

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. IPR2026-00381

U.S. Patent No. 11,909,010

DECLARATION OF SCOTT ANDREWS

TABLE OF CONTENTS

I.	INTRODUCTION.....	15
A.	EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.....	15
II.	MATERIALS CONSIDERED.....	20
III.	OVERVIEW AND LEGAL STANDARDS.....	22
A.	PERSON OF ORDINARY SKILL IN THE ART	23
B.	OBVIOUSNESS	24
C.	CLAIM CONSTRUCTION	29
IV.	LEVEL OF A PERSON OF ORDINARY SKILL.....	29
V.	OVERVIEW OF THE '010 PATENT	30
A.	SUMMARY.....	30
1.	<i>Field of Endeavor</i>	31
2.	<i>Problem Solved by the Inventor</i>	31
B.	PROSECUTION HISTORY	33
VI.	OVERVIEW OF THE TECHNOLOGY	34
A.	ELECTRIC VEHICLES	34
B.	ELECTRIC VEHICLE HARDWARE	35
1.	<i>Chargers</i>	35
2.	<i>Controllers</i>	35
3.	<i>Displays</i>	36
C.	VEHICLE TIME TO CHARGE	37
1.	<i>Displaying Time to Charge</i>	37
2.	<i>Updating a Time to Charge</i>	38
D.	REMOTELY COMMUNICATING CHARGING INFORMATION WITH VEHICLE	40
E.	CHARGE COST CONSIDERATION.....	41
VII.	SUMMARY OF THE PRIOR ART REFERENCES	42
A.	ISHII.....	42
B.	HAYASHI.....	47

C.	FUJITA	50
D.	KELTY-078	51
E.	SUTARDJA	53
F.	SUYAMA	54
G.	KELTY-218	56
H.	IZUNO	57
VIII.	GROUND OF UNPATENTABILITY	59
IX.	OPINIONS REGARDING GROUND 1: CLAIMS 1, 7-9, 13 AND 14 ARE OBVIOUS OVER ISHII, HAYASHI, AND FUJITA	61
A.	CLAIM 1	61
1.	<i>Claim 1[Pre]: A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising: ”</i>	<i>61</i>
2.	<i>Claim 1[a]: “a display mounted within the vehicle; and”</i>	<i>63</i>
a)	Ishii’s Teachings	63
b)	Fujita’s Teachings	66
c)	Motivation to Combine	67
3.	<i>Claim 1[b]: “a controller onboard the vehicle and coupled to the display, the controller configured to”</i>	<i>69</i>
4.	<i>Claim 1[c][1]: [“the controller configured to”]... “begin an active charging session of the battery based on a programmed manner of charge and at least one condition,”</i>	<i>71</i>
a)	’010 Patent Description Regarding “active charging session”	71
b)	’010 Patent Description Regarding “programmed manner of charge” and “at least one condition”	72
c)	Ishii’s Teachings	72

5.	<i>Claim 1[c][2]: “[the controller configured to]... “the programmed manner of charge starting charging of the battery in response to the at least one condition being met”</i>	78
6.	<i>Claim 1[d]: [“the controller configured to”]... “calculate an amount of time required to charge the battery,”</i>	80
	a) Ishii’s Teachings	80
	b) Hayashi’s Teachings	82
	c) Motivation to Combine	89
7.	<i>Claim 1[e]: [“the controller configured to”]... “display, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display, and”</i>	93
	a) '010 Patent Description Regarding "active charging session"	94
	b) Ishii’s Teachings	94
	c) Hayashi’s Teachings and Internal Motivation to Combine for Hayashi	95
	d) Motivation to Combine	99
8.	<i>Claim 1[f]: [“the controller configured to”], ... “repeatedly update the amount of time upon the display during the active charging session, including during the active charging session but before starting charging of the battery according to the at least one condition.”</i>	102
	a) '010 Patent Description Regarding Repeatedly	103
	b) Explanation of the Combination of Ishii- Hayashi or Ishii-Hayashi-Fujita	103
	c) Hayashi’s Teachings	105
	d) Fujita’s Teachings	105
	e) Motivation to Combine	109

B.	CLAIM 7: "THE VEHICLE CHARGER OF CLAIM 1, FURTHER COMPRISING A USER INTERFACE POSITIONED WITHIN THE VEHICLE, WHEREIN THE AT LEAST ONE CONDITION INCLUDES A TIME OF DAY AND WHEREIN THE CONTROLLER RECEIVES THE TIME OF DAY VIA THE USER INTERFACE."	114
	a) Ishii's Teachings	114
	b) Hayashi's Teachings	116
	c) Motivation to Combine	117
C.	CLAIM 8: "THE VEHICLE CHARGER OF CLAIM 7, WHEREIN THE USER INTERFACE IS DEFINED AT LEAST IN PART BY THE DISPLAY."	119
D.	CLAIM 9	120
	1. Claim 9[Pre]: "A method of charging a battery of a vehicle with a vehicle charger, the method comprising:"	120
	2. Claim 9[a]: "beginning an active charging session of the battery based on a programmed manner of charge and at least one condition, the programmed manner of charge starting charging of the battery in response to the at least one condition being met;"	120
	3. Claim 9[b]: "calculating, via a controller of the vehicle, an amount of time required to charge the battery;"	120
	4. Claim 9[c]: "displaying, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon a display mounted within the vehicle;"	121
	5. Claim 9[d]: "supplying, under control of the controller of the vehicle, power to the battery of the vehicle to charge the battery; and"	121
	6. Claim 9[e]: "updating the amount of time upon the display during the active charging session, repeatedly update the amount of time upon the display during the active charging session,	

*including during the active charging session but
before starting charging of the battery according
to the at least one condition."* 122

- E. CLAIM 13: "THE METHOD OF CLAIM 9, WHEREIN THE AT
LEAST ONE CONDITION INCLUDES A TIME OF DAY AND
FURTHER COMPRISING RECEIVING, VIA A USER INTERFACE
OF THE VEHICLE CHARGER, THE TIME OF DAY." 122
- F. CLAIM 14: "THE METHOD OF CLAIM 13, WHEREIN THE USER
INTERFACE IS DEFINED AT LEAST IN PART BY THE DISPLAY." 122

**X. OPINIONS REGARDING GROUND 2: CLAIMS 2-4, 10,
15, 17, AND 18 ARE OBVIOUS OVER ISHII, HAYASHI,
FUJITA, AND KELTY-078 122**

- A. CLAIM 2: "THE VEHICLE CHARGER OF CLAIM 1, WHEREIN
THE CONTROLLER IS A FIRST CONTROLLER, THE VEHICLE
CHARGER FURTHER COMPRISING A RECEIVER COUPLED TO
THE FIRST CONTROLLER, THE RECEIVER CONFIGURED TO
ESTABLISH COMMUNICATION BETWEEN THE FIRST
CONTROLLER AND A SECOND CONTROLLER REMOTE FROM
THE VEHICLE AND THE VEHICLE CHARGER." 122
1. *"the controller is a first controller"* 122
2. *"the vehicle charger further comprising a receiver
coupled to the first controller"* 123
3. *"the receiver configured to establish
communication between the first controller and a
second controller remote from the vehicle and the
vehicle charger"* 126
- a) *"second controller"* 126
- b) *"establish communication"* 130
4. *Motivation to Combine* 135
- B. CLAIM 3: "THE VEHICLE CHARGER OF CLAIM 2, WHEREIN
THE FIRST CONTROLLER IS FURTHER CONFIGURED TO
CONTROL POWER SUPPLY TO THE BATTERY OF THE VEHICLE
RESPONSIVE AT LEAST IN PART TO DATA RECEIVED FROM
THE SECOND CONTROLLER VIA THE RECEIVER." 139
1. *Kelty-078's Teachings* 139

2.	<i>Motivation to Combine</i>	141
C.	CLAIM 4: “THE VEHICLE CHARGER OF CLAIM 2, WHEREIN THE FIRST CONTROLLER IS FURTHER CONFIGURED TO RECEIVE THE AT LEAST ONE CONDITION FROM THE SECOND CONTROLLER VIA THE RECEIVER.”	143
1.	<i>Motivation to Combine</i>	144
D.	CLAIM 10	146
1.	<i>Claim 10[a]: “The method of claim 9, further comprising: establishing wireless communication between the controller of the vehicle and another controller remote from the vehicle and the vehicle charger;”</i>	146
2.	<i>Claim 10[b]: “starting or stopping supply of power to the battery based at least in part upon a signal received by the controller of the vehicle from the controller remote from the vehicle and the vehicle charger.”</i>	147
E.	CLAIM 15	150
1.	<i>Claim 15[Pre]: “A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:”</i>	150
2.	<i>Claim 15[a]: “a display mounted within the vehicle;”</i>	150
3.	<i>Claim 15[b]: “a controller onboard the vehicle and coupled to the display, the controller configured to”</i>	150
4.	<i>Claim 15[c]: [“the controller configured to”]... “begin an active charging session of the battery based on a programmed manner of charge and at least one condition, the programmed manner of charge starting charging of the battery in response to the at least one condition being met,”</i>	150
5.	<i>Claim 15[d]: [“the controller configured to”]... “calculate an amount of time required to charge the battery, and”</i>	151

6.	<i>Claim 15[e]: [“the controller configured to”]... “display, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display; and”</i>	151
7.	<i>Claim 15[f]: “a receiver electrically coupled to the controller;”</i>	151
8.	<i>Claim 15[g]: “wherein the controller onboard the vehicle is further configured to repeatedly update the amount of time upon the display during the active charging session, and”</i>	152
9.	<i>Claim 15[h]: “wherein the controller onboard the vehicle is further configured to, responsive to data received from another controller remote from the vehicle and the vehicle charger via the receiver, to change a charging state of the vehicle charger by at least one of a group consisting of increasing a rate of charge of the battery, decreasing a rate of charge of the battery, starting battery charging, or stopping battery charging.”</i>	152
F.	CLAIM 17: “THE VEHICLE CHARGER OF CLAIM 15, FURTHER COMPRISING A USER INTERFACE POSITIONED WITHIN THE VEHICLE, WHEREIN THE AT LEAST ONE CONDITION INCLUDES A TIME OF DAY AND WHEREIN THE CONTROLLER RECEIVES THE TIME OF DAY VIA THE USER INTERFACE.”	153
G.	CLAIM 18: “THE VEHICLE CHARGER OF CLAIM 17, WHEREIN THE USER INTERFACE IS DEFINED AT LEAST IN PART BY THE DISPLAY.”	153
XI.	OPINIONS REGARDING GROUND 3: CLAIMS 5, 11, AND 19 ARE OBVIOUS OVER ISHII, HAYASHI, FUJITA, KELTY-078, SUTARDJA, AND KELTY-218.....	154
A.	CLAIM 5: “THE VEHICLE CHARGER OF CLAIM 2, WHEREIN THE FIRST CONTROLLER IS FURTHER CONFIGURED TO SUPPLY POWER TO THE BATTERY OF THE VEHICLE BASED AT LEAST IN PART UPON DATA INDICATIVE OF A COST OF POWER RECEIVED FROM THE SECOND CONTROLLER VIA THE RECEIVER.”	154

1.	<i>Sutardja's Teachings and Motivation to Combine.....</i>	<i>154</i>
2.	<i>Kelty-218's Teachings and Motivation to Combine.....</i>	<i>158</i>
B.	CLAIM 11: "THE METHOD OF CLAIM 10, WHEREIN THE SIGNAL INCLUDES DATA INDICATIVE OF A COST OF POWER."	159
C.	CLAIM 19: "THE VEHICLE CHARGER OF CLAIM 15, WHEREIN THE CONTROLLER ONBOARD THE VEHICLE IS FURTHER CONFIGURED TO SUPPLY POWER TO THE BATTERY OF THE VEHICLE BASED AT LEAST IN PART UPON DATA INDICATIVE OF A COST OF POWER RECEIVED FROM THE CONTROLLER REMOTE FROM THE VEHICLE AND THE VEHICLE CHARGER VIA THE RECEIVER."	160
XII.	OPINIONS REGARDING GROUND 4: CLAIMS 6 AND 12 ARE OBVIOUS OVER ISHII, HAYASHI, FUJITA, AND SUYAMA	160
A.	CLAIM 6: "THE VEHICLE CHARGER OF CLAIM 1, WHEREIN THE CONTROLLER IS FURTHER CONFIGURED TO DISPLAY, DURING THE ACTIVE CHARGING SESSION, A LEVEL OF CHARGE OF BATTERY ON THE DISPLAY."	160
B.	CLAIM 12	167
XIII.	OPINIONS REGARDING GROUND 5: CLAIM 16 IS OBVIOUS OVER ISHII, HAYASHI, FUJITA, KELTY-078, AND SUYAMA	167
A.	CLAIM 16: "THE VEHICLE CHARGER OF CLAIM 15, WHEREIN THE CONTROLLER ONBOARD THE VEHICLE IS FURTHER CONFIGURED TO DISPLAY A LEVEL OF CHARGE OF THE BATTERY ON THE DISPLAY DURING THE ACTIVE CHARGING SESSION."	167
XIV.	OPINIONS REGARDING GROUND 6: CLAIM 20 IS OBVIOUS OVER ISHII, HAYASHI, KELTY-078, AND IZUNO.....	167
A.	CLAIM 20: "THE VEHICLE CHARGER OF CLAIM 15, FURTHER COMPRISING A USER INTERFACE FOR RECEIVING AN INPUT FROM A USER, WHEREIN THE CONTROLLER IS CONFIGURED TO RECEIVE THE INPUT AND STOP CHARGING OF THE BATTERY DURING THE ACTIVE CHARGING SESSION RESPONSIVE TO THE INPUT."	167

XV. CONCLUSION.....172

CLAIM LISTING

Claim Designation	Claim Language
Claim 1[Pre]	1. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:
Claim 1[a]	a display mounted within the vehicle; and
Claim 1[b]	a controller onboard the vehicle and coupled to the display, the controller configured to
Claim 1[c][1]	begin an active charging session of the battery based on a programmed manner of charge and at least one condition,
Claim 1[c][2]	the programmed manner of charge starting charging of the battery in response to the at least one condition being met,
Claim 1[d]	calculate an amount of time required to charge the battery,
Claim 1[e]	display, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display, and
Claim 1[f]	repeatedly update the amount of time upon the display during the active charging session, including during the active charging session but before starting charging of the battery according to the at least one condition.
Claim 2	2. The vehicle charger of claim 1, wherein the controller is a first controller, the vehicle charger further comprising a receiver coupled to the first controller, the receiver configured to establish communication between the first controller and a second controller remote from the vehicle and the vehicle charger.
Claim 3	3. The vehicle charger of claim 2, wherein the first controller is further configured to control power supply to the battery of the vehicle responsive at least in part to data received from the second controller via the receiver.
Claim 4	4. The vehicle charger of claim 2, wherein the first controller is further configured to receive the at least one condition from the second controller via the receiver.
Claim 5	5. The vehicle charger of claim 2, wherein the first controller is further configured to supply power to the battery of the vehicle based at least in part upon data indicative of a cost of power received from the second controller via the receiver.

Claim Designation	Claim Language
Claim 6	6. The vehicle charger of claim 1, wherein the controller is further configured to display, during the active charging session, a level of charge of the battery on the display.
Claim 7	7. The vehicle charger of claim 1, further comprising a user interface positioned within the vehicle, wherein the at least one condition includes a time of day and wherein the controller receives the time of day via the user interface.
Claim 8	8. The vehicle charger of claim 7, wherein the user interface is defined at least in part by the display.
Claim 9[Pre]	9. A method of charging a battery of a vehicle with a vehicle charger, the method comprising:
Claim 9[a]	beginning an active charging session of the battery based on a programmed manner of charge and at least one condition, the programmed manner of charge starting charging of the battery in response to the at least one condition being met;
Claim 9[b]	calculating, via a controller of the vehicle, an amount of time required to charge the battery;
Claim 9[c]	displaying, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon a display mounted within the vehicle;
Claim 9[d]	supplying, under control of the controller of the vehicle, power to the battery of the vehicle to charge the battery; and
Claim 9[e]	updating the amount of time upon the display during the active charging session, repeatedly update the amount of time upon the display during the active charging session, including during the active charging session but before starting charging of the battery according to the at least one condition.
Claim 10[a]	10. The method of claim 9, further comprising: establishing wireless communication between the controller of the vehicle and another controller remote from the vehicle and the vehicle charger; and
Claim 10[b]	starting or stopping supply of power to the battery based at least in part upon a signal received by the controller of the vehicle from the controller remote from the vehicle and the vehicle charger.

Claim Designation	Claim Language
Claim 11	11. The method of claim 10, wherein the signal includes data indicative of a cost of power.
Claim 12	12. The method of claim 9, further comprising displaying on the display a level of charge of the battery.
Claim 13	13. The method of claim 9, wherein the at least one condition includes a time of day and further comprising receiving, via a user interface of the vehicle charger, the time of day.
Claim 14	14. The method of claim 13, wherein the user interface is defined at least in part by the display.
Claim 15[Pre]	15. A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:
Claim 15[a]	a display mounted within the vehicle;
Claim 15[b]	a controller onboard the vehicle and coupled to the display, the controller configured to
Claim 15[c]	begin an active charging session of the battery based on a programmed manner of charge and at least one condition, the programmed manner of charge starting charging of the battery in response to the at least one condition being met,
Claim 15[d]	calculate an amount of time required to charge the battery, and
Claim 15[e]	display, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display; and
Claim 15[f]	a receiver electrically coupled to the controller;
Claim 15[g]	wherein the controller onboard the vehicle is further configured to repeatedly update the amount of time upon the display during the active charging session, and
Claim 15[h]	wherein the controller onboard the vehicle is further configured to, responsive to data received from another controller remote from the vehicle and the vehicle charger via the receiver, to change a charging state of the vehicle charger by at least one of a group consisting of increasing a rate of charge of the battery, decreasing a rate of charge of the battery, starting battery charging, or stopping battery charging.
Claim 16	16. The vehicle charger of claim 15, wherein the controller onboard the vehicle is further configured to display a level of charge of the battery on the display during the active charging session.

Claim Designation	Claim Language
Claim 17	17. The vehicle charger of claim 15, further comprising a user interface positioned within the vehicle, wherein the at least one condition includes a time of day and wherein the controller receives the time of day via the user interface.
Claim 18	18. The vehicle charger of claim 17, wherein the user interface is defined at least in part by the display.
Claim 19	19. The vehicle charger of claim 15, wherein the controller onboard the vehicle is further configured to supply power to the battery of the vehicle based at least in part upon data indicative of a cost of power received from the controller remote from the vehicle and the vehicle charger via the receiver.
Claim 20	20. The vehicle charger of claim 15, further comprising a user interface for receiving an input from a user, wherein the controller is configured to receive the input and stop charging of the battery during the active charging session responsive to the input.

I, Scott Andrews, declare as follows:

I. INTRODUCTION

1. I have been retained by counsel for Petitioner as a technical expert in the above-captioned case. Specifically, I have been asked to render certain opinions regarding the IPR petition with respect to U.S. Patent No. 11,909,010 (“the ’010 Patent”). I understand that the Challenged Claims are 1-20, and my opinions are limited to those claims. A true and correct copy of my Curriculum Vitae, which provides further details about my background and experience, is appended to this Declaration.

A. Educational Background and Professional Experience

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

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

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

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

information systems, vehicle user interfaces, and other emerging transportation products.

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

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

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

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

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

10. In the various positions mentioned above, I was responsible for research and development projects relating to numerous mobile and vehicle information systems, hybrid vehicles systems, vehicle networks, user interface systems, sensory systems, communications systems, control systems and safety systems, and had the opportunity to collaborate with numerous researchers and suppliers that are involved in the field of automotive control systems. I therefore believe that I have a detailed understanding of the state of the art during the relevant period, as well as a sound basis for opining how persons of skill in the art at that time would understand the technical issues in this case.

