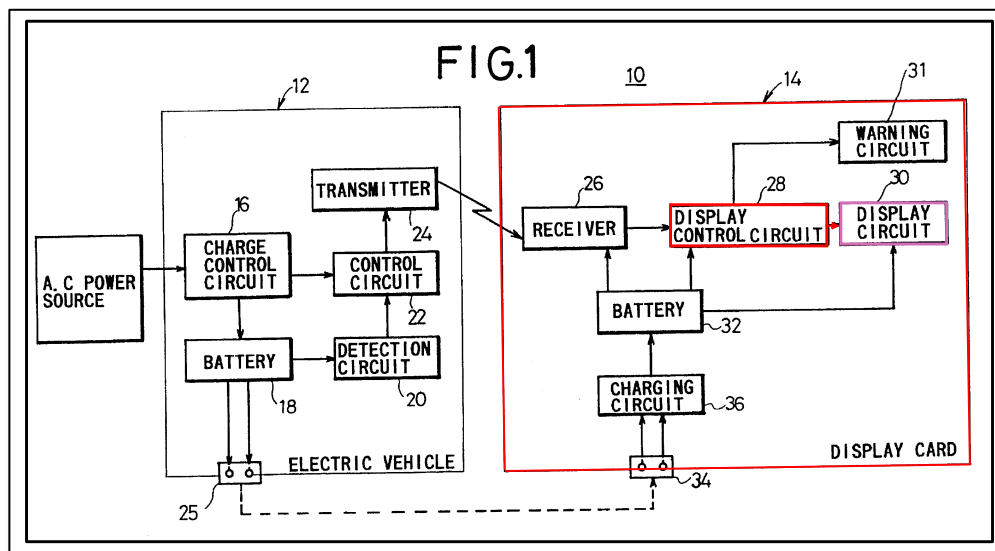
Kelty-078 teaches *a second display* (display of *portable controller*; device 24). Kelty-078 teaches device 24 may be a “consumer interface device” such as a “cell phone,” “Blackberry,” or “Treo”:



EX1004-Kelty-078, FIG. 2; Claim 1[b]. Such devices comprised a *display*. EX1003-Dec., ¶¶229-230. Kelty-078 teaches user’s “portable device” as “any known **display** device....” EX1004-Kelty-078, 4:60-65. Kelty-078 teaches “contact[ing] the user 20 via [] device 24” via “instant messaging” or similar communication methods, where such devices 24 comprise a *display* for viewing textual information like text messages. EX1004-Kelty-078, 5:53-58; EX1003-Dec., ¶¶229-230.

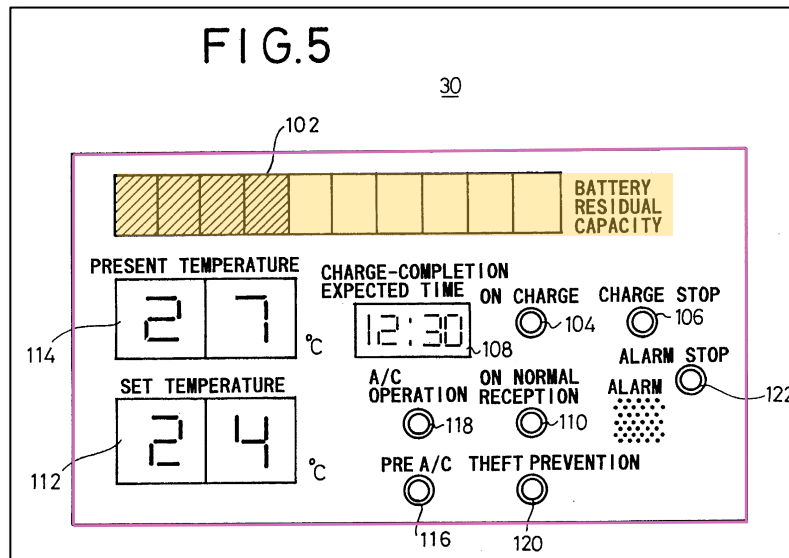
2. *Suyama's Teachings*

Suyama teaches “charge-status display system” for “monitoring the status of charging of the electric vehicle being charged...at a location remote from the electric vehicle.” EX1007-Suyama, Abstract, 1:10-14, 15:29-32. Suyama teaches “detecting” and “determining a status of charging of said main battery,” and “wireless[ly] transmitting” said status to “display unit separated from said electric vehicle and disposed at a location remote from said electric vehicle” (*the controller (vehicle controller)...configured to display on a second display*). EX1007-Suyama, 1:46-65; EX1003-Dec., ¶231. Suyama discloses “portable display card 14 for displaying the state of charging of the electric vehicle 12”:



EX1007-Suyama, 5:48-50, 5:66–6:13, 8:26-28 (disclosing receiver of portable display card 14 receiving signals transmitted wirelessly from transmitter of vehicle, 5:51-63), FIG. 1.

Suyama teaches charging status is presented to the user with “indicators such as an indicator 102 for indicating the remaining capacity of the main battery 18” (*information indicative of the level of charge of the battery*), per Claim 1[i]. EX1007-Suyama, 7:43-45.



EX1007-Suyama, FIG. 5.

The charge status is presented on the remote display *during charging of the battery*. Suyama teaches “[t]he display circuit 30 displays the state of charging of the main battery **while being charged....**” EX1007-Suyama, 8:36-39, 15:29-31, 7:33-45, FIG. 1.

3. *Motivation to Combine*

In the combination, Kelty-078’s system is modified to transmit and *display* to the *second display* (Kelty-078’s device 24 display) Suyama’s teachings of indicator 102 indicating remaining battery capacity (*level of charge of the battery*).

A POSITA would have found obvious and been motivated to modify Kelty-078's system at least because Suyama expressly suggests the modification. EX1007-Suyama, 15:29-31, 15:18-45. Suyama therefore provides express motivations for the combination with Kelty-078, allowing a user to remotely view the level of charge using a portable device such as device 24. EX1003-Dec., ¶235.

A POSITA would have appreciated the flexibility and convenience of using a portable device to monitor the vehicle's charging status "at a location remote from the electric vehicle." EX1007-Suyama, 1:14, 1:26, 1:31-36; EX1003-Dec., ¶¶236-238. A POSITA would have further appreciated being able to do other tasks while charging their electric vehicle. EX1003-Dec., ¶¶236-238.

The modification combines prior art elements (transmitting and displaying information indicative of charge remaining in an electrical vehicle, and the display of a portable device, like a phone) according to known methods to yield predictable results (remotely monitoring an electric vehicle while charging). EX1003-Dec., ¶239.

A POSITA would have had a REOS without undue experimentation in making such a combination since Kelty-078 already envisions "communication between the electric vehicle 12 and user 20 or user 20 and electric vehicle 12" and teaches "user 20 may **check...the charge status**" of vehicle 12 from device 24. EX1004-Kelty-078, 5:1-6. FIG. 3 (Step 307); EX1003-Dec., ¶240.

H. Claim 12

Kelty-078 teaches Claim 12.

Kelty-078 teaches device 24 (*portable controller*) may be a “mobile device” like a “Cell phone,” “Blackberry,” or “Treo” comprising a *second display*. EX1004-Kelty-078, FIG. 2; Claims 1[b], 11. Kelty-078’s devices 24 are “processor-based devices” per the meaning of the ’011 Patent, such that a processor of the cellphone is causing display on a display of the cellphone (*second display*). EX1003-Dec., ¶¶242-243. For example, the Treo 700p included a “312MHz” “Intel XScale® processor” and “[t]ouch-sensitive LCD screen” which a POSITA would have understood requires the controller be *electrically coupled* to the screen (*second display*) for the user to select elements and view information on the screen.” EX1003-Dec., ¶243 (*citing* EX1019-PalmTreo700, 7, 103, 123). Thus, the *portable controller* (processor) of device 24 is *electrically coupled to the second display* of device 24 so “user 20 may check or change the charge status and settings or other vehicle parameters.” EX1004-Kelty-078, 5:3-5, 7:38-43, FIG. 3 (Step 307); EX1003-Dec., ¶¶242-243.