II. MATERIALS CONSIDERED

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

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

Exhibit	Description
1001	U.S. Patent No. 11,909,010 (the “’010 Patent”)
1002	File History of the ’010 Patent (the “’010 File History”)
1004	EP 1220350B1 to Ishii. (“Ishii”).
1005	Japanese Application Publication 2003-333706 to Hayashi et al. (“Hayashi”).
1006	U.S. Patent No. 5,283,513 to Fujita et al. (“Fujita”).
1007	U.S. Patent No. 7,698,078 to Kelty et al. (“Kelty-078”).
1008	U.S. Patent Application Publication No. 2008/0136371 to Sutardja. (“Sutardja”).
1009	U.S. Patent No. 5,596,261 to Suyama. (“Suyama”).
1010	U.S. Patent Application Publication No. 2009/0021218 to Kelty et al. (“Kelty-218”).
1011	Japanese Application Publication 2006-74868 to Izuno et al. (“Izuno”)
1012	<i>Specification of the Bluetooth System Master Table of Contents & Compliance Requirements: Covered Core Package version: 2.0 + EDR</i> . 4 November 2004. (“Bluetooth”).
1013	Intentionally Left Blank
1014	Intentionally Left Blank
1015	U.S. Patent No. 8,370,020 to Bauman et al. (“Bauman”)
1016	U.S. Patent No. 8,433,243 to Sharma (“Sharma”)
1017	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”)
1018	Chan, <i>The State of the Art of Electric and Hybrid Vehicles</i> , February 2002, Vol. 90, No. 2, IEEE (“Chan”)

1019	<i>Electric Vehicle Battery Systems</i> , Sandeep Dhameja, Newnes, 2002 (“Sandeep”)
1020	U.S. Patent No. 5,573,090 to Ross (“Ross”).
1021	U.S. Patent No. 5,487,002 to Diller et al. (“Diller”)
1022	Nadal, M. and Barbir, F. <i>Development of a Hybrid Fuel Cell/Battery Powered Electric Vehicle</i> . International Association for Hydrogen Energy.1996. (“Nadal”).
1023	U.S. Patent No. 7,084,859 to Pryor (“Pryor”)
1024	PCT Application Pub. No. WO 2006/124130 to Hanssen et al. (“Hanssen”)
1025	U.S. Patent No. 5,701,122 to Canedy. (“Canedy”).
1026	U.S. Patent No. 6,181,996 to Chou et al. (“Chou”)
1027	U.S. Patent No. 5,623,194 to Boll et al. (“Boll”)
1028	U.S. Patent No. 5,757,595 to Ozawa et al. (“Ozawa”)
1029	U.S. Patent Application Publication to Witkowski et al. (“Witkowski”)
1030	U.S. Patent No. 7,596,391 to Himmelstein. (“Himmelstein”)
1031	The Massachusetts Division of Energy Resources. <i>Installation Guide for Electric Vehicle Charging Equipment: An Introduction to EVCE</i> . September 2000. (“Massachusetts 2000”).
1032	U.S. Patent No. 5,467,006 to Sims (“Sims”).
1033	U.S. Patent No. 7,693,609 to Kressner et al. (“Kressner”)
1034	U.S. Patent No. 8,531,162 to Hafner et al. (“Hafner”)
1035	U.S. Patent No. 6,281,663 to Yagi et al. (“Yagi”)
1036	U.S. Patent No. 6,577,928 to Obradovich (“Obradovich”)
1037	PalmTreo700p User Guide. 2006. (“PalmTreo700”)
1038	U.S. Patent No. 6,225,944 to Hayes. (“Hayes”).
1039	U.S. Patent Application Publication to Aikawa et al. (“Aikawa”).
1040	U.S. Patent Application Publication 2004/0072584 to Kern. (“Kern”)
1041	U.S. Patent No. 5,548,200 to Nor (“Nor”)
1042	U.S. Patent No. 6,832,171 to Barsoukov et al. (“Barsoukov”)
1043	U.S. Patent No. 8,063,757 to Frey et al. (“Frey”)
1044	U.S. Patent Publication No. 2003/0230443 to Cramer et al. (“Cramer”)
1045	U.S. Patent No. 5,406,188 to Myslinski et al. (“Myslinski”)
1046	U.S. Patent No. 5,963,140 to Kawaguchi et al. (“Kawaguchi”)
1047	U.S. Patent Application No. 61/134646 to Ambroziak (“Ambroziak”)

13. I have considered these materials from the viewpoint of a POSITA as of the priority date of the '010 Patent. For the purposes of this declaration, the priority date of the '010 Patent is August 18, 2008, as I discuss below. *See* Section IV below. I note that my opinions provided in this Declaration are made from the perspective of a POSITA as of this priority date of the '010 Patent unless expressly stated otherwise. To the extent that I use any verb tense in this Declaration that is present tense (e.g., “a POSITA would understand” instead of “a POSITA would have understood”), such verb tense should be understood to be my opinion as of the '010 Patent’s priority date (again, unless expressly stated otherwise). I merely use the present verb tense for ease of reading.

III. OVERVIEW AND LEGAL STANDARDS

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

considered as a ground for considering the patentability of a claim in these proceedings.

A. Person of Ordinary Skill in the Art

15. I understand that the '010 Patent, the record of the proceedings at the Patent Office (which I understand is called the “File History” or “Prosecution History”), and the teachings of the prior art are evaluated from the perspective of a person of ordinary skill in the art (“POSITA”). I understand that the factors considered in determining the ordinary level of skill in the art may include: (i) the levels of education of the inventor; (ii) the types of problems encountered in the art; (iii) prior art solutions to those problems; (iv) the rapidity with which innovations are made; (v) the sophistication of the technology; and (vi) the educational level of persons working in the field.

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

B. Obviousness

17. I understand that a claim may be invalid under 35 U.S.C. § 103(a) if the subject matter described by the claim as a whole would have been “obvious” to a POSITA in view of a single or combination of prior art references at the time the claimed invention was made. I further understand that a POSITA is assumed to know and to have all relevant prior art in the field of endeavor covered by the patent-in-suit and all analogous prior art. I understand that obviousness in an IPR review proceeding is evaluated using a preponderance of the evidence standard, which means that the claims must be more likely obvious than nonobvious.

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

19. In considering whether certain prior art renders a particular patent claim obvious, I have been informed that I can consider the scope and content of the prior art, including the fact that a POSITA would regularly look to the disclosures in

patents, trade publications, journal articles, conference papers, industry standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard setting organizations, and materials from industry conferences, as examples.

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

21. I have been informed that to establish that a claimed invention was obvious based on a combination of prior art elements, an articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I

have been informed that the prior art, either as a single reference or a combination of multiple items of prior art, renders a patent claim obvious when there was an apparent reason for a POSITA, at the time of the invention, to combine or modify the prior art. Rationales for combining or modifying the prior art include, but are not limited to, any of the following: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) identifying an explicit teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine the prior art references to arrive at the claimed invention.

22. I have also been informed that where there is a motivation to combine, claims may be rejected as obvious provided a POSITA would have had a reasonable expectation of success regarding the proposed combination. I have also been informed that common sense may be considered. Common sense teaches that

familiar items may have obvious uses beyond their primary purposes. I have been informed that if the combination was obvious to try (regardless of whether it was actually tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than non-obvious innovation.

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

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

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

25. I am informed that even if a case of obviousness is established, the final determination of obviousness must also consider “secondary considerations” if presented. Secondary considerations include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) lack of independent simultaneous invention within a comparatively short space of time; and (h) teaching away from the invention in the prior art.

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

C. Claim Construction

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

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

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

IV. LEVEL OF A PERSON OF ORDINARY SKILL

29. Based on my review and analysis of the '010 Patent, the cited prior art, and the ordinary skill factors described in this section, a POSITA at the time of the '010 Patent would have been knowledgeable regarding the field of automotive systems, including electric vehicle battery charging systems. In my experience working in this field, most workers of ordinary skill in the art as of the earliest possible priority date of August 18, 2008, would have had at least a bachelor's degree in electrical or mechanical engineering (or an equivalent field) and at least two years of work experience involving automotive systems, including electric vehicle battery charging systems. Additional industry experience or technical

training may offset less formal education, while advanced degrees or additional formal education may offset lesser levels of industry experience. When I refer to the understanding of a POSITA, I am referring to the understanding of such a person as of August 18, 2008.

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

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

V. OVERVIEW OF THE '010 PATENT

A. Summary

32. The '010 Patent is directed to a vehicle battery charging system that includes a "controller enabling a user to enter a time of day at which the vehicle

battery charger or system begins and/or ends charging of the vehicle battery.”

EX1001, Abstract, 2:9-22. The vehicle includes a display that provides information such as the “amount of time estimated to completely charge the battery [.]” EX1001, 13:14-19. This display, or “charge time remaining indicator 66,” can be updated periodically by the controller throughout the charging session. EX1001, 13:60-14:3.

1. Field of Endeavor

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

34. The ’010 Patent relates to electric vehicle battery charging systems. EX1001, Abstract, 33:25-48. The ’010 Patent is directed to calculating, displaying, and updating an amount of time to charge a battery. EX1001, 13:29-39, 3:22-24, 13:65-14:3..

35. For these reasons, a POSITA would understand that the field of endeavor of the ’010 Patent includes electric vehicle battery charging systems, such as electric vehicle (EV) charging, and EV control interfaces.

2. Problem Solved by the Inventor

36. I have been informed that a prior art reference is “reasonably pertinent” if a POSITA would have consulted it and applied its teachings when faced with the

problems that the inventor was trying to solve. As such, I have been asked to analyze the '010 Patent and determine the problems that the inventors were trying to solve.

37. The '010 Patent describes programming a vehicle charging session. EX1001, 16:21-42, 17:12-16, 20:48-65, 23:63-24:5, 40:11-22, FIG. 14. For example, the '010 Patent describes programming a charger to begin charging at a time of day specified by the user. EX1001, 17:12-16.

38. The '010 Patent describes calculating the amount of time required to charge the battery. EX1001, 13:29-39, 13:64-14:3, 41:18-28; EX1004-Ishii, [0051]-[0052]. In particular, the charge time can be calculated by the controller “in any number of manners well known to those in the art [.]” EX1001, 13:29-39.

39. The '010 Patent describes displaying the amount of time required to charge the battery. EX1001, 3:22-24, 40:6-22, FIG. 25. In particular, the '010 Patent describes displaying the amount of time remaining to complete charging of the battery. EX1001, 3:22-24.

40. The '010 Patent describes establishing wireless communication with a controller remote from the vehicle. EX1001, Abstract, 1:64-2:8, 2:66-3:2, 9:13-19. In particular, the '010 Patent describes the vehicle controller is enabled to communicate with another controller which “can be one or more processors of a personal computer, phone, PDA, or other processor-based device associated with a user of the vehicle charging cord[.]” EX1001, 9:13-19.

41. The '010 Patent describes using a controller/processor in a vehicle to perform processing operations. EX1001, 2:9-65, 8:64-9:19, FIG. 15. For example, the '010 Patent describes the vehicle charger including “a controller 44... at least partially controlling operations of the vehicle charging cord 22.” EX1001, 8:64-67.

42. The '010 Patent describes updating the amount of time required to charge the battery. EX1001, 13:65-14:3. “For example, the charge time remaining indicator 66 can be updated by the controller 44 every second or minute based upon battery charge calculations made at the beginning of the charging session or made periodically during the charging session.” EX1001, 13:65-14:3.

B. Prosecution History

43. Patent Owner distinguished the prior art in a Final Office Action (primarily U.S. Patent No. 8,193,766 to Rondoni) as not “display[ing], *during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display.*” EX1002 (Prosecution History), 497-499. Patent Owner provided extensive discussion distinguishing Rondoni, stating “the initial estimated time in Rondoni is either displayed while charging is happening or prior to the commencement of a recharging session.” EX1002, 499. Patent Owner additionally argued the amended claims required “that the updates to the displayed time are provided during the active charging session – including during a **delay time** within the session during which charging hasn't

started yet (e.g., the condition associated with the charger session hasn't yet been satisfied).” *Id.* A Notice of Allowance was filed following this response. EX1002, 567-574.

VI. OVERVIEW OF THE TECHNOLOGY

44. I was asked to briefly summarize the background of the prior art from the standpoint of a person having ordinary skill in the art prior to August 18, 2008. As explained below, the charging of electric-powered vehicles described in the '010 Patent was based on well-known intelligent charging systems and technologies used for vehicles with electric drive systems. All the functionalities encompassed by the Challenged Claims were thus well-known and conventional prior to the invention of the '010 Patent.

A. Electric Vehicles

45. Electric vehicles (EV) “use an electric motor to provide all or part of the mechanical drive power.” EX1017-Kempton, 2, Section 3. “EVs may include battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), and fuel-cell electric vehicles (FCEVs).” EX1018-Chan, 1, Section I. The “EV was invented in 1834” and “[b]y the mid-1970s, oil shortages led to aggressive development of EV programs[,]” with EVs being leased and sold in the USA starting in 1996. EX1018-Chan, 2, Section III.A; EX1019-Sandeep, 4; *see also*, EX1018-Chan, 19 at Table 2.

Thus, electric vehicles, such as hybrid vehicles and fully electric vehicles, were readily available and well-known prior to the '010 Patent.

B. Electric Vehicle Hardware

1. Chargers

46. Electric vehicles were known to require some form of charging to maintain the electric power source. EX1020-Ross, 2:10-15. For this reason, electric vehicles included chargers for charging the batteries on the vehicles. *See, e.g.*, EX1021-Diller, 3:30-31, 4:15-19 (generally describing the energy management system (EMS) on-board the vehicle that contains a “micro-controller” controlling the “charger 60 for the battery in the vehicle”); EX1020-Ross, 7:57-67 (describing an electric vehicle that includes an “onboard power receiving module 20” that “receives electrical power”).

47. Thus, chargers were well-known to be part of electric vehicle hardware prior to the '010 Patent.

2. Controllers

48. Managing EV charging within the vehicle itself was known, as EVs were known to include controllers for controlling charging of the vehicle. For example, EV systems had a controller on-board the vehicle for controlling charging of the batteries among other vehicle functions; for instance, Diller’s EV includes a micro-controller 12 as a calculation engine and means for controlling the various systems of the electric vehicle.” EX1021-Diller, 3:29-33. Ross also describes the EV

including a “microprocessor controller 56, which is realized using a conventional processor-based system” as part of an on-board “power control unit 32.” EX1020-Ross, 8:14-20 (describing the power control unit 32 on-board the vehicle directing charge to the “energy storage system”), 11:37-51, 16:47-50. The microprocessor controller 56 controls charging by “directing the power to and from the energy storage system,” among other vehicle functions (e.g., “monitoring onboard vehicle sensors 60” and “receiving appropriate commands from the operator control devices 38”). *Id.*, 11:58-67 (describing many “tasks” carried out by the microprocessor “are the same as carried out with the operation of any EV”).

49. Thus, the use of controllers in electric vehicles to monitor and control the charging process was well-known prior to the '010 Patent.

3. *Displays*

50. Electric vehicles also commonly included in-vehicle displays for displaying charging information. *See, e.g.*, EX1019-Sandeep, 144-145, EX1022-Nadal, 5-6. An on-board vehicle display was known to be beneficial “for displaying information for the driver[,]” as vehicle displays “improve[d] occupant safety, environmental friendliness, ergonomics, and compatibility to modify, add, or upgrade vehicle features.” EX1044-Cramer, [0307]. For example, vehicles were known to have “a basic vehicle dashboard” comprising “tactile displays/and or touch screens 10-14” which “can be used for the basic control functions of the vehicle.”

EX1023-Pryor, 2:38, 13:19-21. These displays were known to be connected to controllers via, e.g., communication buses. *See, e.g.*, EX1024-Hanssen, 12:5-7, 5:7-13 (generally describing the display of an electric vehicle may “receive[] information from the advanced battery” and “includes means for communication with the vehicle’s communication bus[.]”); EX1025-Canedy, 4:6-12 (“the microprocessor 100 controls a display 110 having a seven segment display array 115, via control bus 111”). Electronic control units typically interface with visual displays and sensors via a communication bus such as a SAE J1850 bus or a CAN-bus. EX1026-Chou, 3:1-13 (“a vehicle 100 having at least one sensor (e.g. sensor circuit) and more preferably a plurality of sensors located at different positions in the vehicle [], an electronic control unit (ECU) 140 [] for controlling sensor circuits, a vehicle communication bus 105 for carrying data and control signals to the ECU 140, an ECU 160 interfaced with the bus 105, and at least one interface device...including, for example, any one or more of a visual display 170”), 3:58-63 (“the car bus, such as a Society of Automotive Engineers (SAE) J1850 communication bus, or a Controller Area Network (CAN)”).

51. Thus, in-vehicle displays were well-known to be included in vehicles and were commonly connected to controllers in the vehicle, prior to the '010 Patent.

C. Vehicle Time to Charge

1. Displaying Time to Charge

52. It was well-known that displays of electric vehicles commonly displayed the time required to charge the battery. EX1027-Boll, 3:36-41, 2:57-62. For example, it was known that the time required to charge a vehicle would be displayed and provided to the user of the vehicle. *See e.g.*, EX1027-Boll, 3:36-41 (“...the computing unit 5 determines the required remaining charging time t_R to complete the charging operation, and emits a corresponding signal 9 to the display unit 7 **so that the remaining charging time t_R is displayed.**”); EX1011-Izuno, [0013] (“This enables the user to receive information such as the battery charge level, charge status, **time remaining until full charge**, remaining capacity...”), [0014] (“The communication terminal 50 may also be a display device or audio device installed in the vehicle system of the user’s vehicle.”).

53. Further, it was known that the display of the time required to charge the battery was important for monitoring purposes. EX1027-Boll, 2:57-62 (“The important monitoring function is the display of the remaining required charging time t_R ; that is, the time required to bring the battery from its present actual charging condition to a desired final charging condition, under defined charging parameters.”).

54. Thus, displaying the time to charge the vehicle was well-known prior to the ’010 Patent.

2. Updating a Time to Charge

55. The process and function of updating a time to charge the battery of the vehicle was known at the time of the '010 Patent. For example, Ozawa discusses an “apparatus for displaying the state of charge of the battery of an electric vehicle.” EX1028-Ozawa, 2:9-13. In this apparatus, there is a “display mode for displaying a remaining time needed until the battery is fully charged” in which the “remaining time needed until the battery is fully charged as hours or minutes in a digital representation.” EX1028-Ozawa, 3:62-67. During the operation of the battery charging display apparatus, a step is included in which “the management ECU 62 displays the state of charge of the battery 58 on the charging indicator 34 in the detected display mode” (step ST12). EX1028-Ozawa, 5:56-60. If it is detected that the selected display mode is the mode for displaying time needed until the battery is fully charge, then the “digital display unit 38 displays the remaining time needed until the battery is fully charged.” EX1028-Ozawa, 5:67-6:5. “After the step ST12, control returns to the step ST3, and the management EC 62 **repeats** the steps ST3-ST12 until the full charging of the battery 58 is detected in step ST4.” EX1028-Ozawa, 6:7-9.

56. Thus, updating the time required to charge an electric vehicle was well-known prior to the '010 Patent.

D. Remotely Communicating Charging Information with Vehicle

57. At the time of the '010 Patent, it was well known that mobile devices were able to wirelessly communicate with vehicle systems. EX1029-Witkowski, Abstract, [0018], FIG. 1; EX1030-Himmelstein, 1:66-65, Abstract. For example, it was known that systems existed for “transfer of information between a motor vehicle and other electronic systems outside of the vehicle.” EX1029-Witkowski, [0018]; *see also id.*, Abstract (“A system for communicating information includes a transceiver provided within a vehicle that is configured for wireless communication with a cellular phone and with a portable computing device.”); EX1030-Himmelstein, 1:55-65 (discussing that the method disclosed is for “providing communication between a cellular phone and vehicle”).

58. It was further known that this communication with the vehicle via a cellular phone would be desirable for the user of a vehicle. EX1029-Witkowski, [0004] (“In many environments, such as within an automobile, it would be desirable to be able to communicate voice and/or data in wireless fashion between various subsystems of the vehicle, such as overhead display subsystem of the vehicle, a cellular phone, notebook computer, PDA, pager or other personal electronic device which is carried on the person of an individual.”). Additionally, it was also known such users would desire communicating charging information remotely from a phone to a vehicle. *See, e.g.*, EX1047-Ambroziak, 11 (generally describing a user

entering charging information, such as “charging parameters” via an “iPhone®” through Bluetooth).

59. Thus, wirelessly communicating charging information between a remote device and vehicle was well-known prior to the '010 Patent.

E. Charge Cost Consideration

60. Energy utility services and charging stations both provide energy to the vehicle at a certain cost. The cost of electricity fluctuates, being “controlled in real-time by either an integrated electric utility or an Independent System Operator.” EX1017-Kempton, 3, Section 4. Specifically, “during peak daytime hours (8 a.m. - 6 p.m., generally) the rates are considerably higher than regular residential rates” for “recharging an EV.” EX1031-Massachusetts 2000, 20.

61. Thus, for an EV user, it is “desirable to optimize the battery charging of an electric vehicle to take maximum advantage of reduced cost time of day energy rates and to insure *[sic]* the battery is sufficiently charged for the next anticipated use of the vehicle.” EX1032-Sims, 1:36-39. To optimize battery charging, charging systems were known to schedule the charging of electric vehicles. *See, e.g.*, EX1033-Kressner, 7:65-8:6 (describing “[o]ne example of a recharge schedule” where the charging of “vehicles is arranged to maintain a constant electrical demand between 23:30 and 06:00[.]”). Through a charging schedule, “the vehicle is scheduled for a recharging period” and the schedule is based on factors including “the expected

itinerary of the vehicle 152, the state of charge of each of the batteries 154, the recharge electrical consumption data 156, [and] the cost of electrical energy 158[.]”

EX1033-Kressner, 8:66-9:2.

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

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

EX1034-Hafner, [0049].

63. Thus, using the monetary price of power based on a user preference to optimize scheduled charging of EVs (e.g., keep charging cost and demand on the energy network low) was well-known prior to the '010 Patent.

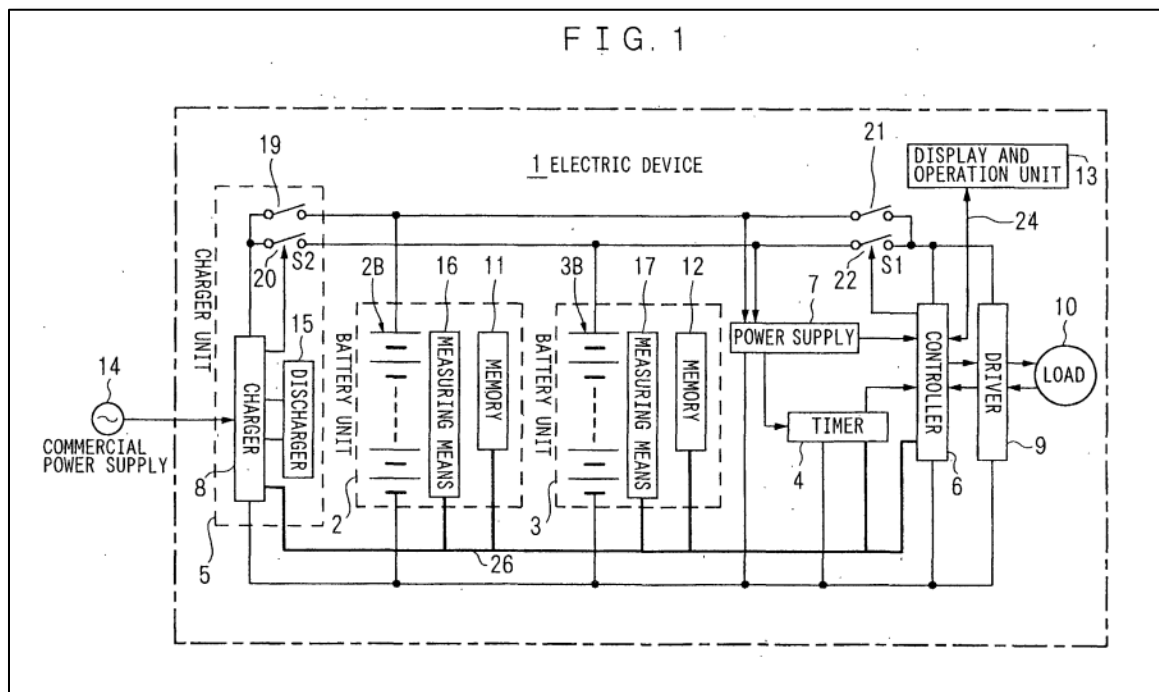
VII. SUMMARY OF THE PRIOR ART REFERENCES

A. Ishii

64. I have been instructed by counsel that Ishii is prior art to the challenged patent.

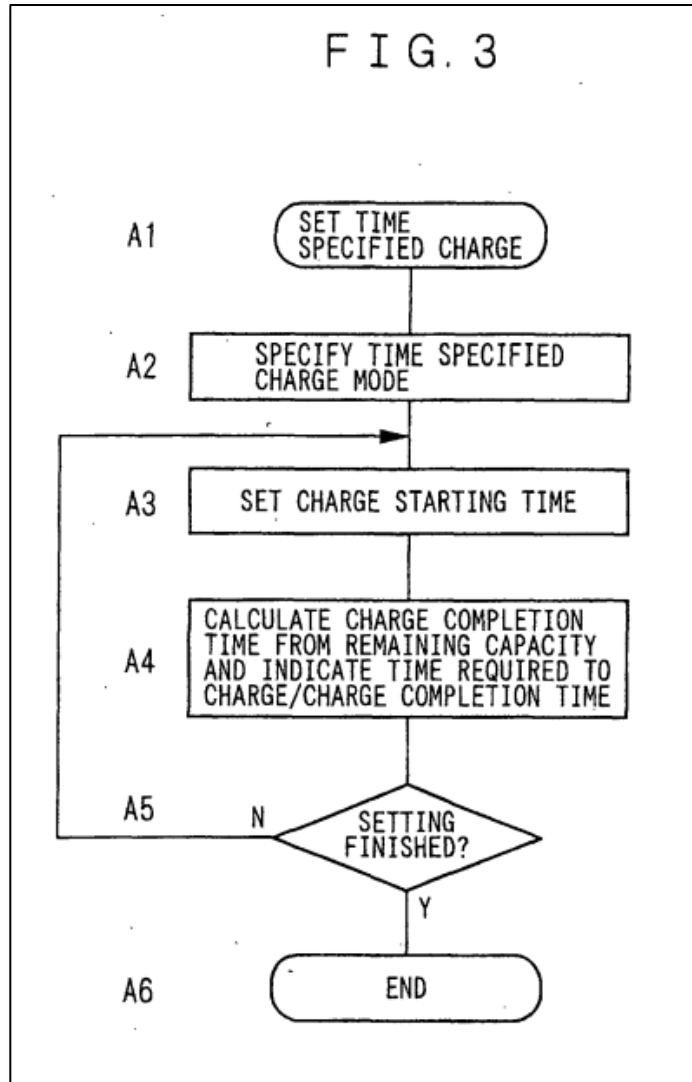
65. Ishii teaches, “an electric device of a compact electric automobile [.]” EX1004-Ishii, [0001]. Ishii’s electric device 1 includes, “battery units 2 and 3..., a

timer 4, a charger unit 5, a controller 6, a power supply, a display and operation unit 13, a driver 9, and a load.” EX1004-Ishii, [0021]. The charger unit 5 of the electric device 1 includes a charger 8. EX1004-Ishii, [0022] (“The charger unit 5 is constituted by a charger 8 including a control function by means of a microcomputer or the like...”). Further, the battery units 2 and 3 include rechargeable secondary batteries 2B and 3B, and the battery units 2 and 3 and the charger unit can be “fixedly provided at an electric device main body (vehicle body)[.]” EX1004-Ishii, [0023], [0032]. All of the components that constitute Ishii’s electric device 1 are illustrated in FIG. 1 below:



EX1004-Ishii, FIG. 1.

66. Ishii further teaches a method of setting a time-specified charge mode and a subsequent method of charging the battery of the vehicle according to the user-selected charge mode. EX1004-Ishii, [0046], [0059], FIGs. 3-4. FIG. 3 illustrates Ishii's method of setting a time-specified charge mode where the charge start time is entered at step A3, and the "charging time (time required to charge)" is calculated (step A4). EX1004-Ishii, [0050]-[0052], FIG. 3. After the charging time is calculated, the display and operation unit 13 indicates "a time required to charge and/or the inputted charge starting time, or a...charge completion time." EX1004-Ishii, [0057], FIG. 3. Then, "the completion of the setting operation is confirmed (pressing down a confirmation key is detected), setting of the time-specified charge is finished." EX1004-Ishii, [0058], FIG. 3.



EX1004-Ishii, FIG. 3.

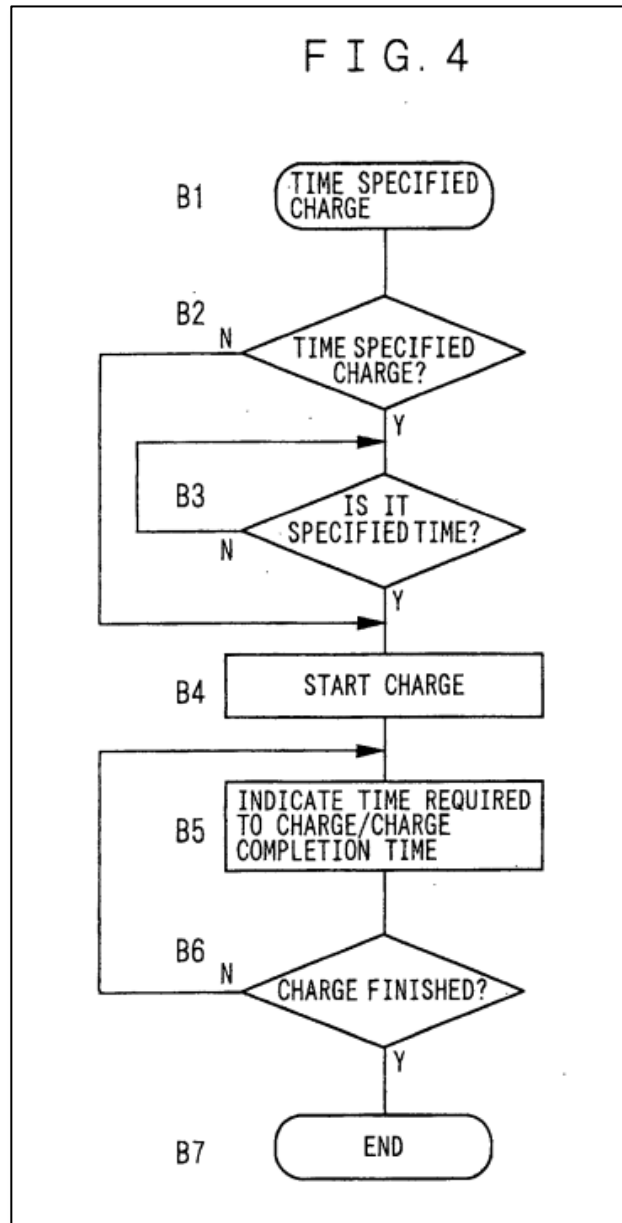
67. Ishii's subsequent method of charging the battery of the vehicle according to the selected charge mode is illustrated by FIG. 4. EX1004-Ishii, [0059], FIG. 4. The method begins when "charger 8 goes into a charge mode." EX1004-Ishii, [0061], FIG. 4. Next, it is checked "[w]hether it is the time-specified charge or not [.]". EX1004-Ishii, [0062]. If it is the time specified charge mode that was selected by the user, "[i]t obtains present time information... compares it with the

specified charge starting time that is stored, and waits until the specified time.”

EX1004-Ishii, [0063]. The charger 8 begins charging the battery of the vehicle

“[w]hen the present time corresponds to the charge starting time[.]” EX1004-Ishii,

[0063]-[0064].



EX1004-Ishii, FIG. 4.

68. Ishii is analogous to the claimed invention of the '010 Patent because Ishii is from a same field of endeavor: electric vehicle battery charging systems. EX1004-Ishii, [0001]-[0002], [0009]-[0019], FIG. 1, with EX1001, Title, Abstract, 1:64-5:2.

69. Ishii is also reasonably pertinent to particular problems with which the inventor of the '010 Patent was involved: (1) programming a vehicle charging session; *compare* EX1004-Ishii, [0046]-[0049], [0059], FIGS. 3-4 *with* EX1001, 16:21-42, 17:12-16, 20:48-65, 40:11-22, FIG. 14; (2) calculating the amount of time required to charge the battery; *compare* EX1004-Ishii, [0051]-[0052] *with* EX1001, 13:29-39, 13:64-14:3, 41:18-28; (3) displaying the amount of time required to charge the battery; *compare* EX1004-Ishii, [0057], [0065], FIG. 3, *with* EX1001, 3:22-24, 40:6-22, FIG. 25; (4) using a controller/processor in a vehicle to perform processing operations; *compare* EX1004-Ishii, [0021], [0024]-[0025], [0047], FIG. 1, *with* EX1001, 2:9-65, 8:64-9:19, FIG. 15; and (5) updating the amount of time required to charge the battery; *compare* EX1004-Ishii, [0065], *with* EX1001, 13:65-14:3.

B. Hayashi

70. I have been instructed by counsel that Hayashi is prior art to the challenged patent.

71. Hayashi teaches “a vehicle battery charging device.” EX1005-Hayashi, Abstract. Specifically, Hayashi teaches a charging process in which a vehicle

charger will “predict the charging completion time” or predict the “time required to charge the battery” (also referred to as the “charging time” and “time from the start of charging to the end of charging of the battery”) after the user sets the charging start date and selects a key (key M) on a display to execute the control process. EX1005-Hayashi, [0098-0099], [0102], [0087], [0030]-[0031], [0170]. Specifically, the user enters the charging start date and time through “start scheduling processing.” EX1005-Hayashi, [0098]-[0099]. This includes, “start scheduling processing that initiates charging at a time that has been intentionally delayed.” EX1005-Hayashi, [0099]. After the user performs the “start scheduling processing,” the charging start date and time are “set.” EX1005-Hayashi, [0098].

72. After the charging start date and time are set, the process eventually continues to determine whether the user instructed “start charging.” EX1005-Hayashi, [0094]. If the user instructed “start charging,” the processing proceeds to a step where the latest charging conditions are retrieved and “the predicted charging completion time TK” is determined. EX1005-Hayashi, [0094], FIG. 5. Hayashi also teaches “the result of the prediction” may be the time required to charge or the completion time (i.e., “the time (date and time) when charging of the battery is expected to be completed”). EX1005-Hayashi, [0031], [0169] (disclosing “the time required to charge the battery 6 is estimated”), [0102] (disclosing calculating the “required time to charge the battery” during predicting the “charge completion

time”). Then, “the predicted charging completion time TK” that was determined “is displayed on the display unit.” EX1005-Hayashi, [0095]. Specifically, “[i]f the system is in standby waiting to start charging,...the start time for charging is displayed along with the completion time for charging.” EX1005-Hayashi, [0095]. Hayashi also teaches that “the predicted charging time (the time required to charge battery 6)” may be displayed. EX1005-Hayashi, [170] (“Also, in the example described above, when charging control is executed, the display unit 24 shows the date and time when charging is to be completed. However, the predicted charging time (the time required to charge the battery 6) may simply be displayed.”).

73. Hayashi is analogous to the claimed invention of the '010 Patent because Hayashi is from a same field of endeavor: electric vehicle battery charging systems. EX1005-Hayashi, [0029], [0031], [0099], [0134], with EX1001, Title, Abstract, 1:64-5:2.

74. Hayashi is also reasonably pertinent to particular problems with which the inventor of the '010 Patent was involved: (1) programming a vehicle charging session; *compare* EX1005-Hayashi, [0029], [0031], [0099], [0134], *with* EX1001, 16:21-42, 17:12-16, 20:48-65, 40:11-22, FIG. 14; (2) calculating the amount of time required to charge the battery; *compare* EX1005-Hayashi, [0094], [0098]-[0099], [0102], [0104], FIGS. 4-5, *with* EX1001, 13:29-39, 13:64-14:3, 41:18-28; (3) displaying the amount of time required to charge the battery; *compare* EX1005-

Hayashi, [0031], [0095]-[0096], [0170], FIG. 9b , *with* EX1001, 3:22-24, 40:6-22, FIG. 25; (4) updating the amount of time required to charge the battery; *compare* EX1005-Hayashi, [0096], [0115]-[0116], FIGS. 4, 7, 12, *with* EX1001, 13:65-14:3.

C. Fujita

75. I have been instructed by counsel that Fujita is prior art to the challenged patent.

76. Fujita teaches “a battery charging device for electric vehicles.” EX1006-Fujita, 1:53-55. Fujita teaches that the user can input a “desired running distance L,” and the electronic control unit (ECU) 16 of the electric vehicle 10 “calculates a required amount C_L of electric energy of the battery to run the desired distance L (step S4)[.]” EX1006-Fujita, 3:58-62, 3:65-4:2. Then, the ECU 16 “calculates a current residual amount C of electric energy of the battery and compares the input amount C_L obtained with the residual amount C.” EX1006-Fujita, 3:65-4:2. If the ECU 16 determines that $C < C_L$, the user must charge the electric vehicle. EX1006-Fujita, 4:5-14. Based on parameters detected during charging, the charging efficiency and charge time t are calculated. EX1006-Fujita, 4:21-24, 4:27-30. Once the charge time is calculated, the “charge time t is displayed on the charge time display 44 of the alarm/ display means 22.” EX1006-Fujita, 4:32-34. Fujita teaches that during charging if the current amount of electric energy of the battery (C_s) is less than the required amount of electric energy of the battery (C_L) (i.e., C_s

< CL), “the operations after step S9 are repeated.” EX1006-Fujita, 4:48-49, FIGS. 4-5.

77. Fujita is analogous to the claimed invention of the '010 Patent because Fujita is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1006-Fujita, Title, Abstract, 1:52-2:42, FIGS. 1, 3, 6, *with* EX1001, Title, Abstract, 1:64-5:2.

78. Fujita is also reasonably pertinent to particular problems with which the inventor of the '010 Patent was involved: (1) calculating the amount of time required to charge the battery; *compare* EX1006-Fujita, 4:27-34, FIG. 5, *with* EX1001, 13:29-39, 13:64-14:3, 41:18-28; (2) displaying the amount of time required to charge the battery; *compare* EX1006-Fujita, 4:27-34, 4:59-64, FIGS. 5-6, *with* EX1001, 3:22-24, 40:6-22, FIG. 25; (3) using a controller/processor in a vehicle to perform processing operations; *compare* EX1006-Fujita, 3:9-13; 3:54-4:49, FIG. 2, *with* EX1001, 2:9-65, 8:64-9:19, FIG. 15; (4) updating the amount of time required to charge the battery; *compare* EX1006-Fujita, 4:39-49, FIGS. 4-5, *with* EX1001, 13:65-14:3.