VI. GROUND 2: CLAIMS 7-8 ARE OBVIOUS OVER KELTY-078, FUJITA, SUYAMA, AND SUTARDJA

A. Claim 7

The modified Kelty-078 in view of Sutardja teaches Claim 7.

1. Kelty-078's Teachings

Kelty-078's *controller* (VMS) is configured to supply electricity (“starting and stopping of charging of the battery pack”) *from the source of power* (utility company controlling an electricity grid) *responsive to a wireless signal* (an instruction sent via Bluetooth, per Kelty-078; Claims 1[c]-[d]) communicated from the *portable controller* (device 24). EX1004-Kelty-078, 5:40-44, 7:35-43, FIG. 3; Claim 1[c].

2. Sutardja's Teachings

EX1010-Sutardja is similarly directed to “charging batteries in vehicles.” EX1010-Sutardja, [0002]. Sutardja teaches “users may use the user interface modules to generate default and/or custom charging parameters.” EX1010-Sutardja, [0235]. “The charging parameters may specify **a time of the day** to charge the batteries, a charge **completion time**,” etc. (*time of day to supply electricity*). EX1010-Sutardja, [0235]. For example, “the user may request a full charge daily between 9 pm and 6 am.” EX1010-Sutardja, [0262]. “Utility companies may supply power to the batteries...according to the charging parameters generated by the users.” EX1010-Sutardja, [0233].

Therefore, Sutardja teaches *supply[ing] electricity from the source of power* (utility company supplying electricity) *to the battery* (battery 14) *based on the time of day* (charging parameters, such as charge start time).

3. *Motivation to Combine*

A POSITA would have been motivated and found obvious to further modify EX1004-Kelty-078's *wireless signal* (instruction from device 24 to VMS 32, such as powering on/off) to include a *time of day*, per Sutardja's charging parameters. Kelty-078 already contemplates charging "at a different time of day" "to reduce [the user's] cost of charging the battery pack of the electric vehicle 12." EX1004-Kelty-078, 8:65–9:3; EX1003-Dec., ¶248.

It was well-known prior to the '011 Patent that charging electric vehicles may require lengthy charging time; thus, it would have been desirable for the user to schedule charging when the vehicle would likely not be used, or at a time when the cost of electricity is less expensive, per Kelty-078. EX1003-Dec., ¶249 (discussing EX1014-Sandeep, EX1033-Chan).

A POSITA would have also appreciated added convenience from scheduling charge time to not have to remember to manually charge the electric vehicle, avoiding a user forgetting to charge their vehicle. EX1003-Dec., ¶250. Further, a POSITA would appreciate "**custom** charging parameters" that are tailored to the user's specific needs, per Sutardja. EX1003-Dec., ¶250. Additionally, utilizing Kelty-078's device 24 to input charging parameters, such as time of day to charge, provides added convenience of setting the charging schedule using the portable

controller and thus, not requiring the user to be in the vehicle to set the charging parameters. EX1003-Dec., ¶251.

The modification combines prior art elements (wireless signal comprising time of day information, per Sutardja, and a vehicle charging system, per Kelty-078) according to known methods to yield predictable results (customizable, e.g., scheduled, electric vehicle charging). EX1003-Dec., ¶252.

The combination would have had REOS since, in the modification, the *wireless signal* is sent from Kelty-078's portable device 24. Similarly, Sutardja teaches embodiments in which "a user of the vehicle 102-1 may use the user interface module 108 to set charging parameters for charging the battery 14 and for returning charge from the battery 14." EX1010-Sutardja, [0243]. Further, Kelty-078 already contemplates scheduling charging to benefit the user by reducing cost. EX1004-Kelty-078, 2:6-11. EX1003-Dec., ¶253.

B. Claim 8

The modified Kelty-078 system in view of Sutardja teaches Claim 8. Sutardja expressly teaches "charging parameters may specify...a charge completion time..." (*time of day includes a time of day to complete charging*). EX1010-Sutardja, [0235]; Claim 7.

VII. GROUND 3: CLAIM 9 IS OBVIOUS OVER KELTY-078, FUJITA, SUYAMA, AND KELTY-218

A. Claim 9

The modified Kelty-078 system further modified by Kelty-218's cost thresholds teach Claim 9.

The modified Kelty-078 teaches *controller* (VMS 32) *configured to supply electricity* to the vehicle battery responsive to a portable controller's wireless signal, which "enables the user to control certain aspects of **charging of the battery.**" Claim 1[d], *citing* EX1004-Kelty-078, 2:41-43; §V.A.4 (*signal*). Kelty-078 teaches "provid[ing] an electric vehicle communication interface that will allow the user...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." EX1004-Kelty-078, 2:6-11.

EX1008-Kelty-218 teaches charging cost circuit 212 associated with a computer, such as a vehicle computer or home computer, operable to control electric vehicle charging automatically based on a cost of power. EX1008-Kelty-218, [0024]-[0027], [0030], [0048], FIG. 2; Claim 13. In embodiments, charging cost circuit 212 is part of a computing device outside the vehicle (e.g., in a computing device of the user), operable to control vehicle charging, including turning charging on/off. EX1008-Kelty-218, [0025]-[0026], [0048]. Charging cost circuit 212 may include a user controllable interface so "the user can input a **threshold** for what is a

less expensive charging cost rate and what is a more expensive charging cost rate.” EX1008-Kelty-218, [0030]. A user may specify via their vehicle or home computer “to charge **only** when below a certain threshold.” EX1008-Kelty-218, [0030], [0047]-[0048], FIG. 8; EX1003-Dec., ¶258. Therefore, Kelty-218 teaches a *wireless signal* (instruction entered by user on a portable device) *includes a cost threshold* (user-specific threshold at which charge can occur, per Kelty-218) and *wherein the controller is configured to supply electricity from the source of power to the battery based on the cost threshold* (in the combination with the modified Kelty-078, VMS 32 controls supply of power to the battery based on the cost threshold entered by the user). EX1003-Dec., ¶258.

1. Motivation to Combine

A POSITA would have been motivated and found obvious to modify Kelty-078’s system to receive a user’s desired cost of power threshold, thereby providing the user with convenient control of the vehicle charging and associated costs. EX1003-Dec., ¶259. Doing so would have furthered Kelty-078’s express objective of allowing the user 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,” motivating the combination. EX1004-Kelty-078, 2:6-11; EX1003-Dec., ¶259. Similar to the MTC for Claim 7 (§VI.A.3), utilizing Kelty-078’s device 24 to input charging parameters, such as cost of power threshold, provides added

convenience for the user by allowing inputting charge parameters from any location with the user's phone. EX1003-Dec., ¶¶260-262. A POSITA would have recognized the combination constitutes applying a known technique (receiving the user's cost threshold, per Kelty-218) to a known system ready for improvement (Kelty-078's vehicle charging system) to the yield predictable result of stopping the charging of the vehicle when the cost of power exceeds the user's selected cost of power threshold, leading to a REOS. EX1003-Dec., ¶¶260-262.

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." EX1008-Kelty-218, [0048].

VIII. GROUND 4: CLAIMS 13-14, 5 ARE OBVIOUS OVER KELTY-078, FUJITA, SUYAMA, KELTY-218, AND SUTARDJA

A. Claim 13

Petitioner applies the claim construction for *cost of power* as "monetary price of power." §III.C.1.

Sutardja teaches a processor associated with a utility company (*third controller*) sending information indicative of a cost of power to a vehicle battery charger. Kelty-218 provides further specificity that the cost of power is a monetary price of power.

1. '011 Specification Regarding “third controller”

The '011 Patent describes a “*third controller*” by stating “another controller can be...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, 9:5-13, 9:13-16 (explaining “the other controller is a remote computer of a power utility”).

2. Kelty-078’s Teachings

Kelty-078 teaches a *first controller* (controller; VMS 32) and a *second controller* (portable controller; device 24). Claims 1[a]-1[b].

Kelty-078 teaches “an electric vehicle communication interface that will allow 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.**” EX1004-Kelty-078, 2:7-11, 2:55-59, 8:65-9:3; EX1003-Dec., ¶¶266-267; Claim 1[d] (utility company supplying electricity).