D. Kelty-078

79. I have been instructed by counsel that Kelty-078 is prior art to the challenged patent.

80. Kelty-078 teaches, “[a] method of communicating with an electric vehicle wherein the method includes a step of installing a communication device in the electric vehicle.” EX1007-Kelty-078, Abstract. Kelty-078 includes a vehicle management system (VMS) 32 that “is the onboard computer that monitors, controls and coordinates various systems in the electric vehicle 12[.]” EX1007-Kelty-078, 7:44-51. Kelty-078 further teaches the inclusion of an electric vehicle communication chip 14 that “may communicate with” VMS 32 and further “allow for the vehicle 12 to contact the user 20 via the user interface device 24 by any known mobile device....” EX1007-Kelty-078, 4:43-58. Additionally, Kelty-078 teaches “user 20 will be capable of communicating...directly with the vehicle 12 via any user interface device 24 (step 305). Contemplated user interface devices 24 may include...mobile devices, such as cellphones.” EX1007-Kelty-078, 4:16-21, FIG. 3. Specifically, communication chip 14 uses “standard protocol[s]” such as Bluetooth, to communicate with VMS 32 and user interface 24. EX1007-Kelty-078, 3:62-65, 4:1-4, 7:44-51, FIGS. 1-2.

81. Kelty-078 is analogous to the claimed invention of the '010 Patent because Kelty-078 is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1007-Kelty-078, Abstract, 1:63-2:14, 2:39-3:4, FIG. 3, *with* EX1001, Title, Abstract, 1:64-5:2.

82. Kelty-078 is also reasonably pertinent to particular problems with which the inventor of the '010 Patent was involved: (1) establishing wireless communication with a controller remote from the vehicle; *compare* EX1007-Kelty-078, 2:25-30, 4:16-21, 4:53-58, 5:2-3, FIGS. 2-3, *with* EX1001, Abstract, 1:64-2:8, 2:66-3:2, 9:13-19; (2) using a controller/processor in a vehicle to perform processing operations. *Compare* EX1007-Kelty-078, 7:44-8:6, FIG. 2, *with* EX1001, 2:9-65, 8:64-9:19, FIG. 15.

E. Sutardja

83. I have been instructed by counsel that Sutardja is prior art to the challenged patent.

84. Sutardja is directed to “systems and methods for charging batteries in vehicles.” EX1008-Sutardja, [0002]. Sutardja teaches a user interface module 108 that communicates with control module 112 of a charge management module 104-1 of vehicle 12. EX1008-Sutardja, [0234], [0241], [0243], [0247], FIGs. 3A-3B. Specifically, a user can use a user interface module 108 to “set charging parameters for charging the battery 14.” EX1008-Sutardja, [0243]. These charging parameters can include “costs the users may pay if batteries are charged at higher than normal priority, etc.” EX1008-Sutardja, [0235]. When the charging parameters are input and communicated to the control module 112, the batteries are supplied power

“according to the charging parameters generated by the users.” EX1008-Sutardja, [0233].

85. Sutardja is analogous to the claimed invention of the '010 Patent because Sutardja is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1008-Sutardja, Abstract, [0008]-[0207], *with* EX1001, Title, Abstract, 1:64-5:2.

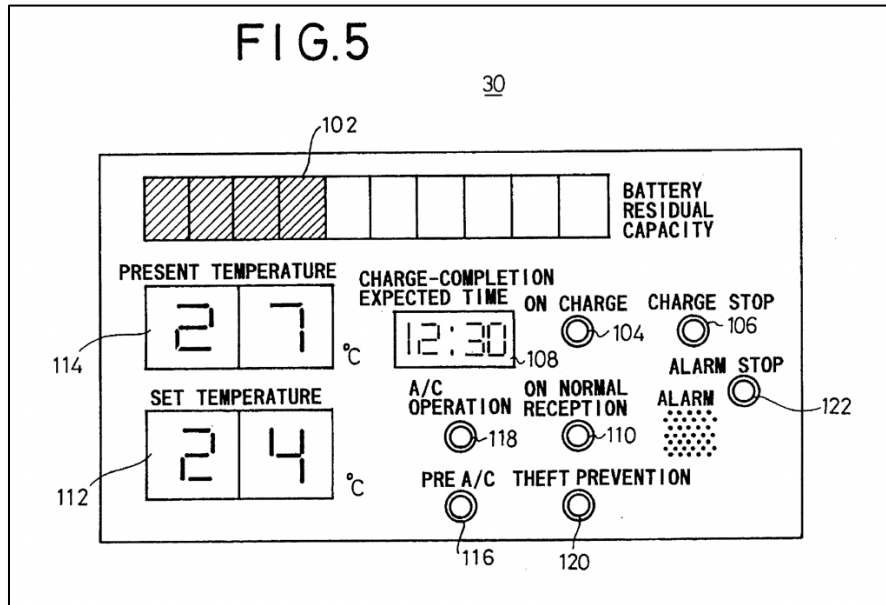
86. Sutardja is also reasonably pertinent to particular problems with which the inventor of the '010 Patent was involved: (1) establishing wireless communication with a controller remote from the vehicle; *compare* EX1008-Sutardja, [0234], [0245]-[0247], FIGS. 3A-3B, *with* EX1001, Abstract, 1:64-2:8, 2:66-3:2, 9:13-19; (2) using a controller/processor in a vehicle to perform processing operations. *Compare* EX1008-Sutardja, [0241]-[0244], FIG. 4A, *with* EX1001, 2:9-65, 8:64-9:19, FIG. 15.

F. Suyama

87. I have been instructed by counsel that Suyama is prior art to the challenged patent.

88. Suyama teaches a “charge-status display system 10” for an “electric automobile or vehicle 12” and a “portable display card 14 for displaying the state of charging of the electric vehicle 12.” EX1009-Suyama, 5:48-50. The display card 14 includes a “display circuit 30” which includes a “battery residual-capacity indicator

102.” EX1009-Suyama, 5:66 – 6:2, 7:43-45, FIG. 5. The “battery residual-capacity indicator” is for “indicating the remaining capacity of the main battery,” as illustrated in FIG.5 below:



EX1009-Suyama, FIG. 5, 7:43-45.

89. Suyama is analogous to the claimed invention of the '010 Patent because Suyama is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1009-Suyama, Title, Abstract, 1:50-45; 2:5-14, 5:29-5:65, 6:25-59, FIGS. 1-2, *with* EX1001, Title, Abstract, 1:64-5:2.

90. Suyama is also reasonably pertinent to particular problems with which the inventor of the '010 Patent was involved: (1) calculating the amount of time required to charge the battery; *compare* EX1009-Suyama, 9:6-19, *with* EX1001, 13:29-39, 13:64-14:3, 41:18-28; (2) displaying the amount of time required to charge

the battery; *compare* EX1009-Suyama, 7:43-51, 9:6-19, FIGS. 4-5, *with* EX1001, 3:22-24, 40:6-22, FIG. 25; (3) using a controller/processor in a vehicle to perform processing operations. *Compare* EX1009-Suyama, 6:18-7:42, 8:4-19, 14:34-15:17, FIGS. 1-2, *with* EX1001, 2:9-65, 8:64-9:19, FIG. 15.

G. Kelty-218

91. I have been instructed by counsel that Kelty-218 is prior art to the challenged patent.

92. Kelty-218 teaches “an electrical vehicle charging system 202.” EX1010-Kelty218, [0022]. The system can include a battery 206 coupled to an electric vehicle 204, a charging circuit 208, and a charging cost circuit 21. EX1010-Kelty-218, [0022]-[0024], FIG. 2. Specifically, Kelty-218 teaches the “charging cost circuit 212” is included to “estimated a charging cost rate.” EX1010-Kelty-218, [0024]. 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).” EX1010-Kelty-218, [0024].

93. Kelty-218 is analogous to the claimed invention of the '010 Patent because Kelty-218 is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1010-Kelty-218, Abstract, [0013]-[0014], [0023]-[0032], FIG. 2, *with* EX1001, Title, Abstract, 1:64-5:2.

94. Kelty-218 is also reasonably pertinent to particular problems with which the inventor of the '010 Patent was involved: (1) programming a vehicle charging session; *compare* EX1010-Kelty-218, [0034], [0037], *with* EX1001, 16:21-42, 17:12-16, 20:48-65, 40:11-22, FIG. 14; (2) using a controller/processor in a vehicle to perform processing operations; *compare* EX1010-Kelty-218, [0035], *with* EX1001, 2:9-65, 8:64-9:19, FIG. 15.

H. Izuno

95. I have been instructed by counsel that Izuno is prior art to the challenged patent.

96. Izuno teaches a “battery charging system” for a vehicle that is “composed of a vehicle system 10 installed in the user’s electric vehicle.” EX1011-Izuno, [0012]. The battery charging system also includes a “communication terminal 50” that is either remote from the user or “a display device or audio device installed in the vehicle system 10 of the user’s vehicle.” EX1011-Izuno, [0013]-[0014]. The vehicle system 10 of the battery charging system also includes an “electronic control unit (ECU) 11” as well as a charger for “charg[ing] the battery 12.” EX1011-Izuno, [0015]-[0016]. During charging of the battery, the ECU 11 “communicates with” a “service system server 100,” which schedules charging based on “information received from the vehicle system 10 (the ECU 11)” and “controls charging of the

battery by transmitting charging start/end signals to the charging station 60 in response to instructions from the user.” EX1011-Izuno, [0018].

97. For example, Izuno teaches the vehicle system 10 performing the steps of FIG. 3 as part of the processing for “controlling charging of the battery 12,” which includes a step S8 where the system checks what charging mode the user has selected via “their own communication terminal 50 or an input device in the vehicle system 10” (i.e., the communication terminal 50 that is the display and audio device in the vehicle). EX1011-Izuno, [0027]. If the user selects the automatic charging mode and then after selects “stop charging” via the input device, the vehicle system 10 controlled via ECU 11 “transmits a charging stop” signal to server 100. EX1011-Izuno, [0027]-[0028]. When the user chooses automatic charging mode, the vehicle system 10 (ECU 11) sends a “charging mode selection signal indicating automatic charging” to server 100, which then charges the vehicle. EX1011-Izuno, [0027], [0034]. When the server 100 receives a “charging stop signal” from the vehicle system 10, the charging is stopped and “the post-charging driving range and remaining battery capacity” is estimated. EX1011-Izuno, [0035].

98. Izuno is analogous to the claimed invention of the '010 Patent because Izuno is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1011-Izuno, [0012], [0015], *with* EX1001, Title, Abstract, 1:64-5:2.

99. Izuno is also reasonably pertinent to particular problems with which the inventor of the '010 Patent was involved: (1) programming a vehicle charging session; *compare* EX1011-Izuno, [0018], [0023], [0027]-[0028], *with* EX1001, 16:21-42, 17:12-16, 20:48-65, 40:11-22, FIG. 14; (2) using a controller/processor in a vehicle to perform processing operations; *compare* EX1011-Izuno, [0016]-[0018], *with* EX1001, 2:9-65, 8:64-9:19, FIG. 15.

VIII. GROUNDS OF UNPATENTABILITY

Proposed Grounds of Unpatentability (All Under § 103, Obviousness)		
Ground	Claims	Exhibits-References
1	1, 7-9, 13-14	EX1004-Ishii EX1005-Hayashi EX1006-Fujita
2	2-4, 10, 15, 17-18, 20	EX1004-Ishii EX1005-Hayashi EX1006-Fujita EX1007-Kelty-078
3	5, 11, 19	EX1004-Ishii EX1005-Hayashi EX1006-Fujita EX1007-Kelty-078

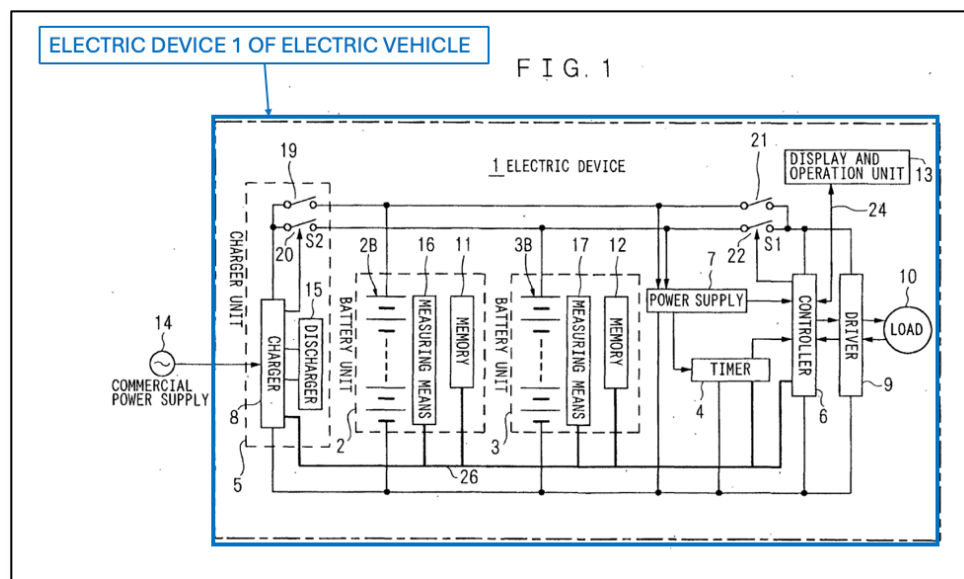
		EX1008-Sutardja EX1010-Kelty-218
4	6, 12	EX1004-Ishii EX1005-Hayashi EX1006-Fujita EX1009-Suyama
5	16	EX1004-Ishii EX1005-Hayashi EX1006-Fujita EX1007-Kelty-078 EX1009-Suyama
6	20	EX1004-Ishii EX1005-Hayashi EX1006-Fujita EX1007-Kelty-078 EX1011-Izuno

IX. OPINIONS REGARDING GROUND 1: CLAIMS 1, 7-9, 13 AND 14 ARE OBVIOUS OVER ISHII, HAYASHI, AND FUJITA

A. Claim 1

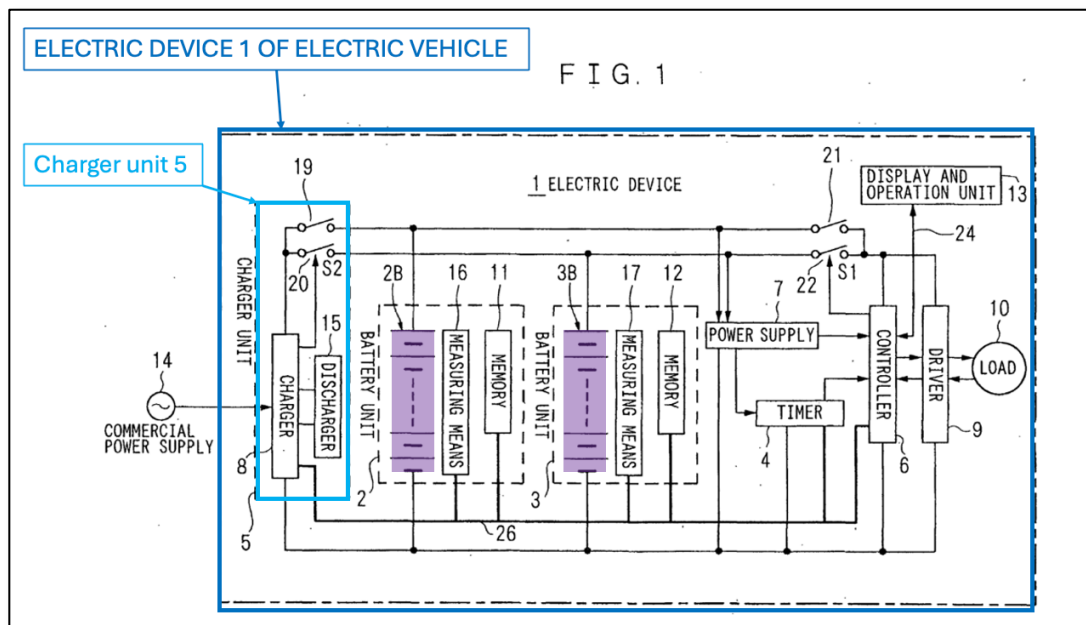
1. Claim 1[Pre]: A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:

100. Ishii teaches or suggests *a vehicle charger*¹, namely Ishii's "electric device [1] of an electric vehicle":



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 and are incorporated by reference, including the motivations to combine and showing of reasonable expectation of success provided in the cross-referenced section. All reasonable expectation of success include the benefits described for the respective motivations to combine.

EX1004-Ishii, [0119], [0021-0022], FIG. 1, Claim 1 (Preamble). Ishii's **electric device 1** (*vehicle charger*) is for charging a **battery** of a vehicle, namely **batteries 2B, 3B** of respective battery units 2, 3 “fixedly provided at an electric device main body (vehicle body).” EX1004-Ishii, [0033], [0023] (disclosing **batteries 2B, 3B**), [0119] (teaching the “industrial applicability” is an “electric device of an electric vehicle”), [0001] (disclosing electric device is for a “compact electric automobile”), [0009]. Battery units 2, 3 include rechargeable secondary batteries 2B and 3B, where the claimed **battery** is either or both of **batteries 2B, 3B** of respective battery unit 2, 3. EX1004-Ishii, [0023].



EX1004-Ishii, FIG. 1. **Electric device 1** is a **vehicle charger** because electric device 1 includes **charger unit 5**, where “charger 8 turns ON either switch..., selects the battery unit 2 or 3 to be charged, and supplies charge electric power to the secondary

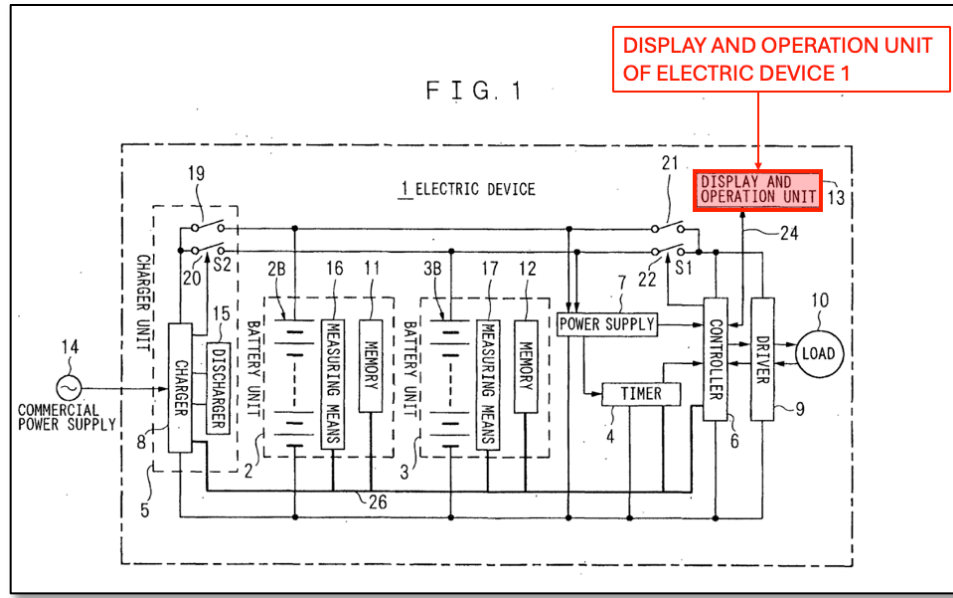
battery 2B or 3B of the selected battery unit.” EX1004-Ishii, [0064], [0059-0060], FIG. 4 (Step B4), FIG. 1, EX1004-Ishii, [0021], [0033].

2. Claim 1[a]: “a display mounted within the vehicle; and”

101. Ishii teaches *a display mounted within the vehicle*, namely a “display and operation unit 13” included in the electric device 1 of the electric vehicle. EX1004-Ishii, [0010], [0014], [0021], [0029], FIG. 1. Alternatively, Fujita teaches *a display mounted within the vehicle*, providing additional implementation details regarding the display being *mounted within the vehicle*.

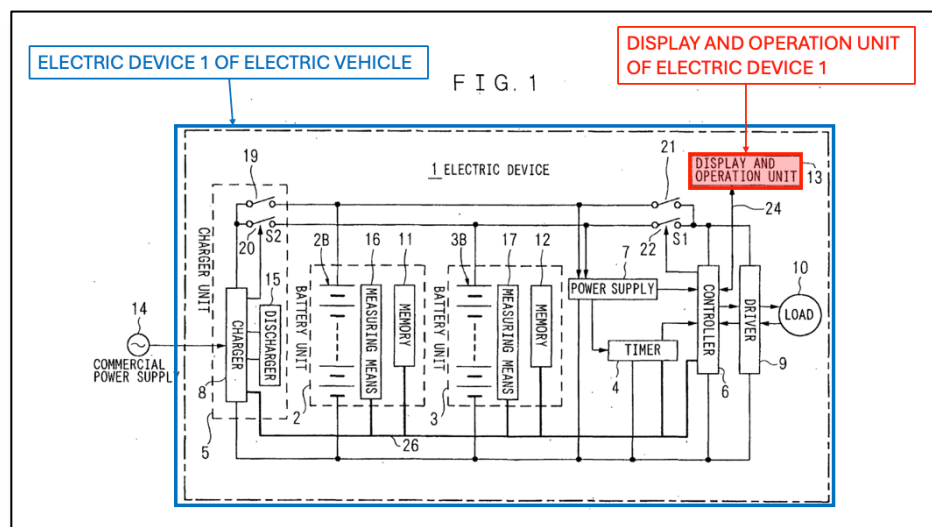
a) Ishii’s Teachings

102. Ishii teaches the electric device 1 (*vehicle charger*) “is constituted by... *a display* and operation unit 13,” with the display including an “LCD display or the like for displaying necessary states and information such as a state of the electric device 1, a state of the charger 8 of the charger unit 5 and time[.]” EX1004-Ishii, [0021], FIG. 1, [0029].



EX1004-Ishii, FIG.1.

103. Ishii teaches display and operation unit 13 is *mounted within the vehicle* because unit 13 is included in electric device 1 within the “electric vehicle.” EX1004-Ishii, [0001, [0119], [0021]. Ishii specifically teaches display and operation unit 13 is provided “**in the electric device.**” EX1004-Ishii, [0014].



EX1004-Ishii, FIG. 1. The “electric device” main body is that of the “vehicle body.”

See e.g., EX1004-Ishii, [0033] (“The battery units 2 and 3 and the charger unit 5 may be fixedly provided at an **electric device main body (vehicle body)**...”).

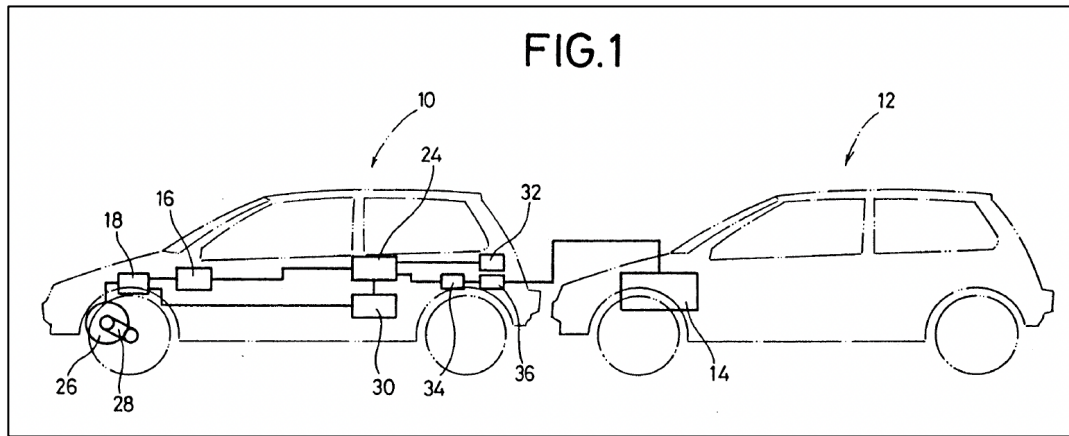
104. Because Ishii teaches (1) the electric device 1 is “of an electric vehicle,” (2) the electric device 1 contains the display and operation unit 13, and (3) the batteries, including secondary batteries comprised in the electric device 1, are “in an electric vehicle,” the electric device 1 is mounted in a vehicle, and thus its display and operation unit 13 is *mounted within the vehicle*. EX1004-Ishii, [0119] (“....**the electric device of an electric vehicle** or the like according to the invention...”), [0021] (discussing display and operation unit 13 is comprised in electric device 1, in addition to other components including the batteries), [0023], [0001], [0014], [0033] (discussing battery units and the charger unit 5 being fixedly provided at the “electric device main body (vehicle body)”), FIG. 1. Because the “electric device” is “of an electric vehicle” and includes the charger of batteries for the electric vehicle, the electric device 1 (including its components, such as display and operation unit 13) are *mounted within a vehicle*. Indeed, it was known that “an electric device of an electric vehicle such as a compact electric automobile” for charging the power supply of the vehicle is mounted in the vehicle, so the electric device can provide “vehicle-mounted charging.” EX1004-Ishii, [0002], [0003]; *see* ¶¶ 46-47 (generally discussing how vehicle chargers are known to be within the electric vehicle).

Additionally, Ishii teaches battery units 2,3 and the charger unit 5 of electric device 1 being “fixedly provided” at the main body of the electric device 1, which is the “vehicle body,” further confirming the electric device 1 is mounted on a vehicle, and thus the display and operation unit 13 of electric device 1 is also *mounted within the vehicle*. Additionally, Ishii teaches battery units 2, 3 and the charger unit 5 of electric device 1 being “fixedly provided” at the main body of the electric device 1, which is the “vehicle body,” further confirming the electric device 1 is mounted on a vehicle, and thus the display and operation unit 13 of electric device 1 is also *mounted within the vehicle*.

b) Fujita’s Teachings

105. Fujita provides implementation details of a vehicle charging system that includes a display being mounted within a vehicle. Namely, Fujita teaches a “battery charging device” being mounted in an “electric vehicle 10,” which includes an “alarm/display means 22” (*display*) and an “electronic control unit 16” (ECU 16) that controls the charging of the battery. EX1006-Fujita, 3:9-53, FIG.1, FIG.2. Specifically, Fujita teaches the **“electric vehicle 10, as shown in FIG. 2, is intensively controlled by an electronic control unit 16,** to which are connected a driver 18, input means, **alarm/display means 22... .”** EX1006-Fujita, 3:9-13. Further, Fujita teaches “[t]he input means 20 and alarm/display means 22 are, as shown in FIG. 3, provided on an instrument panel 38 of the electric vehicle 10.”

Because the display 22 is “provided on an instrument panel 38 of the electric vehicle 10,” the *display is mounted within the vehicle*. EX1006-Fujita, 3:38-40, FIG. 3. Additionally, other components of the battery charging device are also mounted within the vehicle 10, including ECU 16, per FIG. 1:



EX1006-Fujita, FIG. 1.

c) Motivation to Combine

106. A POSITA would have been motivated and found obvious to modify Ishii's electric device 1 to be mounted within the vehicle, including the display and operation unit 13 (*display*), per Fujita. A POSITA would have been motivated to mount Ishii's electric device 1 in the vehicle that is being charged via the electric device 1, to increase ease of use of the charger, as a POSITA would appreciate not having to attach electric device 1 to the vehicle themselves every time they needed to drive and/or charge their vehicle. This would increase user convenience, by eliminating a step of having to attach the electric device 1 to the vehicle in using and

charging the vehicle. Mounting the display and operation unit 13 of the electric device within the vehicle would also allow the user to remain in the vehicle to use and view the display and operation unit 13 to perform the charging operations that require user inputs, which may be desirable to a driver in certain instances (charging when it is dark out or in a dangerous environment). Additionally, mounting electric device 1 within the vehicle would protect the various electrical components from environmental variables, such as weather, rather than having the components exposed. Additionally, mounting electric device 1 within the vehicle would ensure the user does not lose the electric device 1, further increasing ease of use and convenience.

107. Such a modification is nothing more than use of a known technique (mounting a vehicle charging device in a vehicle) to improve similar devices (vehicle chargers) in the same way by protecting components of the electric device 1 and increasing ease of use of the electric device for a user.

108. The modification would have had a reasonable expectation of success, given Ishii already teaches the electric device 1 being “of an electric vehicle” and that the “(vehicle body)” is the body of the electric device 1. EX1004-Ishii, [0033], [0119]. Such a modification would have been well within the skill of a POSITA, given mounting vehicle chargers, including displays for the vehicle chargers, within a vehicle was well-known and common. *See* ¶¶ 46-47, 50-51. In the modified

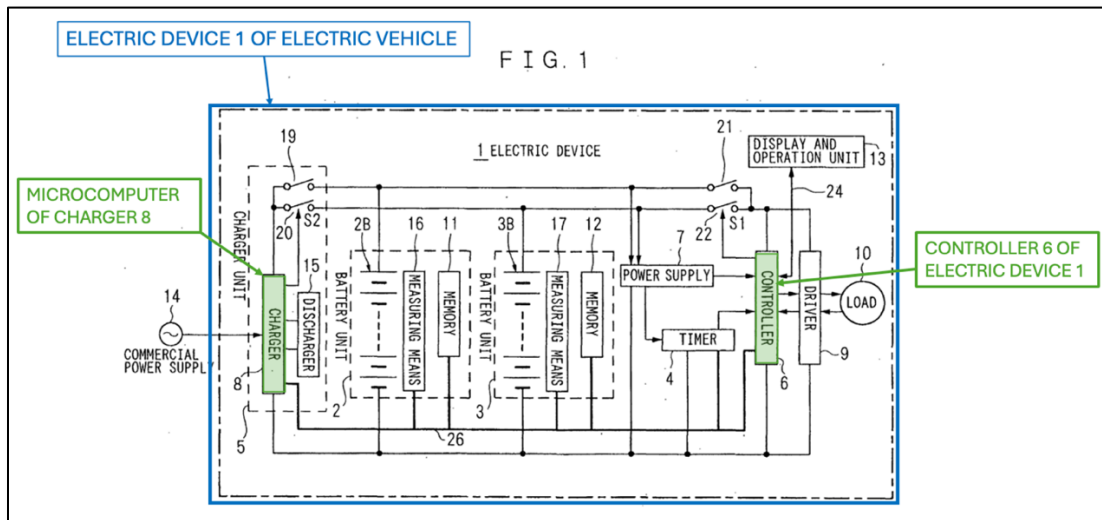
system, Ishii's electric device 1 would be *mounted within the vehicle* through simple and straightforward hardware modifications, as readily recognized by a POSITA.

3. Claim 1[b]: “a controller onboard the vehicle and coupled to the display, the controller configured to”

109. Ishii teaches *a controller*, namely the collective controller 6 and the microcomputer of charger 8. EX1004-Ishii, [0021], [0024-0025], FIG. 1. Ishii discloses certain functionality of the electric device 1 in the vehicle is performed by controller 6 and certain functionality is performed by charger 8, which includes the microcomputer. In the mapping, the *controller* is mapped to both Ishii's controller 6 and microcomputer of charger 8, dependent on the performed functionality.

110. Ishii teaches controller 6 “includes a control function by means of a microcomputer or the like, and has a function of performing a main control of the operation of the electric device.” EX1004-Ishii, [0024], FIG. 1. Ishii also teaches charger 8 includes a “control function by means of a microcomputer,” and the microcomputer “execute[s]” the charge modes that are selected by a user. EX1004-Ishii, [0022], [0044]. Because the microcomputer of charger 8 controls functions such as executing charge modes for charging the battery, the microcomputer is a *controller*. The '010 repeatedly equates a controller with a computer. EX1001, 28:34-35 (describing “controller 444 (e.g., computer)”), 21:53-54, 9:8-9, 13:49-50. Thus, the microcomputer of charger 8 and controller 6 collectively teach the claimed *controller*.

111. Controller 6 and the microcomputer are *onboard the vehicle* because electric device 1 within an electric vehicle includes controller 6 and charger 8. EX1004-Ishii, [0001], [0119], [0021], [0033], FIG. 1; Claim 1[b].



EX1004-Ishii, FIG. 1. Alternatively, for the same reasons discussed above at claim 1[a], Ishii's electric device 1 would be mounted in the vehicle, per Fujita, including controller 6 and charger 8 microcomputer accordingly being *onboard the vehicle*.

112. Controller 6 is *coupled to the display*. Namely, controller 6 “has an interface with the display and operation unit 13” and sends signals and information via “operation bus 24.” EX1004-Ishii, [0025], [0029], FIG. 1. The display and operation unit 13 also displays information such as “a state of the electric device 1, a state of the charger 8 of the charger unit 5 and time[.]” EX1004-Ishii, [0029]. To perform displaying of this information, the display and operation unit 13 receives signals from controller 6 via operation bus 24: “[d]isplay is performed according to

a signal from the controller 6 and operation information is sent to the controller 6 via an operation bus 24.” EX1004-Ishii, [0029]. Thus, because Ishii’s controller 6 is connected to the display and operation unit 13 and sends/receives signals to/from the display, Ishii’s collective *controller is coupled to the display*. EX1004-Ishii, [0025], [0029], FIG. 1.

113. As mapped below, Ishii’s *controller* (controller 6 and charger 8 microcomputer) alone or as modified by Hayashi and/or Fujita is *configured to* perform the claimed functions. *See* Claims 1[c]-[f].

4. ***Claim 1[c][1]: [“the controller configured to”]... “begin an active charging session of the battery based on a programmed manner of charge and at least one condition,”***

a) **’010 Patent Description Regarding “active charging session”**

114. The ’010 Patent describes the “charging session” begins once the user selects a charge start time and sets the programmed charge: **“Once the charge start time has been selected by a user as just described, the user can select the navigation button 82 described above to return to the first screen 40, and can command the vehicle charging cords 22 to begin a charging session by pressing the power button 34.”** EX1001, 16:43-52. The controller will then “compare the start time 90 entered by the user to the current time of day...and will begin charging the battery 20 at the entered charge start time.” EX1001, 16:47-52, FIG. 24. Additionally, Patent Owner stated during prosecution that “active charging session”

includes a “delay time” commencing at the start of the active charging session and concluding when the *at least one condition* is met, such that actual charging of the battery (i.e., current or power supplied to the battery for charging the battery) is not occurring during the delay time (because the condition has not been met). *See* Section V.B; EX1001, 15:2-5; EX1002 (Prosecution History), 497-499.

b) '010 Patent Description Regarding “*programmed manner of charge*” and “*at least one condition*”

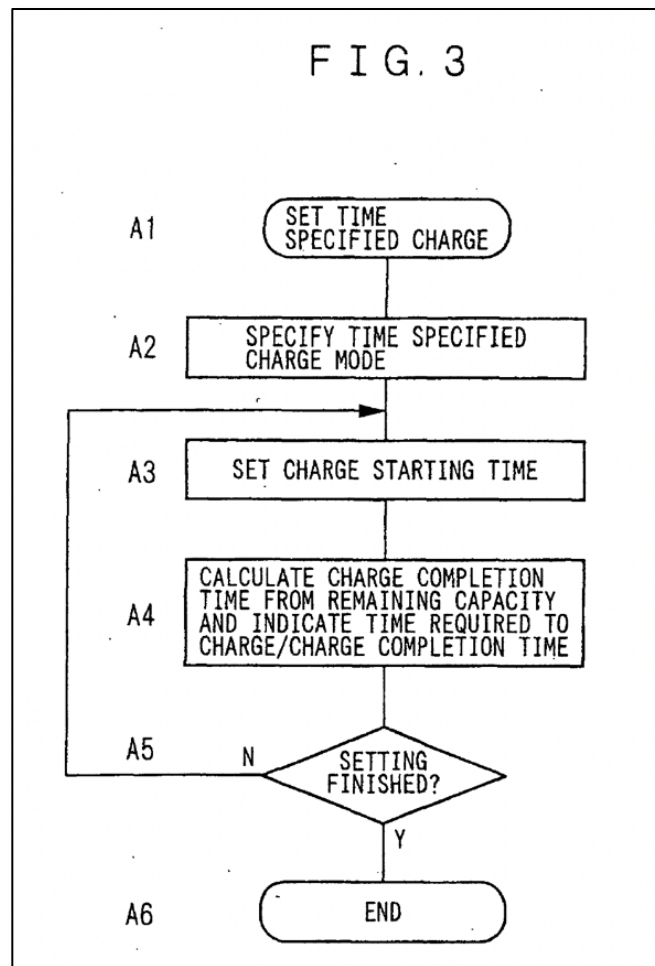
115. The '010 Patent describes a “programmed charge” based on a “charge start time” (*at least one condition*). Specifically, the '010 Patent describes, “By pressing any of the four buttons 274, a user can start a manual charge, **start a programmed charge of the type described above in connection with the charge start time 90 illustrated in FIG. 10 (i.e., start charging at a time entered by the user)**, start a programmed charge of the type described in connection with the charge completion time 104 ” illustrated in FIG. 10 (i.e., start charging based upon power utility control and complete charging by a time entered by the user), and stop the vehicle charging cords 222 from charging a battery 20 connected thereto.” EX1001, 23:63-24:5, FIG. 10.

c) Ishii's Teachings

116. As a summary, Ishii teaches *begin an active charging session of the battery based on the programmed manner of charge and at least one condition* by beginning the time-specified charge mode when charger 8 determines the user

selected a time-specified charge mode, per step B2 of FIG. 4. The *active charging session* (i.e., the time-specified charge mode) is *based on the programmed manner of charge and at least one condition*; namely, the user selecting and confirming the mode is time-specified charge mode (FIG. 3) and selecting the charge start time (*at least one condition*).

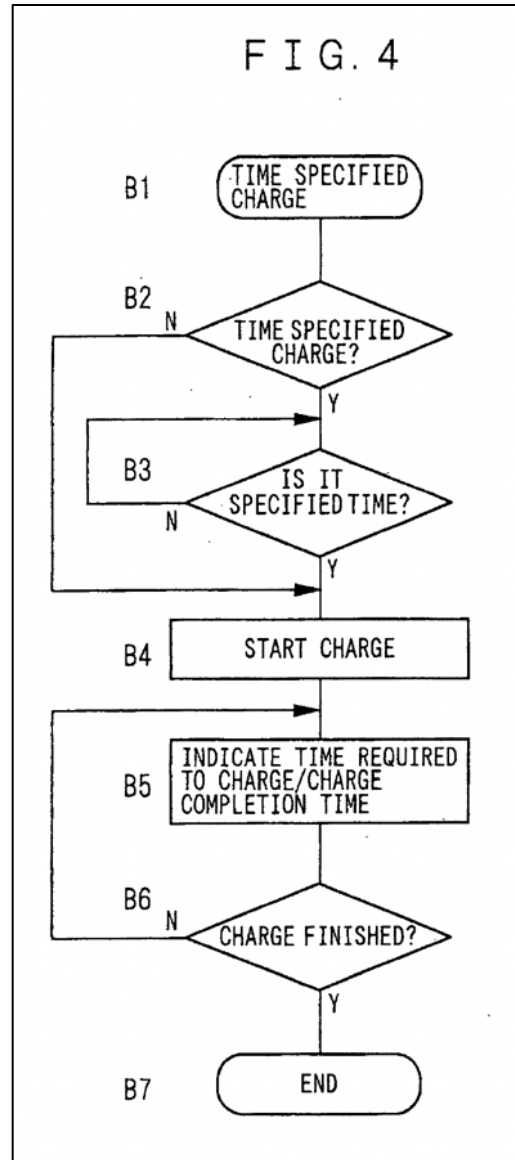
117. Ishii teaches a method for a user setting a charge mode, including setting a time-specified charge mode, as shown in FIG. 3:



EX1004-Ishii, FIG. 3, [0047]. During the setting process, the user specifies their “charge mode” as the time-specified charge mode (step A2) and inputs the charge starting time (step A3). EX1004-Ishii, [0048]-[0049]. When the charge time is entered by the user, the charge start time is “stored in the memory of charger 8[.]” EX1004-Ishii, [0050], FIG. 3. Then, charger 8 calculates the “charging time (time required to charge)” (step A4). EX1004-Ishii, [0051-0052], FIG. 3. A user then confirms the operation by pressing down a confirmation key and accordingly the “setting of the charge is finished” (steps A5-A6). EX1004-Ishii, [0058], FIG. 3.