Kelty-078 teaches a *third controller*, namely the server of the utility company supplying electricity. EX1004-Kelty-078, 5:47-52 (“electric vehicle 12 is either charged or stored via a vehicle to grid application that will allow for communication between a **local utility company server** and the electric vehicle 12, thus allowing for certain operations to be performed by the utility company and the user 20 on the

electric vehicle 12.”). *Cf.* EX1001, 44:8-10 (“controller 50 of the power utility 48” “can be defined by one or more servers and associated computer equipment”).

VMS 32 *is configured to receive data from a third controller*, i.e., the utility server because (1) VMS 32 is the onboard vehicle computer that controls various vehicle systems, including the ESS 26 (battery) and PEM 34 (responsible for charging battery 26); and (2) Kelty-078 teaches “communication between” vehicle 12 and the utility company “for charging the vehicle 12 during periods of low power consumption....” EX1004-Kelty-078, 5:48-49, 6:1-2; EX1003-Dec., ¶269.

The utility server (*third controller*) is remote from vehicle 12 and the vehicular battery charger (VMS 32, PEM 34, ESS 26) (*remote from the vehicle and the vehicular battery charger*) because vehicle 12 may be charged from multiple locations, indicating the utility company is not at a single, shared location with the *vehicle and vehicular battery charger*. EX1003-Dec., ¶270.

3. Sutardja’s Teachings and MTC

Sutardja teaches *receiv[ing] information indicative of the cost of power* (cost of and discounts for electricity) *from a third controller* (server LMM at utility company 23) *remote from the vehicle and the vehicular battery charger*.

Sutardja teaches negotiating parameters for charging between control module 112 (inside vehicle) and utility company 23. EX1010-Sutardja, [0267], FIG. 3B; EX1003-Dec., ¶272. Such “alternate charging parameters” include “additional

costs” for charging, expressly teaching receiving data indicative of a monetary price (cost) of power. EX1010-Sutardja, [0235-0236], [0243], [0264-0265]; EX1003-Dec., ¶272. 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.

A POSITA would have been motivated and found obvious to modify Kelty-078’s VMS 32 (*first controller*) to *receive data indicative of a cost of power (monetary price of power) from the utility company server (third controller) remote from the vehicle and the vehicular battery charger*, recognizing that the utility company would have been the most-straightforward, expected source of the cost of power information. EX1003-Dec., ¶273. The monetary price of power would have been valuable information for the vehicle to achieve Kelty-078’s express objective of allowing the user 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,” motivating the combination. EX1004-Kelty-078, 2:6-11, 6:4-7; EX1003-Dec., ¶273.

A POSITA would have recognized the combination constitutes applying a known technique (receiving the monetary price of power, per Sutardja) to a known system ready for improvement (Kelty-078’s vehicle charging system) to yield

predictable result of providing up-to-date price information to the vehicle, leading to a REOS. EX1003-Dec., ¶274.

The combination would have had a REOS and been well-within the expertise of a POSITA given that Kelty-078 already contemplates “pre-register with a local utility company or energy provider to allow for charging of the vehicle at periods of low power consumption, thus reducing the overall cost of operating the electric vehicle.” EX1004-Kelty-078, 2:55-59, 8:65–9:3; EX1003-Dec., ¶275.

4. Kelty-218’s Teachings and MTC

Kelty-218 provides additional specificity that a transmitted cost of power is a “monetary price of power,” per the applied claim construction. Kelty-218 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.”). EX1008-Kelty-218, [0024]; EX1003-Dec, ¶276. Kelty-218 also teaches estimating that it will cost “\$5.00 to charge an electric vehicle based on measured conditions and optionally learned conditions.” EX1008-Kelty-218, [0028]. Therefore, Kelty-218 express teaches a *cost of power* that is a “monetary price of power,” applying the claim construction.

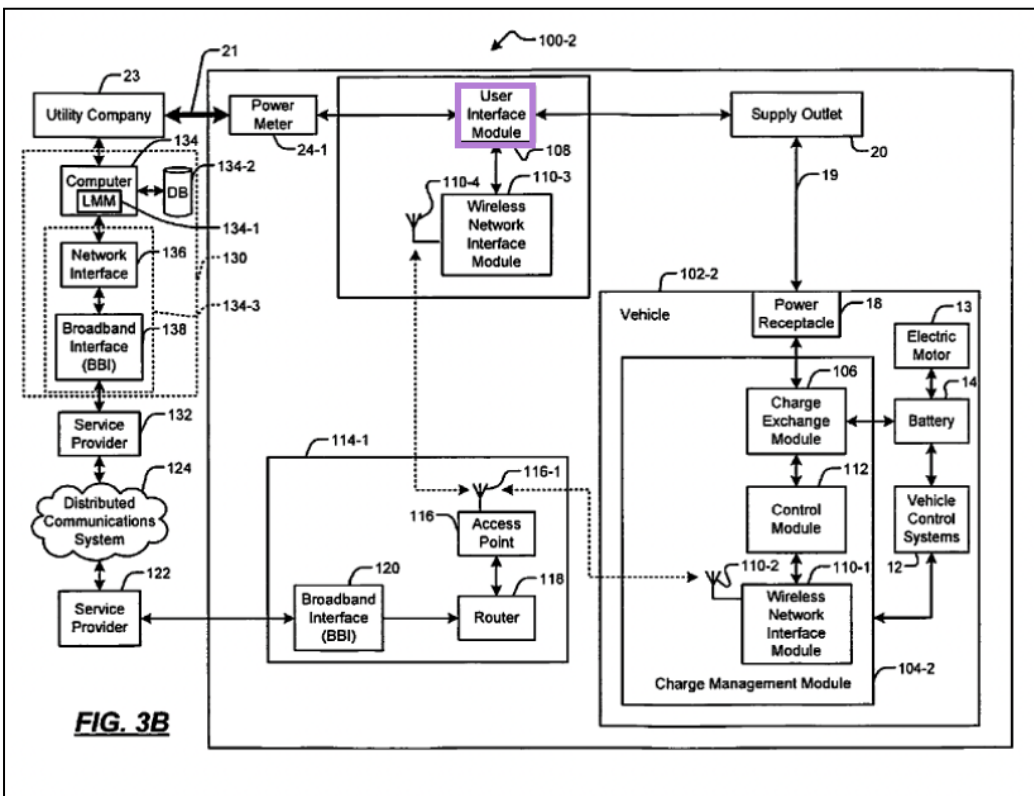
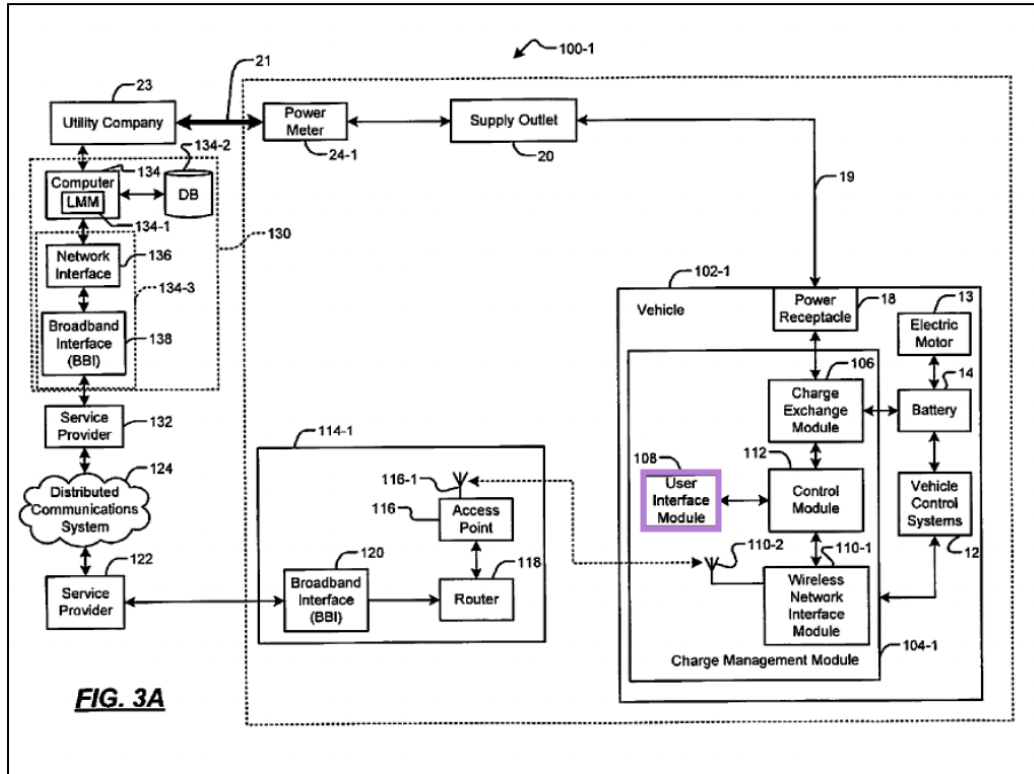
A POSITA would have been motivated and found obvious to use monetary value (e.g., \$0.06, per Kelty-218) as the costs the user may pay in the Sutardja-modified Kelty-078 system. EX1003-Dec, ¶277. The end user would have easily

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 REOS, at least because of payment in money is well accepted. EX1003-Dec, ¶277.