118. “Setting of the time-specified charge is carried out by the charger 8 of the charger unit 5 via the controller 6.” EX1004-Ishii, [0047]. Ishii’s user-selected time-specified charge mode that is set by the charger 8 via controller 6 is *a programmed manner of charge* and specifies *at least one condition* by specifying the charge starting time, similar to the ’010 Patent’s “programmed charge” selected by the user and specifying a charge start time “entered by the user.” EX1004-Ishii, [0047]-[0050]; EX1001, 23:63-24:5.

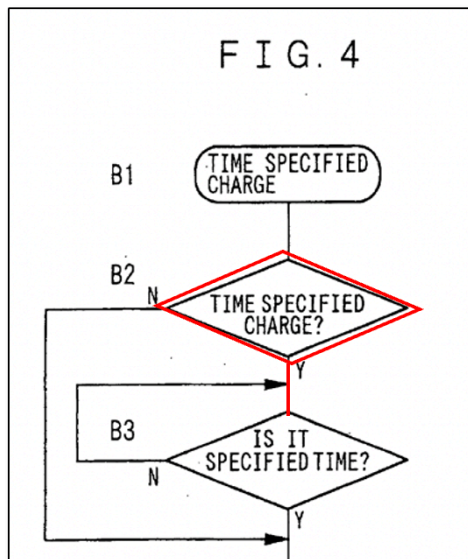
119. Once a user confirms the charge setting by “pressing down a confirmation key,” charger 8 goes into “charge mode” (Step B1), per FIG. 4:



EX1004-Ishii, [0059]-[0060], FIG. 4. At step B2, charger 8 checks “whether it is the time-specified charge or not,” and “if it is one of the other charge modes, it immediately proceeds to” charging the battery (Step B4). EX1004-Ishii, [0062], [0064]. If the selected charge mode is time-specified charge, the present time is obtained from the timer 4 and it is compared “with the specified charge starting time that is stored” (step B3). EX1004-Ishii, [0063], FIG. 4. The charger 8 begins

charging the battery of the vehicle “[w]hen the present time corresponds to the charge starting time” (steps B3-B4). EX1004-Ishii, [0063-0064]. Specifically, the charger 8 supplies “electric power to the secondary battery 2B or 3B of the selected battery unit to start the charge.” EX1004-Ishii, [0064].

120. During Ishii’s charge mode procedure per FIG. 4, when the charger 8 determines in step B2 that the mode “is the time-specified charge” (Denoted by “Y” annotated below), the time-specified charge mode begins:



EX1004-Ishii, FIG. 4 (annotated), [0062]. Thus, Ishii teaches *begin an active charging session of the battery* by charger 8 performing step B2 and determining the user-selected mode is a time-specified charge mode. The time-specified charge mode is for charging the battery 2,3, and thus the *active charging session is of the battery*. EX1004-Ishii, [0064].

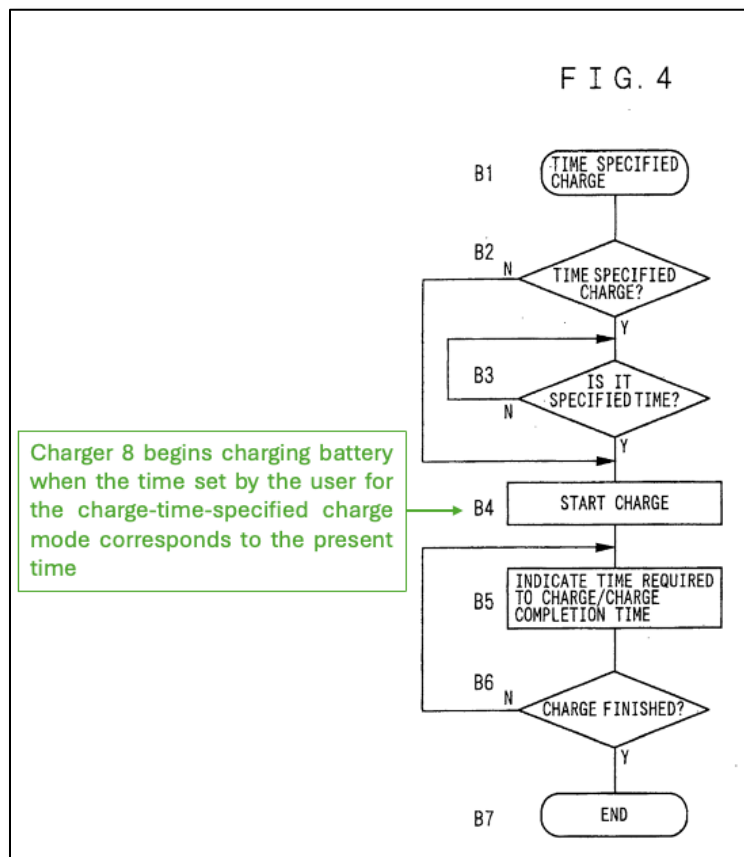
121. Ishii's time-specified charge mode (*active charging session*) is *based on a programmed manner of charge* because step B2 only begins the time-specified charge mode (i.e., moving to step B3 where current time is compared to selected charge start time) if the user selects and confirms the time-specified charge mode (*programmed manner of charge*) option during the setting process of FIG. 3. EX1004-Ishii, [0058]-[0062] (disclosing if step B2 determines "it is the time-specified charge, it proceeds to B3"), [0049] (user selecting the "time-specified charge mode" via "keys of the like of the operation section"), [0058] (further disclosing that the time-specified charge mode is set "when the completion of the setting operation is confirmed (pressing down a confirmation key is detected)"). Additionally, because the charger 8 determines whether the time-specified charge mode was selected by the user, which includes a stored charge starting time, the time-specified charge mode begins *based on a programmed* charge mode.

122. Ishii's time-specified charge mode for charging the battery (*active charging session*) is also *based on at least one condition*, namely the charge start time set by the user for the time-specified charge mode, similar to the '010 Patent describing a user entering a start time for charging as part of the "programmed charge." Ex1004-Ishii, [0049]-[0050]; EX1001, 23:63-24:5. Indeed, when the time-specified charge mode option is selected, "input of the charge starting time is required." EX1004-Ishii, [0049].

123. Therefore, Ishii's charger 8 begins a time-specified charge mode when charger 8 determines the time-specified charge mode was selected by the user at step B2 (*begin an active charging session of the battery*), and the *begin[ning]* of such a time-specified charge mode is *based on* the programmed time-specified mode that the user selected and confirmed (*a programmed manner of charge*), including the charge start time specified (*and at least one condition*). EX1004-Ishii, [0047-0058], [0062-0064], FIGS. 3-4. Because "setting of the time-specified charge is carried out by the charger 8 of the charger unit 5 **via the controller 6**" and the microcomputer of charger 8 "execute[s] time-specified charge" operations of FIG. 4 operation, including determining whether the time-specified charge was chosen, Ishii's *controller is configured to begin an active charging session....* EX1004-Ishii, [0044] ("Further, the charger 8 includes a control function by a microcomputer or the like and can execute time-specified charge.", i.e., a *programmed manner of charge*) [0047] ("Setting of the time specified charge is carried out by charger 8 of the charger unit 5 via the controller 6..."), [0064] (discussing how charger 8 microcomputer starts the charge and "supplies electric power to the secondary battery 2B or 3B of the selected battery unit to start the charge) , [0060] ("The time-specified charge is carried out by the charger 8...").

5. ***Claim 1[c][2]: "[the controller configured to]"... "the programmed manner of charge starting charging of the battery in response to the at least one condition being met"***

124. Ishii teaches the *programmed manner of charge starting charging of the battery in response to the at least one condition being met*, namely charger 8, during the time-specified charge mode (*active charging session*) begins charging the battery by supplying power when the “present time corresponds to the charge starting time.” EX1004-Ishii, [0062-0064], FIG. 4. When the charger 8 is in the time-specified charge mode, the present time is obtained and compared with the “specified charge starting time” set by the user. EX1004-Ishii, [0062-0063], FIG. 4. “When the present time corresponds to the charge starting time,” the charger will begin to supply charge to the battery unit. EX1004-Ishii, [0064], FIG.4.



EX1004-Ishii, FIG. 4. Thus, Ishii's time-specified charge mode selected and confirmed by the user (*the programmed manner of charge*) starts charging the battery when the current time meets the specified start time (*in response to the at least one condition being met*). Because the microcomputer of charger 8 executes the time-specified charge mode, including comparing the times and "start[ing] the charge," Ishii's *controller is configured to...starting charging of the battery in response to the at least one condition being met via the programmed manner of charge*. EX1004-Ishii, [0044], [0060] (describing FIG. 4, including steps B3 and B4, being carried out by charger 8) [0063]-[0064] (disclosing step B3 as comparing the current time to the specified time, and only proceeding to step B4 for starting charging when the times "correspond[]").

6. Claim 1[d]: [*"the controller configured to"*]... *"calculate an amount of time required to charge the battery,"*

125. Ishii alone or Ishii in combination with Hayashi teaches Claim 1[d].

a) Ishii's Teachings

126. Ishii teaches *calculate an amount of time required to charge the battery*. Namely, Ishii's charger 8 "calculates a charging time (time required to charge) from remaining capacity." EX1004-Ishii, [0051], FIG. 3. Ishii teaches that after the charge starting time is stored in the memory of charger 8, the charger 8 calculates "a charging time (time required to charge) from the remaining capacity" of the battery unit 2,3, as shown in Step A4 of FIG. 3 during setting of the time-specified charge

mode. EX1004-Ishii, [0051]-[0052], FIG. 3. Ishii teaches both a “charge completion time” and a “time required to charge,” and expressly teaches calculating the “charging time (time required to charge). EX1004-Ishii, [0051]. Thus, step A4 in FIG. 3 calculates the “time required to charge,” which is an *amount of time required to charge the battery*.

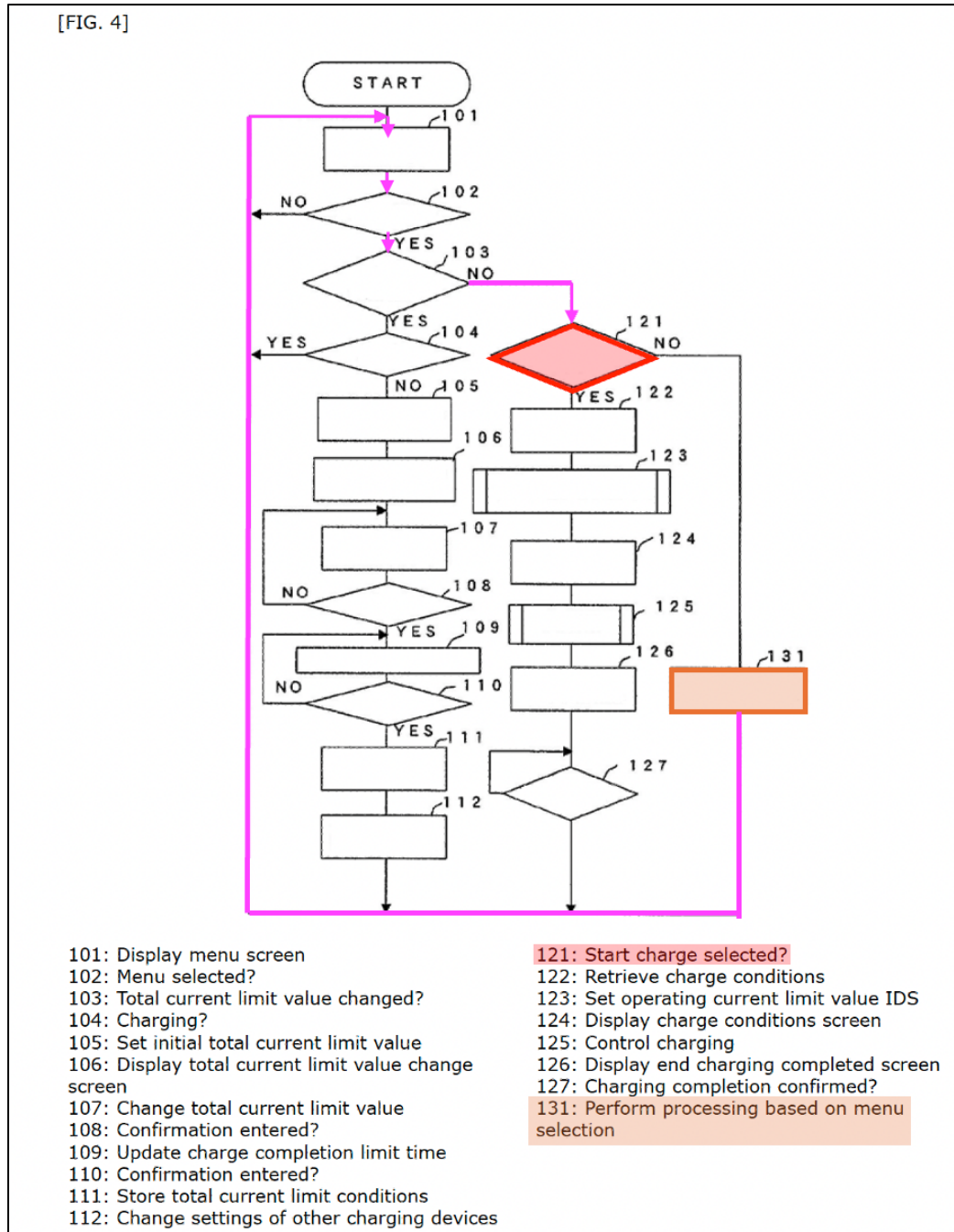
127. Ishii also teaches during charging of the battery (Step B5 of FIG. 4) when in the time-specified mode (during the *active charging session*), updating the “charging time” (meaning “time required to charge”) (Step B5 of FIG. 4), and thus calculating the *amount of time* during the *active charging session*. EX1004-Ishii, [0065] (disclosing “as the charge proceeds, **it calculates the charging time...to indicate the time taken before the completion of the charge...**”), [0051] (referring to “charging time (time required to charge)” being calculated). Thus, Ishii teaches recalculating the time required to charge during the time-specified charge mode being carried. Because Ishii’s controller 6 controls charger 8 to carry out setting the time-specified charge mode (via steps in FIG. 3) and charger 8 microcomputer controls performing the time-specified charge mode (via steps in FIG. 4), Ishii’s *controller is configured to* calculate the time required to charge the battery, and this is done both before entering time-specified charge mode and after entering the time-specified charge mode (after beginning the *active charging session*). EX1004-Ishii, [0047]. Additionally, Ishii teaches during charging of the battery, updating the

“charging time” (meaning “time required to charge”) (Step B5 of FIG. 4), and thus calculating the *amount of time* during the *active charging session*. EX1004-Ishii, [0065] (disclosing “as the charge proceeds, **it calculates the charging time...to indicate the time taken before the completion of the charge...**”).

b) Hayashi’s Teachings

128. Alternatively, Hayashi teaches *calculate an amount of time required to charge the battery* **after** beginning an *active charging session* but before actual charging of the battery (i.e., during a delay time); namely, by calculating a “time required to charge the battery” when determining “the predicted charging completion time” during a “standby for charging state.” EX1005-Hayashi, [0094], [0102], [0104].

129. Hayashi’s FIG. 4 outlines the charging control process, and annotated FIG. 4 below illustrates the path of instructions in the control process in which the user first establishes an intentionally delayed, future charging start date and time at S131, then issues a start charging instruction at S121, and then the process ultimately determines the predicted charging completion time (including the time required to charge) during processing that occurs at S123:



EX1005-Hayashi, FIG. 4, [0094]-[0095], [0098]-[0099]. Hayashi teaches that the charging process begins at S101, where a menu screen is displayed, and proceeds to S102, which determines if a menu selection has been made, and S103, which determines if the instructions is to change a charging current limit. EX1005-Hayashi,

[0086]-[0089]. If the instruction is not to change a charging current limit at step S103 (highlighted pink “NO” above), then the process proceeds to step S121 to determine whether the selection is an instruction to “start charging.” EX1005-Hayashi, [0094]. If “start charging” was not selected, “the processing proceeds to S131” to schedule an “intentionally delayed” charging session via the user setting a charging start date and time (Step S131 in orange above). EX1005-Hayashi, [0098]-[0099]. Thus, FIG. 4, above, illustrates that step S131 occurs when a menu item has been selected that is “a start scheduling instruction.” EX1005-Hayashi, [0099].

130. Namely, a “start scheduling processing is performed” via step S131 “in which, in order to schedule charging of the battery 6, a screen is displayed on display unit 24 allowing the user to set the charging start date and time in accordance with a start scheduling instruction selected by the user, and receives a start date and time based on user input via the control panel 22.” EX1005-Hayashi, [0099]. The process executed at S131 is “start scheduling process that **initiates charging at a time that been intentionally delayed**”. *Id.* This scheduling per S131 that creates an intentionally delayed charging session by a user selecting a “separately established start time” is similar to Ishii’s time-specified charge setting. EX1005-Hayashi, [0031]; EX1004-Ishii, [0046]. Notably, step S131 occurs when a “start scheduling instruction” is selected by the user, before charging has been started, as a user has not selected an “instruction to start charging” (S121).