B. Claim 14

There is no antecedent basis for the *information indicative of the cost of power*. Claim 13 recites the *data indicative of the cost of power*. Petitioner construes Claim 14’s *information* as the recited *data* of Claim 13.

Sutardja teaches Claim 14. As brief background, Sutardja discloses FIGS. 3A-3B but notes that the components of charge management system (CMS) 100 shown in FIG. 3A are applicable to the corresponding components in FIG. 3B. In FIG. 3B, the “user interface module 108 [is]...arranged outside a vehicle 102-2,” versus inside the vehicle in FIG. 3A. EX1010-Sutardja, [0239], [0247] (“Otherwise, the CMS 100-2 of FIG. 3B may be substantially similar to the CMS 100-1 of FIG. 3A.”); EX1003-Dec., ¶¶278-280. Thus, when Petitioner refers to descriptions and functionality of FIG. 3A while discussing the architecture of FIG. 3B, this is not intended as a combination of embodiments.



EX1010-Sutardja, FIGS. 3A (top), 3B (bottom); both annotated to show the similarity of CMS 100 between the two figures apart from the location of user interface module 108.

In FIG. 3B, Sutardja discloses an interface **outside the vehicle** acts as a middleman between a utility company 23 and the vehicle. EX1010-Sutardja, [0247], [0243], FIG. 3B. Sutardja teaches “wireless network interface module 110-3” (outside the vehicle) enables “user interface module 108 to communicate with the utility company 23.” EX1010-Sutardja, [0247]. The same “wireless network interface module 110-3 may enable the user interface module 108 to communicate with a CMM [charge management module] 104-2 **in the vehicle** 102-2 via the user LAN 114-1.” *Id.* Thus, Sutardja teaches that computer 134 at utility company 23 connects wirelessly with interface 108, which connects with the vehicle’s CMM that “manage[s] the amount of charge in the battery 14.” EX1010-Sutardja, [0239].

Information transmitted from Sutardja’s utility company 23 to the vehicle specifically includes data indicative of a monetary price of power (cost of power) such as “additional costs” for charging. Claim 13, *citing* EX1010-Sutardja, [0264], [0267].

Thus, in the combination, the modified Kelty-078 vehicle controller (VMS 32 of Kelty-078; *first controller*) is *configured* (per Sutardja, FIG. 3B) *to receive the information indicative of the cost of power* (e.g., “additional costs” for charging with

specificity of monetary price per Kelty-218) *from the third controller* (Sutardja's computer 134 at utility company 23) *through the second controller* (processor of Kelty-078's device 24, modified to serve as a middleman like wireless network interface module 110-3 of Sutardja's FIG. 3B). EX1003-Dec., ¶282.

1. Motivation to Combine

A POSITA would have been motivated and found obvious to further modify the modified Kelty-078 system. EX1003-Dec., ¶283. A POSITA would have appreciated the convenience and ease of monitoring the cost of power through their personal device and being able to monitor charging of their electric vehicle remote from the vehicle itself. EX1003-Dec., ¶283. Because it was well-understood that “municipal power grid pricing fluctuates frequently,” a POSITA would have further valued up-to-date pricing information delivered through their mobile device, and charging their vehicle dynamically in response to the changing cost of electricity. EX1008-Kelty-218, [0048]; EX1003-Dec., ¶283. Further, routing utility pricing information through Kelty-078's device 24 would allow the user to approve cost-based charging decisions. EX1004-Kelty-078, 5:62-67, 6:7-16, FIG. 3 (Step 323); EX1003-Dec., ¶283. Additionally, a POSITA would have valued the portability of a mobile device and being able to monitor charging of their electric vehicle without needing to be in the exact same location as their vehicle. EX1003-Dec., ¶283.

A POSITA would have recognized the combination constitutes applying a known technique (routing information regarding cost of power from a utility company through a user's phone to an electric vehicle's controller, per Sutardja) to a known system ready for improvement (Kelty-078's vehicle charging system 10) to the yield predictable result of dynamically charging the electric vehicle based on cost, leading to a REOS. EX1003-Dec., ¶¶284-285.

Doing so would have furthered Kelty-078's express objective of allowing the user 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," motivating the combination. EX1004-Kelty-078, 2:6-11; EX1003-Dec., ¶¶284-285. Kelty-078's vehicle 12 is already equipped to perform wireless communications, and the user is already capable of starting/stopping charging using device 24, per Claims 1[b]-1[d].

C. Claim 5

Petitioner applies the claim construction for *cost of power* as "monetary price of power." §III.C.1.

Kelty-078 teaches *controller* (VMS 32) *is configured to receive data* from a utility company, describing "a vehicle to grid application that will allow for **communication between a local utility company server and the electric vehicle 12.**" EX1004-Kelty-078, 5:47-52; Claim 13. Further, Kelty-078's *controller* (VMS

32) *is configured to start and stop charging of the battery of the vehicle* in response to an instruction from device 24. Claim 1[d]. Kelty-078 teaches VMS 32 “monitors, **controls**, and coordinates” various systems in the vehicle including the power electronics module and energy storage system, such that VMS 32 is configured to *stop charging*, when appropriate. EX1004-Kelty-078, 7:44-51; EX1003-Dec., ¶287.

Sutardja teaches receiving data indicative of a cost of power from utility company 23. Claim 13; EX1010-Sutardja, [0264], [0267], FIG. 3B. Kelty-218 teaches the cost of power is a “monetary price of power.” *Id.* Per Claim 9, Kelty-218 teaches a user-specified “**threshold** for what is a less expensive charging cost rate and what is a more expensive charging cost rate” by which a user may specify to charge the vehicle **only** when the cost of power is below a certain threshold. EX1008-Kelty-218, [0030], [0047]-[0048], FIG. 8; EX1003-Dec., ¶288. Thus, Kelty-218 teaches *stop[ping] charging of the battery of the vehicle based on data indicative of the cost of power* (a monetary price of power).

In the combination, the modified Kelty-078 vehicle is further modified pursuant to Sutardja and Kelty-218 so VMS 32 receives the monetary price of power (cost of power) from utility company 23 (Claim 13, discussing Sutardja) and *stop charging of the battery of the vehicle* when the cost of power rises above a user-specified threshold (Claim 9, discussing Kelty-218).

1. Motivation to Combine

MTCs for receiving data indicative of a cost of power (the “monetary price of power,” per Sutardja) and *stop[ping] charging of the battery of the vehicle* when the monetary price of power exceeds the threshold (per Kelty-218) are provided above for Claims 13 and 9.

IX. GROUND 5: CLAIMS 15-16 ARE OBVIOUS OVER KELTY-078, FUJITA, SUYAMA, AND JOHNSON

Petitioner applies the claim construction for *cost of power* as “monetary price of power.” §III.C.1.