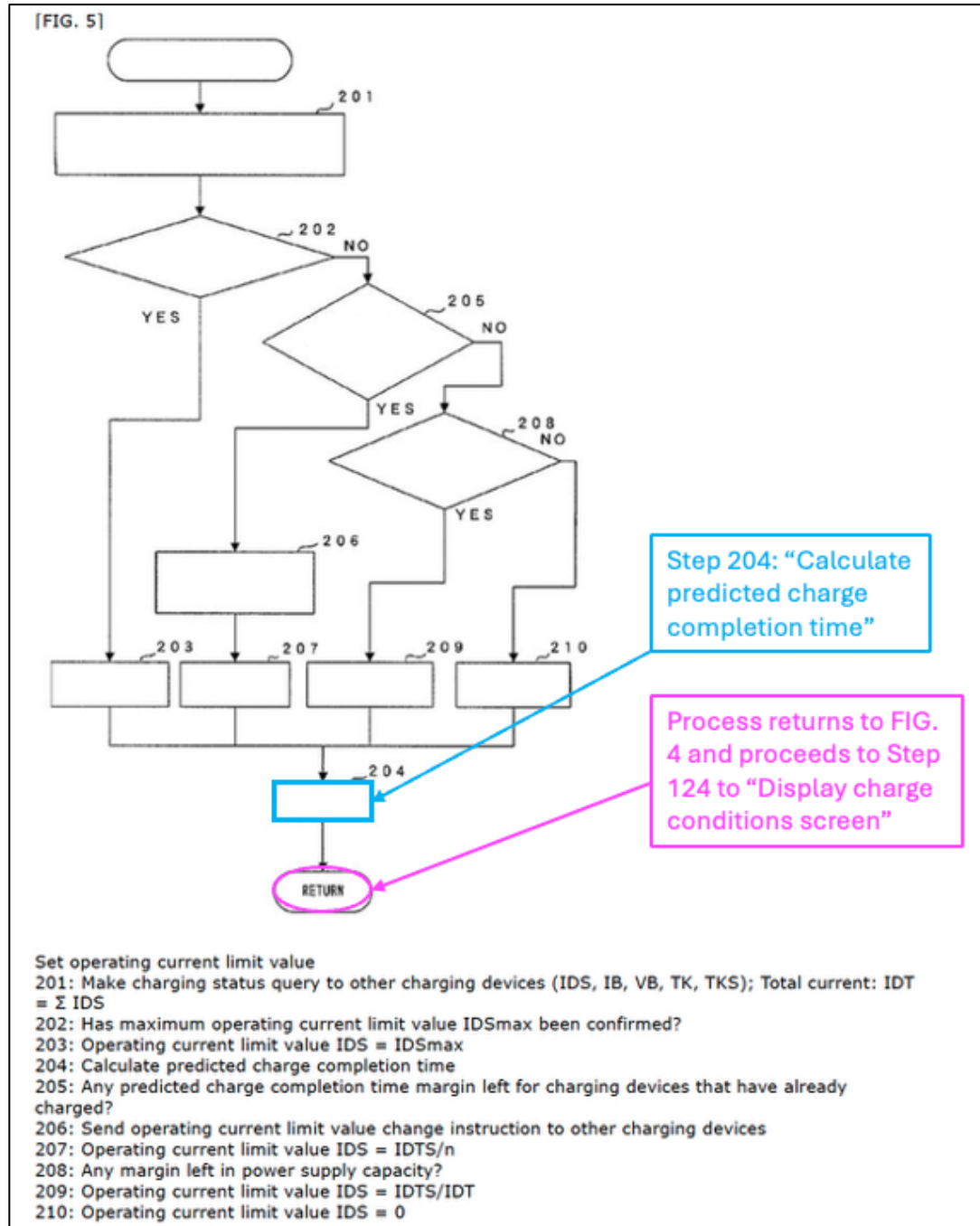
131. After the scheduling occurs at S131, the process loops back to S101, as depicted in FIG. 4 above. EX1005-Hayashi, [0098], FIG. 4. After S131 proceeds back to S101, the process reaches S121 to determine whether the user instructed “**start charging.**” EX1005-Hayashi, [0094]. If the user instructed “start charging” after selecting an intentionally delayed charge, the system enters a “standby state waiting to start charging” at the future set time. EX1005-Hayashi, [0094]-[0095]. Thus, to start a charging session via an intentionally delayed charge selected by the user, the user selects the charging schedule (step S131), then the process loops back to S101 after the user enters the intentionally delayed charge selection, where the user can then select the “start charging” (per step S121) to start the intentionally delayed charge session. Per the annotated FIG. 4 above, the user selects the intentionally-delayed charge schedule (per S131) prior to then selecting to start charging at S121.

132. Accordingly, Hayashi *begin[s] an active charging session...* when the user instructs “start charging” at step S121 that places the system in a standby state where current is not supplied *based on* a user “set” intentionally delayed charge (selected at step S131) (*programmed manner of charge*) that includes a selected future time and date (*at least one condition*) and begins charging the vehicle when the set future time and date is reached (performs step S125 when the current time

meets the future time) (*the programmed manner of charge starting charging...in response to the at least one condition being met*). EX1005-Hayashi, [0095], [0096].

133. During the charge control process of FIG. 4, Hayashi teaches predicting **“the time required for charging the battery”** and the “charge completion time” at step S123 after S121 “start charging” instruction has been selected. EX1005-Hayashi, [0030]-[0031], [0169] (disclosing how the **“time required to charge the battery 6** is estimated”), [0094], [0102]. To calculate the charge completion time, the time required to charge is calculated as part of S123. EX1005-Hayashi, [0102] (disclosing “to predict the charging completion time,” the “device calculates the required time to charge the battery”).

134. Because S123 occurs after step S121 where user selects “start charging,” Hayashi teaches the charge completion time is predicted (which includes calculating the time required to charge) **after** the user sets the charging start date (at step S131) and **after** the user subsequently selects start charging (at step S121, after *begin an active charging session*), but before actual charging of the battery occurs (per step S125). EX1005-Hayashi, [0031], [0098-0099], [0102], [0087]. Hayashi teaches during step S123, “the predicted charging completion time TK is determined.” *Id.* FIG. 5 discloses predicting/calculating the charging completion time at step S204:



EX1005-Hayashi, FIG. 5, [0102] (describing step S204 as including "calculate[ing] the required time to charge the battery"). During step S204, Hayashi teaches "[i]n order to predict the charging completion time," the device "calculates the required time to charge the battery." EX1005-Hayashi, [0102]. Thus, as part of predicting the

charge completion time, the time required to charge is calculated (*calculate an amount of time required to charge the battery*).

135. Hayashi teaches that “[w]hen in the standby for charging state, the predicted charging completion time is calculated” via S204. EX1005-Hayashi, [0104]. Because S204 is performed during standby for charging, and S204 includes calculating the time required to charge in order to predict the charge completion time, Hayashi teaches *calculate an amount of time* (i.e., the time required to charge) **after** beginning the *active charging session* (after a “start charging” command at step S121) but before actual charging of the battery. EX1005-Hayashi, [0102], [0104] (“When in the standby for charging state, the predicted charging completion time is calculated by adding the predicted charging start time...to the previously predicted time from charging start to completion”). Indeed, Hayashi teaches at [0104] that the predicted charging completion time is calculated by using a “time from charging start completion” (i.e., time required to charge) during the standby state.

136. Further, Hayashi teaches control unit 20 executes the control processing in FIGs. 4-7 (*is configured to*), including calculating the time required to charge. EX1005-Hayashi, [0086], [0030]-[0031], [0170] (discussing that the predicted time may be the “predicted charging time (time required to charge the battery 6)”). Because the control unit 20 executes the control processing, including calculating

the predicted time, and the predicted time calculated is the “time required to charge the battery 6,” the control unit 20 (*controller*) is configured to calculate the amount of time required to charge the battery. EX1005-Hayashi, [0030]-[0031], [0170] (the predicted charging time (time required to charge) is calculated and displayed “when charging control is executed”).

c) Motivation to Combine

137. A POSITA would have found it obvious and been motivated to modify Ishii’s *controller* (controller 6 and charger 8 microcomputer) controlling setting and executing time-specified charge to perform Ishii’s calculation of the time required to charge **after** beginning Ishii’s time-specified charge mode (*active charging session*) and before charging the batteries, per Hayashi’s teachings. As discussed above, Ishii already teaches calculating the time required to charge (*amount of time*) both while setting the time-specified charge mode (per FIG. 3, step A4) and during the time-specified charge mode being carried out (per FIG. 4) when the battery is charging (step B5). *See* Claim 1[d], Section “a”. Additionally calculating Ishii’s time required to charge during the delay time between entering the time-specified mode and charging the battery, per Hayashi’s teachings, would have been a trivial modification to Ishii with resulting benefits.

138. A POSITA would have appreciated calculating the time required to charge **after** Ishii’s time-specified charge mode was initiated (at step B2 of FIG. 4)

but before charging commences would improve the accuracy of the time calculated prior to charging, as the time required would be representative of current battery conditions, such as state of charge, and temperature, closer to the actual charging time, and thus provide a more accurate prediction than what is presented during time-specified mode set-up. For example, a user would appreciate variables affecting charging would change between when a user sets up charging and when charging is started, especially if the user sets up charging in advance (e.g., a couple hours in advance, a day in advance). EX1005-Hayashi, [0102]. Thus, calculating time required to charge closer to the start of charging would be advantageous to provide a more accurate prediction. Hayashi discusses that in order to calculate the predicted time “the device first uses the relationship between the charge stored in the battery and the battery voltage V_B to estimate the **charge currently stored** in the battery.” EX1005-Hayashi, [0102]. Thus, Ishii’s electric device 1 would be able to make a more accurate prediction and increase the overall accuracy of the charging operation if the time required to charge calculation is updated during the delay time. Hayashi also specifies by increasing the accuracy of the predicted time (either the charge completion time or the time required to charge the battery), the accuracy of scheduling of use of the vehicle will also increase. EX1005-Hayashi, [0033] (“As a result, in the vehicle battery charging device of the present invention (claim 10), the predicted time of charge completion provided to the user **becomes more accurate**,

and **the subsequent scheduling of use of the vehicle** equipped with the battery being charged by this charging device **becomes more accurate, thereby improving efficiency.”).**

139. Additionally, a POSITA would have appreciated this modification would allow for verification that the charging still works for a user before commencing charging. As discussed above, Hayashi specifies that increasing the accuracy of the predicted time required to charge will increase the accuracy of the “subsequent scheduling of use of the vehicle.” EX1005-Hayashi, [0033]. This verification would provide an opportunity for correction, if needed, to the charge mode if a user’s plans change, and allow a user to better manage their own schedule based on the time required to charge. It was well-known that when scheduling a charge of an electric vehicle, it would be advantageous to inform the user of the required charging time and ensure that the charging time would work with a user’s schedule. EX1027-Boll, 4:46-52 (“...in order to be able to charge by means of inexpensive night current, it is also useful to provide the start time and/or the end time of the charging operation can be input by the user. Expediently, these parameters 8 will be entered after the user has informed himself concerning the required charging time, so that the charge time interval is not selected to be too brief.”). For example, providing a time required to charge prediction would allow a user to better manage their own schedule based on the required charging time (e.g.,

delay an errand or trip) before charging commences, or allow a user to re-set a new time-specified charge mode that works better with their current schedule and plans before the charging actually starts. Additionally, providing such accurate time required to charge during the delay period before charging would allow a user to make charging changes if something unexpected comes up in their schedule (e.g., unexpected trip, emergency need of the vehicle).

140. The modification is a simple use of a known technique (Hayashi's calculating predicted time required to charge during a charge session delay) to improve similar devices (vehicle charging systems) in the same way (improve accuracy of calculation of time required to charge and user convenience).

141. A POSITA would have had a reasonable expectation of success modifying Ishii per Hayashi. Ishii already teaches calculating a "time required to charge" from "remaining capacity." EX1004-Ishii, [0051-0056], FIG. 3. Further, Ishii teaches the operation of setting the time specified charge is performed by the charger 8 via the controller 6 and time-specified charge mode is executed via charger 8 microcomputer. EX1004-Ishii, [0024], [0047]. Specifically, Ishii states, setting the time-specified mode is carried out by charger 8 "via controller 6," and teaches charger 8 "calculate[ing] a charging time (time required to charge)." Ex1004-Ishii, [0047], [0051]. Additionally, Ishii teaches, during actual charging of the batteries, updating the "charging time" (also referred to by Ishii as the time required to charge).

EX1004-Ishii, [0065]. Thus, a POSITA would have recognized that modifying Ishii to implement the functionality of calculating the time required to charge after starting the time-specified charge mode but during standby, per Hayashi, would have required only straightforward modifications to the programming instructions of Ishii's collective controller (controller 6 and charger 8 microcomputer). Modifying Ishii to implement the functionality of calculating the time required to charge during the delay state would have simply required an additional step to the programming instructions of charger 8 microcomputer similar to the instructions already performed. EX1004-Ishii, [0065], [0051]-[0052]. This modification would have required nothing more than ordinary skill in the art and would have been well within the skillset of a POSITA, given calculating the time required to charge was well-known. See ¶¶ 52-56. In the modified system, Ishii's *controller* would be *configured to calculate the amount of time* after entering the time-specified charge mode by, e.g., charger 8 microcomputer calculating the time required to charge during standby.

7. ***Claim 1[e]: [“the controller configured to”]...“display, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display, and”***

a) '010 Patent Description Regarding "*active charging session*"

142. As discussed for Claim 1[c][1], the '010 Patent describes “active charging session” to include a time where actual charging of the battery (i.e., current supplied to the battery) is not occurring. Specifically, the '010 Patent describes that “the battery 20 **may not be actively charging the battery 20 at one or more times during a charging session.**” EX1001, 15:2-5. Patent Owner also argued during prosecution that the “active charging session” includes “a delay time within the session during which charging hasn’t started yet (e.g., the condition associated with the charger session hasn’t yet been satisfied.” EX1002, 497-499.

b) Ishii’s Teachings

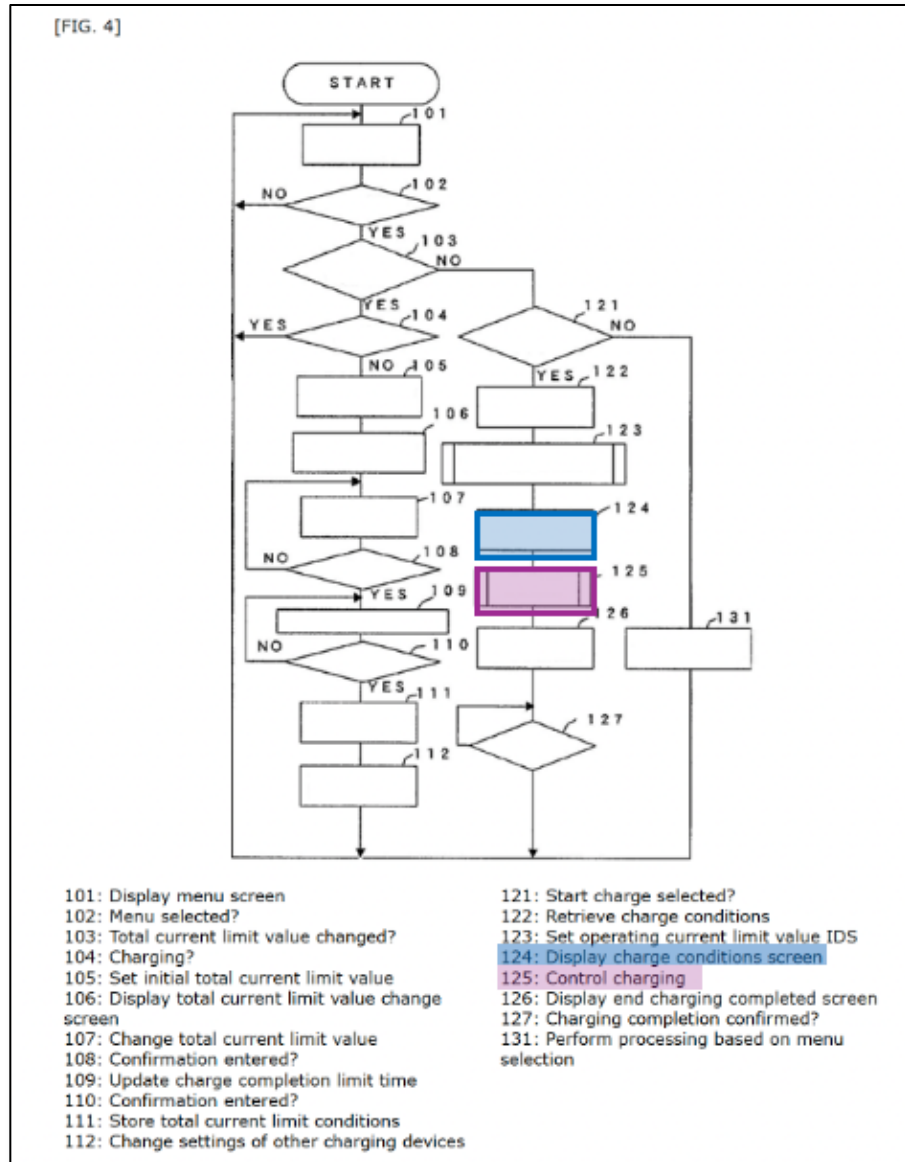
143. Ishii teaches, during the time-specified charge mode being carried out (*during the active charging session*), per FIG. 4, the calculated “time required to charge” (*the amount of time*) is *display[ed]* (step B5). EX1004-Ishii, [0065] (disclosing charger 8 “displays the time required to charge” at step B5), FIG. 4. The displaying of the time required to charge occurs after charging of the batteries has started (after step B4).). In related art, Hayashi teaches displaying the time required to charge during a standby mode prior to charging the batteries.

c) **Hayashi's Teachings and Internal Motivation to Combine for Hayashi**

144. Hayashi teaches displaying the time required to charge *before starting charging of the battery*....; namely, displaying the time required to charge during standby of the “start charging” session. Hayashi teaches the *amount of time* is displayed on the display unit 24; namely, “the predicted charging time (the time required to charge the battery 6) may simply be displayed.” EX1005-Hayashi, [0170].

145. Hayashi teaches displaying both (1) the time required to charge the battery; and (2) the charge completion time. EX1005-Hayashi, [0170], [0030]-[0031] (describing “the result of the prediction **displayed**” is the time required to charge or the charge completion time). Hayashi expressly teaches: “If the system is in standby waiting to start charging, as shown in FIG. 9 (b), the start time for charging is displayed **along with the completion time for charging**” at step S124. EX1005-Hayashi, [0095]. Therefore, Hayashi teaches (1) displaying the completion time during the standby period; and (2) displaying the time required to charge.

146. Following the calculation (S123) and display (S124) “the processing proceeds to S125 and begins controlling the charging of battery 6”:



EX1005-Hayashi, EX1005-Hayashi, [0096], FIG. 4.

147. Instead of displaying the charge completion time during standby, as expressly taught at [0095], a POSITA would have found obvious to display the predicted result of the time required to charge during standby prior to charging (*during the active charging session but before starting charging of the battery, i.e., after step S121 begins the intentionally-delayed session, but before charging of the*

battery commences at step S125). As discussed above at Claim 1[d], the charge completion time and time required to charge are also both mathematically linked, as the control unit 20 uses the time required to charge in calculating the predicted charge completion time. Additionally, Hayashi already teaches the time required to charge “may simply be displayed.” EX1005-Hayashi, [0170]. Because the time required to charge and charge completion time are already mathematically linked (as discussed in Claim 1[d]), and Hayashi expressly teaches displaying the time required to charge and the charge completion time, it would have been obvious to display, during the standby period, the time required to charge.

148. Hayashi expressly motivates the combination at [0170], stating “the predicted charging time (the time required to charge the battery 6) may simply be displayed” instead of the charge completion time. The internal modification to Hayashi is simply substituting Hayashi’s displayed charge completion time during standby with displaying the time required to charge during standby, with the predictable result of “allow[ing] the user to plan the next scheduled use of the charging device.” EX1005-Hayashi, [0029]. A POSITA would have had a reasonable expectation of success in displaying the time required to charge during “standby,” given the time required to charge is already calculated and displayed during charge control. Indeed, Hayashi teaches that when in the standby state, “the predicted charging completion time is calculated” per S204, which includes

calculating the time required to charge for use in calculating the charge completion time. EX1005-Hayashi, [0104], [0102]; Claim 1[d]. Additionally, Hayashi also teaches displaying the time required to charge during the charge control process. EX1005-Hayashi, [0170]. Thus, the modification would only require simple programming changes to have the control unit 20 display the already-calculated time required to charge during standby.