A. Claim 15

1. Kelty-078’s Teachings

Kelty-078 teaches *the display*, namely in-vehicle display 30 displaying charging information. Claim 1[g]. Kelty-078 teaches VMS 32 (onboard vehicle computer) controls various vehicle systems, including ESS 26 (battery) and PEM 34 (responsible for charging battery 26). Per FIG. 2, VMS 32 controls display 30 via “CAN BUS” through PEM 34 and electric vehicle service equipment module (EVSE) 36. EX1004-Kelty-078, 7:64–8:2, FIG. 2. Thus, Kelty-078 teaches *the controller configured to* perform Claim 15’s functionality, namely VMS 32 displaying charging information. EX1004-Kelty-078, 7:44-64; Claims 1[a], 1[g]-1[i] (additional information the *controller is configured to* repeatedly display on display 30, per Fujita and Suyama).

2. *Johnson's Teachings*

Johnson (EX1011) teaches a system for charging electric automobiles that displays the price per kwh (kilowatt-hour) on display screen 35, teaching *display[ing] information indicative of a cost of power*. EX1011-Johnson, Abstract (system for charging), [0056] (display screen), [0092] (“Price per KWH”), FIGS. 1, 5-6; EX1003-Dec., ¶¶293-294. The displayed power cost is a “monetary price of power” because the cost is displayed as cents per KWH. EX1011-Johnson, [0092]; EX1003-Dec., ¶¶293-294.

Johnson teaches displaying cost of power is useful to a user. EX1011-Johnson, [0092-0093]. Johnson teaches displaying the total power cost after charging. EX1011-Johnson, [0116].

3. *Motivation to Combine*

A POSITA would have been motivated and found obvious to modify Kelty-078's in-vehicle display 30 to further display *information indicative of a cost of power*, such as the “Price per KWH” per Johnson, desirably enabling the user to determine if the current cost of power is “acceptable.” EX1011-Johnson, [0092-0093]; EX1003-Dec., ¶295.

Doing so would have furthered Kelty-078's express objective of allowing the user 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,”

motivating the combination. EX1004-Kelty-078, 2:6-11; EX1003-Dec., ¶296. A POSITA would have recognized the combination constitutes applying a known technique (displaying the cost of power information, per Johnson) to a known system ready for improvement (Kelty-078's vehicle charging system) to the yield predictable result of informing the user of the current charging price, leading to a REOS. EX1003-Dec., ¶296.

B. Claim 16

The Kelty-078 combination in view of Johnson teaches displaying *information indicative of the cost of power includ[ing] a cost of power per unit of power* (monetary price in cents per KWH). Claim 15, *citing* EX1011-Johnson, [0092].

X. GROUND 6: CLAIM 17 IS OBVIOUS OVER KELTY-078, FUJITA, SUYAMA, AND POLLACK

The modified Kelty-078 in view of Pollack teaches Claim 17.

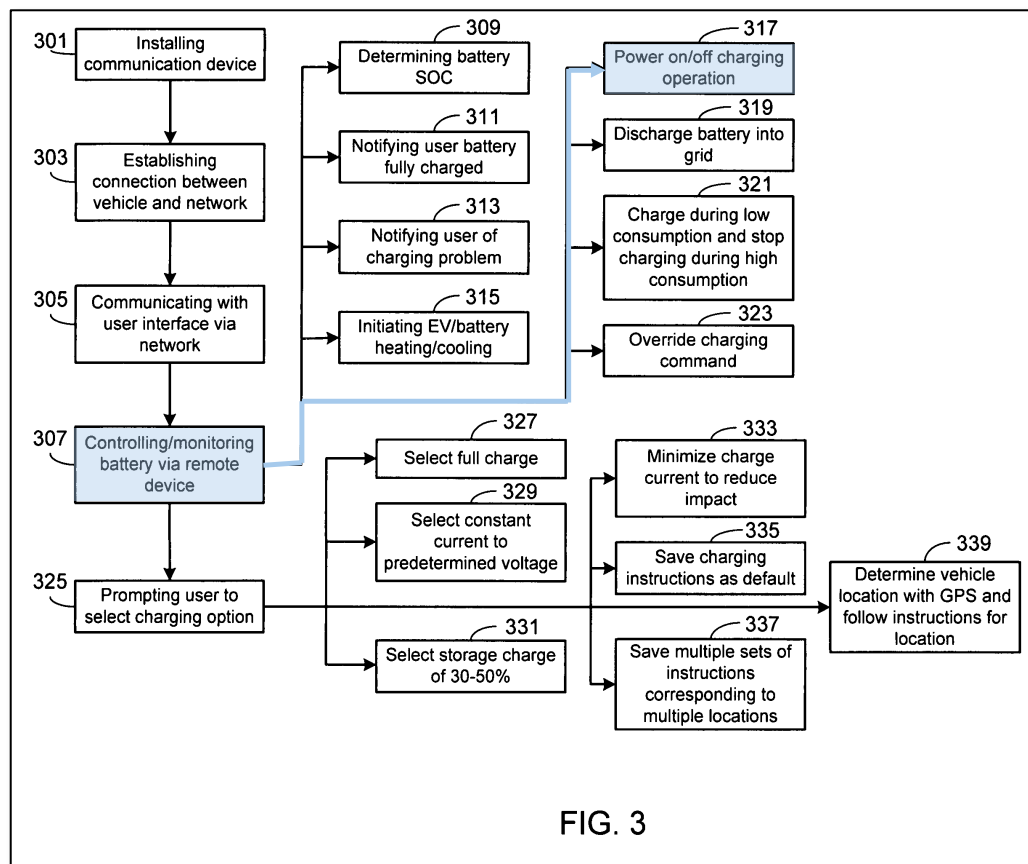
A. '011 Specification Regarding “*signal*” and “*manual charge*”

Claim 1[c] (*signal*). The '011 Patent describes “the process of charging a vehicle battery in ‘manual’ mode (i.e., not based upon a time of day).” EX1001, 11:30-32, 20:64-66; EX1003-Dec., ¶299.

B. Kelty-078's Teachings

Kelty-078 teaches “user or driver 20 of the vehicle is [] capable of communicating with the electric vehicle 12 from their portable device such as a **cell**

phone...to program and send specific **instructions** to the electric vehicle 12 for **controlling and monitoring the battery system 26** arranged within the electric vehicle 12 (step 307).” EX1004-Kelty-078, 4:58–5:1, 4:16-19, FIG. 3; EX1003-Dec., ¶¶300-301; Claims 1[b]–[d]. Examples of such “instructions” are illustrated in FIG. 3 and include user 20 “powering on and off” charging battery 26. EX1004-Kelty-078, 4:66, 5:40-52, FIG. 3 (Step 317).



EX1004-Kelty-078, 6:16-21, FIG. 3 (Steps 307, 317),

VMS 32 (*controller*) “monitors, controls and coordinates various systems in the electric vehicle 12 including” ESS 26 (the electric vehicle battery). EX1004-

Kelty-078, 7:44-51; Claim 1[a]. Therefore, wirelessly communicating using Bluetooth to “send...instructions” from device 24 to VMS 32 includes VMS 32 *receiv[ing] a wireless signal and configured to do so*. EX1004-Kelty-078, 4:53-58, 8–5:18, 8:44-48.

C. Pollack’s Teachings

Pollack teaches a user interface associated with an electric vehicle and displayed on a cellphone/portable device. EX1013-Pollack, [0227]. Claim 6. 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.” EX1013-Pollack, Claims 1-4, 12. The parameters displayed on Pollack’s user interface include “user-selectable manual charging overrides.” EX1013-Pollack, Claim 4.

Pollack teaches *start[ing] a manual charge of the battery*, namely the user interface may include “an **override for requesting immediate charging** of the electric vehicle.” EX1013-Pollack, Claims 4, 15, [0100], [0202]; EX1003-Dec., ¶¶302-304.

In the combination, Kelty-078’s *portable controller* (processor of device 24) sends Pollack’s override signal (“override for requesting immediate charging of the electric vehicle”) to Kelty-078’s *controller* (VMS 32) to *start a manual charge of*

the battery (immediately start charging vehicle 12 and do not start charging the vehicle battery based on time). EX1013-Pollack, Claims 4, 15, [0100], [0202].

D. Motivation to Combine

A POSITA would have been motivated and found obvious to transmit Pollack's manual charge command as a "signal" in the modified Kelty-078 system. EX1003-Dec., ¶305. A POSITA would have appreciated being able to immediately start charging their electric vehicle whenever desired. EX1003-Dec., ¶305. A POSITA would have recognized the benefit of enabling a user of Kelty-078's system to directly initiate charging via a user interface device, rather than relying solely on scheduled triggered charging. EX1003-Dec., ¶305.

Transmitting a manual battery charge as a signal would have been the use of a known technique (charging command in the form of signal) to improve similar devices (EV charging systems) in the same way. A POSITA would have had a REOS because the combination would implement Bluetooth communications expressly taught by Kelty-078 to send a manual charge command signal, a feature well-within the skill of a POSITA. EX1003-Dec., ¶306. Further, EV charging systems commonly provided manually initiating/overriding charging. EX1003-Dec., ¶306.

Kelty-078 already teaches device 24 that allows users "to control certain aspects of charging of the battery" "and discharging of the battery to an electric grid if necessary." EX1004-Kelty-078, 2:42-45. Similarly, Pollack teaches a user

interface 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]. Therefore, a POSITA would have had a REOS applying Pollack’s teachings to the Kelty-078 system given their similarities. EX1003-Dec., ¶307.

XI. GROUND 7: CLAIM 18 IS OBVIOUS OVER KELTY-078, FUJITA, SUYAMA, KELTY-218, AND HOTTA

A. Claim 18

Kelty-218 and Hotta (EX1009) teaches Claim 18. Kelty-218 teaches almost all of Claim 18’s limitations. Hotta provides implementation details for mathematical calculations for beginning battery charging, based on Kelty-218’s predicted charge stop time.

1. Claim 18[a] and MTC

Kelty-218 teaches charging methods based on at least three factors, including charging cost (i.e., cost of power in cents per KWH), the time of day (i.e., first period, second period), and a predicted time of day when the user will want to use their vehicle. EX1008-Kelty-218, [0024], [0047], FIG. 8, [0027]. Kelty-218 recognizes that “municipal power grid pricing fluctuates frequently.” EX1008-Kelty-218, [0048]. To accommodate the frequent fluctuations while keeping the cost of charging as low as possible, Kelty-218 teaches various methods of setting a cost threshold for charging, e.g., charge/do not charge if below/above threshold, such that

charging is performed during different time periods based on different charging costs. EX1008-Kelty-218, [0027]. Yet further, Kelty-218 predicts charging stop times, i.e., a time by which the charging needs to be completed, to ensure the desired charging occurs, even if subjected to a higher charge cost. EX1008-Kelty-218, [0027]. Kelty-218 thus teaches predicting the time of day when the user will need their vehicle to be charged to the desired charge level. This predicted time of day is *a latest time of day* by which charging of the battery should be complete. EX1003-Dec., ¶¶309-310.

Hotta provides specificity on a latest time of day *to begin* charging of the battery. Claim 18. Hotta teaches a vehicle battery charging system “**calculating a charging start time to finish the charging of the storage battery**” based on (a) “the time the driver intends to next board and drive the vehicle” and (b) the total time required to charge the battery. EX1009-Hotta, Abstract, 2:15-19, 6:25-27. Hotta’s charging start time calculation is an *estimat[ion]* of *a latest time of day to begin charging of the battery* because the battery is not charged (held in “holding mode ‘a’”) “until a calculated charging start time in order to finish the charging of the storage battery 22 at the scheduled boarding time” when the driver will next use the vehicle. EX1009-Hotta, 6:25-27; EX1003-Dec., ¶311. Hotta’s controller 21 “executes” a standby mode (“holding mode ‘a’”) to prevent battery charging until

reaching the calculated charging start time T_s . EX1009-Hotta, 9:26-30; EX1003-Dec., ¶¶311-312.

In the combination, Kelty-218's teaching of predicting when the user will want to drive their vehicle (and therefore, for charging to be complete) is combined with Hotta's teaching of calculating a charging start time to finish prior to when the user will want to drive their vehicle. A POSITA would have been motivated and found obvious to modify the Kelty-078 system, as modified, such that Kelty-078's *controller (VMS 32) is configured to calculate the latest time to start charging vehicle 12*, per Kelty-218 and Hotta, to ensure the vehicle is sufficiently charged when the user needs to drive and to further perform the steps of Claims 18[b]-[c].

Kelty-218 provides express motivation for the combination, teaching its system may be particularly helpful where pricing fluctuates. EX1008-Kelty-218, [0048]; EX1003-Dec., ¶¶313-316. A POSITA would have recognized users prefer charging when cost is low and that this be performed automatically. EX1003-Dec., ¶315. A POSITA would have recognized the combination constitutes applying a known technique (calculating a charging start time, per Hotta) to a known system ready for improvement (Kelty-078's vehicle charging system 10) to yield predictable result of determining a time by which to start charging of the vehicle leading to a REOS. EX1003-Dec., ¶¶315-316.

2. *Claims 18[b]-18[c]*

Kelty-218 teaches a *cost of power*, applying the claim construction of a “monetary cost of power.” Claim 13; §III.C.1. Additionally, Kelty-218 teaches a *cost threshold*. Claim 9.

Kelty-218 expressly teaches Claim 18[b]’s *determin[ing] whether a cost of power satisfies a cost threshold*, namely “the charging cost circuit 212 is to turn on the charging circuit 208 during a first time period in which the charging cost rate is **below** a first threshold.” EX1008-Kelty-218, [0027], [0030] (“charge **only** when below a certain threshold”). In Kelty-218, a first threshold (*cost threshold*) is set by the user. EX1008-Kelty-218, [0030]. When it is determined the cost of power is below the first threshold (*determine whether a cost of power satisfies a cost threshold*), the battery is charged. EX1008-Kelty-218, [0027], [0047], FIG. 8 (806, 810); EX1003-Dec., ¶¶317-318.

Regarding Claim 18[c], Kelty-218 teaches in some optional embodiments, a time by which the user will need the charge to be completed is predicted, and charging during a second, more costly time period will occur to ensure charging is complete. EX1008-Kelty-218, [0027-0028], [0047], FIG. 8.

Thus, Kelty-218 teaches a second time period during which the charging cost is “above the first threshold” and thus is at a higher cost rate than the first period (*the cost of power not satisfying the cost threshold*). Kelty-218 teaches the system

automatically start[s] charging the battery, even though the cost of power does not satisfy the cost threshold (i.e., is above the threshold), because the vehicle's battery still needs to be charged "before a user begins to drive their electric vehicle" at the predicted charge stop time. *Id.* Therefore, Kelty-218 teaches *in response to the cost of power not satisfying the cost threshold* (being above the first threshold), the systems still *automatically start[s] charging the battery based on at least the estimated time of day* (the latest time of day to begin charging the battery, per both Kelty-218 and Hotta) in order to finish the charging of the battery at the time when the driver will next use the vehicle (e.g., "during the morning...before a user begins to drive their electric vehicle"). EX1008-Kelty-218, [0027].

In the combined system, if *the cost of power* ("monetary price of power" in dollars/cents per KWH) does not *satisfy the cost threshold* (per Kelty-218), the vehicle will not begin charging until reaching *the estimated latest time of day* (Hotta's charging start time T_s), at which point the combined system *automatically starts charging the battery* in order to finish the charging of the storage battery" at the time when the driver will next use the vehicle. EX1003-Dec., ¶¶319-321.

The MTC provided for Claim 18[a] is incorporated for Claims 18[b]-18[c].

XII. GROUND 8: CLAIMS 19-20 ARE OBVIOUS OVER KELTY-078, FUJITA, SUYAMA, KELTY-218, AND HOBBS

A. Claim 19

The modified Kelty-078 system in view of Hobbs teaches Claim 19.

1. '011 Specification Regarding “power interruption notification” and “signal”

The '011 Patent describes “if the supply of power has been interrupted, the controller 44 can send a power interrupt fault message to the user” as shown by reference numeral 129 in FIG. 27. EX1001, 43:2-6, FIG. 27. The '011 Specification describes “power interruption” as “stopping battery charging.” EX1001, 4:10-20, 43:7-17.

Regarding *signal*, see §V.A.4.

2. Kelty-078’s Teachings

Kelty-078 teaches “an electric vehicle communication interface that allows for the vehicle **to notify the user** when the battery is fully charged or if a problem has occurred during charging thus affecting the operability of the electric vehicle.” EX1004-Kelty-078, 2:46-50; 5:5-9 (“**communication between** the electric vehicle 12 and user 20 or user 20 and electric vehicle 12....”). Kelty-078 teaches “vehicle 12 notifying the user or driver 20 that a problem occurred during charging of the battery 26 (step 313)....” EX1004-Kelty-078, 5:21-26, FIG. 3.

3. Hobbs’s Teachings

Hobbs (EX1012) discloses electric-vehicle charger 100 “configured to charge batteries (e.g., batteries 152) that are located on electric or hybrid electric vehicles (e.g., vehicle 150).” EX1012-Hobbs, [0029]. Charger 100 includes “screen 107 and

key pad 104” configured to “provide diagnostics and manual control.” EX1012-Hobbs, [0036] (fault indication), [0037], FIG. 1.

Hobbs teaches if the voltage of the vehicle battery is not within a defined range after a certain number of charge additions, charger 100 may **stop charging and provide a fault indication** via screen 107. EX1012-Hobbs, [0084]; EX1003-Dec., ¶¶322-327. Hobbs teaches “when a certain amount of charging has been completed or the charge of battery 152 reaches a certain level, **charger 100 may indicate that charging is complete...or substantially complete.**” EX1012-Hobbs, [0111]. Hobbs additionally explains that “charger 100 may **indicate that charging is complete at one current threshold...and stop charging at a lower current threshold.**” *Id.* In each of these descriptions, Hobbs teaches *transmitting a signal including a power interruption notification*. EX1012-Hobbs, [0084], [0111]; EX1003-Dec., ¶¶327-328.

Hobbs further teaches that the user is notified via a display or screen. EX1012-Hobbs, [0109].

4. Motivation to Combine

Kelty-078 provides device 24 connected to VMS 32 for wirelessly initiating battery charging. Claims 1[b]-1[d]. Device 24 is configured and intended for bi-directional communication with the vehicle, including “allow[ing] the vehicle 12 to contact the user” and “**monitoring** a battery in the electric vehicle” via device 24.

EX1004-Kelty-078, 4:53-58, 2:28-30. Thus, in the combination, Hobbs's power interruption notification is wirelessly provided via Kelty-078's device 24 to allow the user to **monitor** the battery conveniently and remotely, motivating the combination. EX1003-Dec., ¶329.

A POSITA would have been motivated and found obvious to combine Hobbs' notification teachings to Kelty-078's device 24 to provide information to the user regarding vehicle charging. EX1003-Dec., ¶330. A POSITA would have recognized the combination constitutes applying Hobb's known technique (transmitting a power interruption notification) to Kelty-078's known system ready for improvement to yield predictable result of notifying the user quickly and conveniently when charging has stopped, leading to a REOS. EX1003-Dec., ¶331.

Hobbs provides express motivation for the combination. EX1012-Hobbs, [0111]; EX1003-Dec., ¶¶330-331.

B. Claim 20

The modified Kelty-078 system teaches *transmitting a second wireless signal including a power interruption notification*. Claim 19. As discussed for Claims 9, 18, the modified Kelty-078 system teaches charging a vehicle battery **only** while the cost of power is below a threshold set by the user. Claims 9, 18 *citing* EX1008-Kelty-218, [0027-0028], [0030], [0047]. Thus, the modified Kelty-078 system

experiences a *power interruption based on a cost of power*, namely when the cost of power rises above the user-selected threshold. EX1003-Dec., ¶332.

Motivations to combine charging only while a cost of power (“monetary price of power,” per Kelty-218) is below a threshold and *transmitting a power interruption notification* (per Hobbs) are provided for Claims 9, 18-19. EX1003-Dec., ¶333.

XIII. CONCLUSION

Petitioner respectfully requests *inter partes* review of the Challenged Claims.

Respectfully submitted,

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XIV. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(A)(1)

A. Real Party-In-Interest

Petitioner is the real parties-in-interest. 37 C.F.R. §42.8(b)(1).

B. Related Matters

The '011 Patent is presently the subject of a patent infringement lawsuit filed against Petitioner in the United States District Court for the Western District of Texas, Midland-Odessa Division: *CHARGELOGIC LLC v. TESLA, INC.*, Case No. 7:26-cv-00100.

C. Lead and Back-Up Counsel

Petitioners provide the following designation and service information for lead and back-up counsel. 37 C.F.R. §§42.8(b)(3) and 42.8(b)(4).

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D. 37 C.F.R. §42.8(b)(4) – Service Information

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CLAIM LISTING APPENDIX
U.S. Patent No. 11,909,011 for Claims 1-20

Claim Designation	Claim Language
Claim 1[Pre]	A system for charging a battery of a vehicle with a vehicular battery charger, the system comprising:
Claim 1[a]	a controller configured to:
Claim 1[b]	establish wireless communication with a portable controller of a user remote from the vehicle and the vehicular battery charger,
Claim 1[c]	receive a wireless signal from the portable controller,
Claim 1[d]	responsive to receiving the wireless signal, supply electricity from a source of power to the battery of the vehicle with the vehicular battery charger, and
Claim 1[e]	during charging of the battery with the vehicular battery charger: repeatedly receive at least one signal indicative of a level of charge of the battery,
Claim 1[f]	repeatedly estimate, based at least in part upon the at least one signal, an amount of time remaining to charge the battery, and
Claim 1[g]	repeatedly display on a display mounted within the vehicle and within view of a user seated in the vehicle:
Claim 1[h]	information indicative of the amount of time remaining to charge the battery based at least in part upon the estimating step, and
Claim 1[i]	information indicative of the level of charge of the battery.
Claim 2	The system of claim 1, wherein the display is electrically coupled to the controller.
Claim 3	The system of claim 1, wherein the controller is further configured to display a time of day at which charging will be completed based at least in part upon the amount of time remaining to charge the battery.
Claim 4	The system of claim 1, wherein the controller is further configured to receive a second wireless signal from the portable controller and, in response to receiving the second wireless signal, stop charging of the battery of the vehicle.
Claim 5	The system of claim 1, wherein the controller is further configured to receive data indicative of a cost of power and, based on the received data indicative of the cost of power, stop charging of the battery of the vehicle.

Claim Designation	Claim Language
Claim 6	The system of claim 1, wherein the controller is included in the vehicular battery charger.
Claim 7	The system of claim 1, wherein the wireless signal includes a time of day and wherein the controller is configured to supply electricity from the source of power to the battery based on the time of day.
Claim 8	The system of claim 7, wherein the time of day includes at least one selected from a group consisting of a time of day to start charging and a time of day to complete charging.
Claim 9	The system of claim 1, wherein the wireless signal includes a cost threshold and wherein the controller is configured to supply electricity from the source of power to the battery based on the cost threshold.
Claim 10	The system of claim 1, wherein the portable controller is defined at least in part by a phone.
Claim 11	The system of claim 1, wherein the display is a first display, and wherein the controller is further configured to display on a second display, during the charging of the battery, at least one selected from a group consisting of the information indicative of the amount of time remaining to charge the battery and the information indicative of the level of charge of the battery.
Claim 12	The system of claim 11, wherein the second display is electrically coupled to the portable controller.
Claim 13	The system of claim 1, wherein the controller is a first controller and the portable controller is a second controller, and wherein the first controller is configured to receive data indicative of a cost of power from a third controller remote from the vehicle and the vehicular battery charger.
Claim 14	The system of claim 13, wherein the first controller is configured to receive the information indicative of the cost of power from the third controller through the second controller.
Claim 15	The system of claim 1, wherein the controller is further configured to display information indicative of a cost of power on the display.
Claim 16	The system of claim 15, wherein the information indicative of the cost of power includes a cost of power per unit of power.

Claim Designation	Claim Language
Claim 17	The system of claim 1, wherein the wireless signal includes a signal to start a manual charge of the battery.
Claim 18[a]	The system of claim 1, wherein the controller is further configured to: estimate a latest time of day to begin charging of the battery;
Claim 18[b]	determine whether a cost of power satisfies a cost threshold; and
Claim 18[c]	in response to the cost of power not satisfying the cost threshold, automatically start charging the battery based on at least the estimated latest time of day.
Claim 19	The system of claim 1, wherein the wireless signal is a first wireless signal and wherein the controller is further configured to transmit a second wireless signal to the portable controller, the second wireless signal including a power interruption notification.
Claim 20	The system of claim 19, wherein the power interruption notification indicates at least one selected from a group consisting of an interruption based on a cost of power, an interruption based on a demand surge, and an interruption based on a time of day.

APPENDIX OF EXHIBITS

Exhibit 1001	U.S. Patent No. 11,909,011
Exhibit 1002	U.S. Patent No. 11,909,011 File History (“the ’011 File History”)
Exhibit 1003	Declaration of Scott Andrews
Exhibit 1004	U.S. Patent No. 7,698,078 to Kelty et al. (“Kelty-078”)
Exhibit 1005	<i>Specification of the Bluetooth System Master Table of Contents & Compliance Requirements: Covered Core Package version: 2.0 + EDR</i> . 4 November 2004. (“Bluetooth Specification”)
Exhibit 1006	U.S. Patent No. 5,283,513 to Fujita et al. (“Fujita”)
Exhibit 1007	U.S. Patent No. 5,596,261 to Suyama (“Suyama”)
Exhibit 1008	U.S. Patent Application Publication No. 2009/0021218 to Kelty et al. (“Kelty-218”)
Exhibit 1009	U.S. Patent No. 5,650,710 to Hotta (“Hotta”)
Exhibit 1010	U.S. Patent Application Publication No. 2008/0136371 to Sutardja. (“Sutardja”)
Exhibit 1011	U.S. Patent Application Publication No. 2009/0021213 to Johnson (“Johnson”)
Exhibit 1012	U.S. Patent Publication No. 2006/0028178 to Hobbs (“Hobbs”)
Exhibit 1013	U.S. Patent Publication No. 2008/0039989 to Pollack et al. (“Pollack”)
Exhibit 1014	<i>Electric Vehicle Battery Systems</i> , Sandeep Dhameja, Newnes, 2002 (“Sandeep”)
Exhibit 1015	Nadal, M and Birbar, F. <i>Development of a Hybrid Fuel Cell/Battery Powered Electric Vehicle</i> . Iht. J. Hydrogen Energy. 1996. Vol. 21, No. 6. pp. 491-505. (“Nadal”)
Exhibit 1016	U.S. Patent No. 6,548,985 to Hayes et al. (“Hayes-985”)
Exhibit 1017	U.S. Patent No. 5,548,200 to Nor et al. (“Nor”)
Exhibit 1018	Aylor et al., <i>A Battery State-of-Charge Indicator for Electric Wheelchairs</i> , IEEE Transactions on Industrial Electronics, Vol. 39, No. 5, October 1992 (“Aylor”)
Exhibit 1019	<i>Your Palm® Treo™ 700P Smartphone User Guide</i> . 2006. (“PalmTreo700p”)
Exhibit 1020	U.S. Patent No. 6,225,944 to Hayes (“Hayes”)
Exhibit 1021	U.S. Patent Application Publication No. 2006/0145817 to Aikawa et al. (“Aikawa”)
Exhibit 1022	U.S. Patent Application Publication No. 2007/0153729 to Alapuranen (“Alapuranen”)
Exhibit 1023	U.S. Patent No. 5,573,090 to Ross (“Ross”)

Exhibit 1024	U.S. Patent No. 5,487,002 to Diller et al. (“Diller”)
Exhibit 1025	U.S Patent No. 7,693,609 to Kressner et al. (“Kressner”)
Exhibit 1026	U.S. Patent No. 5,467,006 to Sims (“Sims”)
Exhibit 1027	U.S. Patent No. 2,309,941 to Drummond (“Drummond”)
Exhibit 1028	<i>Intentionally left blank</i>
Exhibit 1029	<i>Intentionally left blank</i>
Exhibit 1030	<i>Intentionally left blank</i>
Exhibit 1031	<i>Intentionally left blank</i>
Exhibit 1032	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 1033	Chan, <i>The State of the Art of Electric and Hybrid Vehicles</i> , February 2002, Vol. 90, No. 2, IEEE (“Chan”)
Exhibit 1034	U.S. Patent No. 7,084,859 to Pryor (“Pryor”)
Exhibit 1035	International Application Publication 2006/124130 to Hanssen et al. (“Hanssen”)
Exhibit 1036	U.S. Patent No. 5,701,122 to Canedy (“Canedy”)
Exhibit 1037	U.S. Patent No. 6,181,996 to Chou et al. (“Chou”)
Exhibit 1038	U.S. Patent No. 5,623,194 to Boll et al. (“Boll”)
Exhibit 1039	Japanese Patent Application Publication 2006-74868 to Izuno et al. (“Izuno”)
Exhibit 1040	U.S. Patent No. 5,757,595 to Ozawa et al. (“Ozawa”)
Exhibit 1041	U.S. Patent Application Publication No. 2003/0230443 to Cramer et al. (“Cramer”)
Exhibit 1042	2006 Civic Hybrid Online Reference Owner’s Manual, Honda (“2006 Honda Civic Manual”)
Exhibit 1043	2000 Insight Online Reference Owner’s Manual, Honda (“2000 Honda Insight Manual”)
Exhibit 1044	U.S. Patent Application Publication No. 2003/0228879 to Witkowski et al. (“Witkowski”)
Exhibit 1045	U.S. Patent No. 7,596,391 to Himmelstein (“Himmelstein”)
Exhibit 1046	U.S. Provisional Application 61/134,646 (“Ambroziak”)
Exhibit 1047	<i>Installation Guide for Electric Vehicle Charging Equipment</i> , Massachusetts Division of Energy Resources, September 2000 (“Massachusetts”)
Exhibit 1048	U.S. Patent Application Publication No. 2009/0312903 to Hafner et al. (“Hafner”)
Exhibit 1049	U.S. Patent Application Publication No. 2007/0074031 to Adams et al. (“Adams”)

Exhibit 1050	U.S. Patent No. 6,963,186 to Hobbs (“Hobbs-186”)
Exhibit 1051	U.S. Patent No. 6,832,171 to Barsoukov et al. (“Barsoukov”)
Exhibit 1052	U.S. Patent Application Publication No. 2002/0061771 to Hwang et al. (“Hwang”)
Exhibit 1053	<i>First Intel-powered BlackBerry unveiled.</i> NBC News. Nov. 1, 2005. https://www.nbcnews.com/id/wbna9884936 (“Blackberry Article”)
Exhibit 1054	U.S. Patent No. 6,128,509 to Veijola et al. (“Veijola”)
Exhibit 1055	Japanese Patent Application Publication 2003-333706 to Hayashi (“Hayashi”)
Exhibit 1056	U.S. Patent Application Publication No. 2009/0313034 to Ferro et al. (“Ferro”)
Exhibit 1057	Suryavanshi, P. V., V. K. Sharma, and Rakhi Sharma. “ <i>Advance Computer Communication Systems in Hybrid Vehicles.</i> ” 2006 IEEE Conference on Electric and Hybrid Vehicles. IEEE, 2006 (“Suryavanshi”)

CERTIFICATION OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. §42.24 that the foregoing Petition for *Inter Partes* Review, excluding any table of contents, mandatory notices under 37 C.F.R. §42.8, certificates of service or word count, or appendix of exhibits, contains 13986 words according to the word-processing program used to prepare this document (Microsoft Word).

Dated: June 18, 2026

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**CERTIFICATE OF SERVICE ON PATENT OWNER
UNDER 37 C.F.R. §42.105**

Pursuant to 37 C.F.R. §§42.6(e) and 42.105(b), the undersigned certifies that on June 18, 2026, a complete and entire copy of this Petition for *Inter Partes* Review and Exhibits were provided via Federal Express to the Patent Owner by serving the correspondence address of record for the '011 Patent:

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Further, a courtesy copy of this Petition for *Inter Partes* Review was sent via email to Patent Owner's litigation counsel:

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