149. Further, Hayashi teaches the control processing is executed by the charging control unit 20, which is thus *configured to... display, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display*. EX1005-Hayashi, [0086] (The **control processing executed by the charging control unit 20 for operating and controlling these charging devices** will now be explained using the flowcharts in FIG. 4 to FIG. 7. **The processing shown in FIG. 4 is executed by the charging control unit 20...**"). Additionally, the use selects a charging start time when selecting an intentionally-delayed charge, and thus the *starting charging of the battery is according to the at least one condition*. EX1005-Hayashi, [0099]; see Claim 1[d].

150. In the Hayashi-modified system, Ishii's *controller* would be *configured to display* the amount of time required to charge (*amount of time*) during the time-specified charge mode (*active charging session*) *before starting charging* by, e.g.

the microcomputer sending controller 6 the calculated time required to charge and instructing display and operation unit 13 to display the time after entering time-specified charge mode but before starting charging. EX1004-Ishii, [0047], [0051], [0044], [0029].

d) Motivation to Combine

151. A POSITA would have been motivated and found it obvious to modify Ishii's *controller* (controller 6 and charger 8 microcomputer) to display the time required to charge the battery while the system is in standby waiting for charging to begin (during the time-specified charge mode), per Hayashi. Ishii already teaches calculating and displaying the time required to charge during the time-specified charge mode while charge is supplied to the battery. EX1004-Ishii, [0065]. Thus, additionally displaying the calculated time required to charge during the time-specified charge mode before starting charging would have involved adding an additional step in the time-specified mode processing that is already programmed and implemented.

152. The modified Ishii system is already modified to calculate the time required to charge during the delay period prior to starting charging, per Hayashi. *See* Claim 1[d]. A POSITA would have further been motivated to display such a calculated time required to charge for user convenience to review the charging time. A POSITA would have appreciated that displaying the time required to charge would

allow the user to confirm the charging schedule before leaving the vehicle. If the time required to charge is displayed before starting charging but after entering the time-specified charge mode, the user would be assured that the charging schedule would align with their own needs before leaving the vehicle. A POSITA would have also been motivated because displaying the required charge time before the scheduled charging begins would allow the user to visually confirm whether the charging time works with the user's own schedule, or if the scheduled charging should be modified. For example, if the user has a trip planned and needs to charge their vehicle, the user would be able to ensure whether necessary charging would be complete before the time the user needs to use the vehicle. Additionally, presenting charging information was known to be beneficial to users, and thus a POSITA would have recognized the advantage of providing the time required to charge at various stages of the charging session, including during the delay time. *See* ¶¶ 50-54. For example, the user may leave the vehicle prior to the charging starting, and thus would benefit from seeing a calculated time required to charge during the delay period.

153. A POSITA would also have been motivated to make the modification to allow the user to adjust their own schedule if need be based on the displayed required charge time prior to starting charging, especially if the current charge of the vehicle was low. This modification would allow the user to determine if their driving plans needs to be adjusted (e.g., use a taxi instead). For example, if the level of

charge of the battery of the vehicle is low or close to empty, the user may have to change their own plans or schedule if there is not a sufficient amount of time to charge the vehicle.

154. This modification entails the use of a known technique (Hayashi's display of the time required to charge the battery while in standby waiting for charging to begin) to improve similar devices (Ishii's electric device of an electric vehicle) in the same way.

155. A POSITA would have had a reasonable expectation of success in modifying Ishii per Hayashi. Ishii already teaches displaying the time required to charge during the charging of the battery, which charger 8 microcomputer controls. EX1004-Ishii, [0065] (disclosing charger 8 "displays the time required to charge" at step B5 of "starting the charge"), FIG. 4, [0044] (disclosing the microcomputer of charger 8 executing the "time-specified charge"). Ishii teaches controller 6 already communicating with display and operation unit 13 during the time-specified mode setting, charger 8 microcomputer executing the time-specified charge mode, and controller 6 and charger 8 communicating via bus 26. EX1004-Ishii, [0024] (disclosing controller 6 interfaces with display and operation unit 13 and bus 26), [0044], [0047], [0024],[0029], [0030] (disclosing "bus 26" transfers information between charge 8 and controller 6, among other electric device 1 components). Indeed, a POSITA would have recognized controller 6 already relays information

between the display and charger 8, given the display displays “necessary information” including the “state of the charger 8.” EX1004-Ishii, [0029]. Thus, modifying Ishii to implement the functionality of displaying the time required to charge the battery while the system is in standby, per Hayashi, would have required only straightforward modifications to the programming instructions of controller 6 and charger 8 microcomputer. Ishii’s controller 6 is already configured to provide instruction to display the charge starting time. EX1004-Ishii, [0029] (“Display is performed according to a signal from the controller 6 and operation information is sent to the controller 6 via an operation bus.”). Thus, a POSITA would have understood that this modification would simply entail programming charger 8 microcomputer to send the calculated time required to charge to controller 6 during the delay period before starting charging and programming controller 6 to send the time required to charge to the display and operation unit 13 for display during the delay period. This modification would have required nothing more than ordinary skill in the art and would have been well within the skillset of a POSITA, given controllers were known to communicate with displays in the vehicle and known to display the time required to charge. See ¶¶ 48-54.

8. ***Claim 1[f]: [“the controller configured to”],...“repeatedly update the amount of time upon the display during the active charging session, including during the active charging session but before starting charging of the battery according to the at least one condition.”***

a) '010 Patent Description Regarding Repeatedly

156. The word “repeatedly” does not appear in the '010 Specification . The closest support is found at EX1001, 13:60-14:13, generally describing “continually” or “periodically” updating, “such as every second, minute, or other time interval.” EX1001, 13:60-14:13. I note that the '010 Patent provides this description: “For example, the charge time remaining indicator 66 can be updated by the controller 44 every second or minute based upon battery charge calculations made at the beginning of the charging session or made periodically during the charging session.” EX1001, 13:65–14:3.

b) Explanation of the Combination of Ishii-Hayashi or Ishii-Hayashi-Fujita

157. Both Ishii and Hayashi teach modes or states where a charging session has been programmed and set but actual charging of the battery (e.g., supplying current) has not begun. *See* Claims 1[c]-1[d]. In the Ishii-Hayashi combination and per Hayashi’s teachings, the time required to charge (*amount of time*) is displayed during the delay time where the time-specified charge mode (*active charging session*) has begun but *before starting charging of the battery*. *See* Claim 1[e]. Claim 1[f] requires *repeatedly* updating and displaying the time required to charge during this delay period. Both Hayashi and Fujita teach repeatedly updating and displaying the time required to charge.

158. Hayashi teaches, when displaying the time required to charge (also referred to by Hayashi as “charging time”), “the **charging time displayed** on the display unit 24 should be **incrementally reduced** in accordance with progress in the charging process to indicate the remaining time until charging is complete.” EX1005-Hayashi, [0170]. Fujita similarly teaches repeatedly updating and displaying a time required to charge while the battery is actively charging and provides further implementation details and specificity. *See* Claim 1[f], below.

159. In the combination, it would have been obvious to apply either Hayashi’s or Fujita’s teachings of repeatedly updating/displaying a time required to charge during Ishii’s delay time encompassing the time period from when Ishii’s time-specified charge mode begins to actual charging of the battery (e.g., supplying current to the battery), as discussed further in Section IX.A.8.e. Specifically, this delay time is after beginning the time-specified charge mode and before the charger begins charging the battery by supplying power when the “present time corresponds to the charge starting time.” EX1004-Ishii, [0046-0058], [0062-0064]. As discussed further in Section IX.A.8.e., such a modification to the Ishii-Hayashi combination is expressly suggested by Hayashi, which teaches that “if the charging device is in **standby waiting for charging to begin..., the time at which charging is completed will vary** depending on the status of the other charging devices.” EX1005-Hayashi, [0032]. Therefore, as discussed further below, it would have been

obvious and advantageous to modify Ishii's system to receive renewed parameters, recalculate, and then display the updated time required to charge while in standby waiting to charge.

c) Hayashi's Teachings

160. Hayashi teaches *repeatedly update the amount of time upon the display during the active charging session*. Specifically, Hayashi teaches that during the "charging of battery 6," "charging control is executed." EX1005-Hayashi, [0096]. The charging control includes "incrementally" updating the time required to charge displayed on display 24 during charging of the battery. EX1005-Hayashi, [0170]. Hayashi's control unit 20 performs the charging control process and thus is *configured to...repeatedly....* EX1005-Hayashi, [0086].

d) Fujita's Teachings

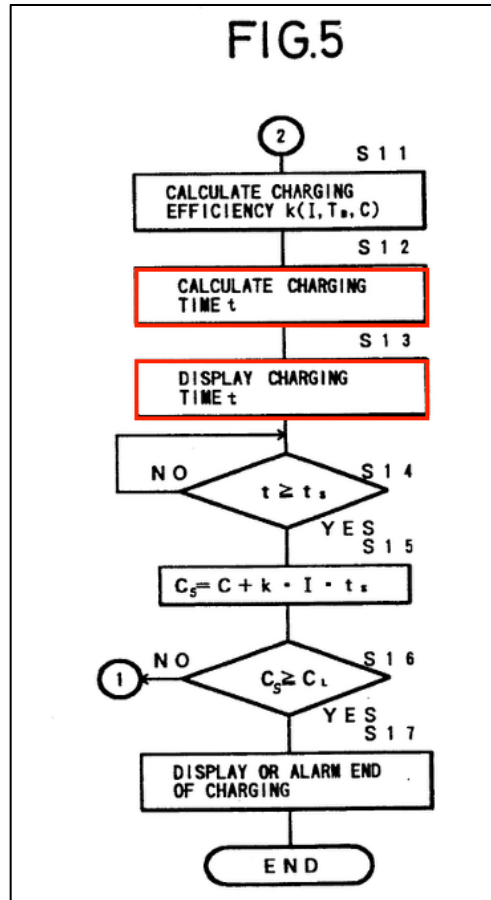
161. Fujita additionally teaches *repeatedly update...* and provides additional implementation details and specificity. Fujita teaches *repeatedly update* (i.e., repeat steps S9-S16 including steps S12, "calculate charging time t," and S13, "display charging time t") *the amount of time upon the display* (i.e., display charging time on alarm/display means 22, step S13). EX1006-Fujita, 3:58-4:49, FIGS. 4-5.

162. First, Fujita teaches calculating and displaying the *amount of time* required to charge the battery. EX1006-Fujita, Abstract, 1:7-8, 2:14-36, 3:58-4:49, FIGS. 4-5. Fujita teaches, "a battery charging device for charging batteries of electric

vehicles” and includes a control circuit for calculating and displaying charging time.

Id. Based on an input from the user specifying a “desired running distance L ”, the electronic control unit (ECU) 16 of the electric vehicle 10 “calculates a required amount C_L of electric energy of the battery to run the desired distance L (step S4)[.]”

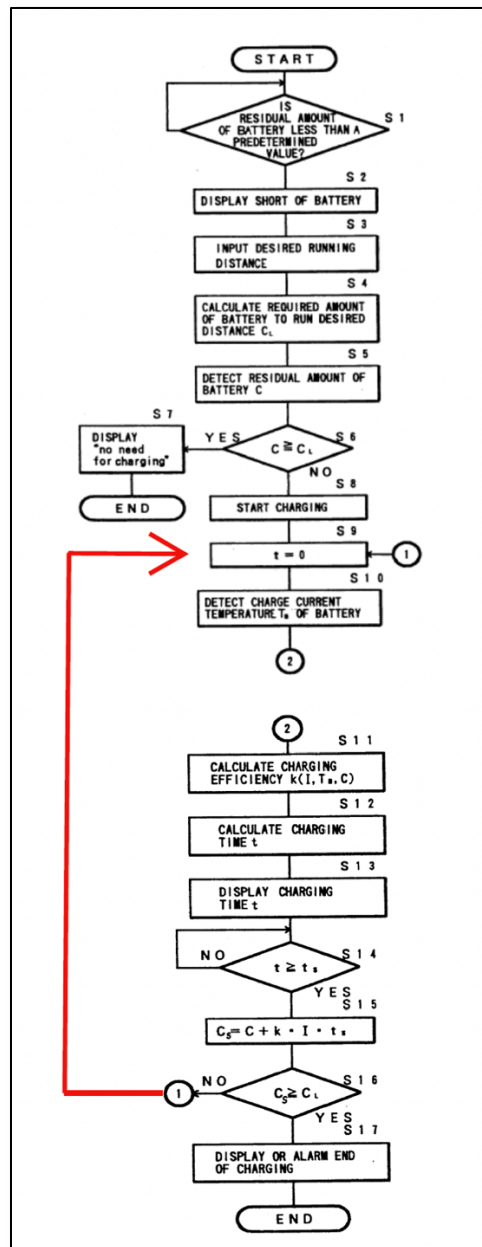
EX1006-Fujita, 3:58-62, 3:65-4:2. The ECU 16 “calculates a current residual amount C of electric energy of the battery (step S5),” and compares the input amount C_L obtained with the residual amount C (step S6).” EX1006-Fujita, 3:65-4:2. If the ECU 16 determines that $C < C_L$, the user must charge the electric vehicle. EX1006-Fujita, 4:5-14. Specifically, during charging, the ECU 16 “detects the charge current I flowing through the battery 30 and the temperature T_B of the battery 30 (step 10).” EX1006-Fujita, 4:15-18. During charging, the ECU detects parameters and then “calculates a charging efficiency $k(I, T_B, C)$.” EX1006-Fujita, 4:21-24. The charge efficiency is used to calculate a “charge time t .” EX1006-Fujita, 4:27-30. **“This charge time t is displayed on the charge time display 44 of the alarm/display means 22.”** EX1006-Fujita, 4:32-34. The charge time is the “residual time before the completion of charging.” *Id.* FIG. 5 below illustrates charging time t is calculated and displayed.



EX1006-Fujita, FIG. 5. Thus, Fujita teaches calculating and displaying the *amount of time* required to charge the battery.

163. Fujita further teaches that the calculating and display of charging time t is done *repeatedly*. After charge time t is calculated and displayed in steps S12 and S13, the “ECU 16 compares the charge time t with a predetermined time t_s (step S14) and **when a lapse of time t_s is detected**, the values of the charge current I , temperature T_B and residual amount C of the battery are renewed.” EX1006-Fujita, 4:35-40. If the current amount of electric energy of the battery (C_s) is less than the required amount of electric energy of the battery (C_L) (i.e., $C_s < C_L$), “**the**

operations after step S9 are repeated.” EX1006-Fujita, 4:48-49. Fujita teaches the operations of steps S9 through S16 are performed if $C_S < C_L$ after a particular lapse of time t_s has passed (i.e., periodically). FIGS.4-5 below demonstrate the repeated portion of the operation including the steps of calculating and displaying charging time t (steps S12 and S13). EX1006-Fujita, FIGS.4-5.



EX1006-Fujita, FIGS. 4-5; 4:35-49. As discussed above, ECU 16 is performing the steps of this operation and is this *configured to repeatedly update the amount of time upon the display*.

164. In the modified system with Hayashi or Fujita's periodic updating, Ishii's controller would be programmed to repeatedly update the amount of time upon the display during the active charging session, including during the active charging session but before starting charging of the battery according to the at least on condition as the controller would update the display and operation unit 13 with the updated time required to charge during the "delay time" before the present time has reached the input charge starting time.

e) Motivation to Combine

165. A POSITA would have found it obvious and been motivated to modify Ishii-Hayashi's electric device with either of Hayashi's or Fujita's operation of periodically renewing parameters and recalculating and displaying the updated charging time while in the delay period waiting to charge to increase the accuracy of the time required to charge displayed to the user. Fujita teaches the "ECU 16 compares the charge time t with a predetermined time (step S14) and when a lapse of time t_s is detected the values of the charge current I , temperature T_B and residual amount C of the battery are renewed [.]” EX1006-Fujita, 4:35-39. These parameters are utilized to calculate the charging efficiency and the charging time. EX1006-

Fujita, 4:15-40. A POSITA would have appreciated that once Fujita's periodically repeated algorithm was implemented in Ishii-Hayashi's system, Ishii's controller 6 would receive renewed parameters from the measuring means 16 after a certain amount of time had lapsed. Thus, Ishii would recalculate the time required to charge based on the renewed parameters. Further, Ishii would then display the updated time required to charge on the display and operation unit 13 before the specified time for charging is reached and charging (power being supplied to the battery) begins.

166. A POSITA would have appreciated periodically renewing, recalculating, and displaying an updated time required to charge would provide the user with a more accurate representation of the vehicle's charging time. For example, a POSITA would have appreciated some conditions could vary while the charger is in Ishii's time-specified charge mode prior to starting charging and affect the calculated time required to charge the battery, and thus providing an updated charging time calculation would improve accuracy of the predicted time. For example, it was known in the art that temperature of the battery could impact the charging efficiency. EX1027-Boll, 5:11-15 ("Subsequently, the charging operation will be precalculated, in which case the temperature course of the battery is also taken into account, which influences the charging efficiency and a possibly required charging current limitation."); EX1035-Yagi; 1:42-48 ("...if the allowable temperature is exceeded, the charging efficiency is reduced and it is not possible for

the battery to be charged substantially.”); EX1006-Fujita, 4:21-26 (discussing how charging efficiency is calculated and varies based on “other factors of the battery 30”), 4:27-31 (discussing that charging efficiency is used in the calculation of the charge time t). Indeed, both Ishii and Fujita utilize battery temperature and “charging efficiency” when calculating the charging time (time required to charge). EX1004-Ishii, [0052], [0045]; EX1006-Fujita, 3:65-67, 4:27-34. Thus, a POSITA would appreciate viewing a renewed time required to charge would provide a more accurate time prediction within the charging schedule that the user could better rely on in considering their driving plans.

167. Hayashi expressly suggests the combination, as it recognizes charge time varies, including during standby (i.e., before actual charging has begun): “if the charging device is in **standby waiting for charging to begin...**, **the time at which charging is completed will vary** depending on the status of the other charging devices.” EX1005-Hayashi, [0032]. In houses with multiple electric vehicles being charged, Hayashi informs a POSITA that the time required to charge will vary during standby. EX1005-Hayashi, [0032], (“... if the charging device is in standby waiting for charging to begin, or has executed the monitoring means to increase its current usage in response to a decrease in current usage by other charging devices, **the time at which charging is completed will vary depending on the status of the other charging devices.**”), [0033].

168. Additionally, a POSITA would have been motivated to modify Ishii-Hayashi per either Hayashi or Fujita to provide an accurate time required to charge to improve scheduling efficiency. Hayashi understands the importance of providing an accurate charging time as “the subsequent scheduling of use of the vehicle equipped with the battery being charged by this charging device becomes more accurate, thereby improving efficiency.” EX1005-Hayashi, [0033], (discussing that accuracy and efficiency improve when “the predicted time of charge completion provided to the user becomes more accurate”). A POSITA would have appreciated that performing periodic recalculations of the time required to charge and displaying that to the user during the standby (delay time) would allow the user to more accurately plan trips with the vehicle. For example, if the periodic recalculations of the time required to charge results in an increase or decrease of the charging time, the user would appreciate such refined predictions, as they would be made aware that the charging may take longer than expected or shorter than expected and be able to adjust use of the vehicle based on that information.

169. This modification entails the use of a known technique (either Hayashi’s or Fujita’s periodically repeated operation based on renewed time required to charge) to improve similar device (Ishii-Hayashi’s electric device) in the same way.

170. A POSITA would have had a reasonable expectation of success further modifying Ishii-Hayashi. Ishii, Hayashi, and Fujita teach similar algorithms that ultimately calculate the time required to charge the vehicle. EX1004-Ishii, [0045], [0052]; EX1005-Hayashi, [0102], [0170]; EX1006-Fujita, 3:65-67, 4:27-34. Additionally, Ishii updates the “charging time” during the actual charging of the battery “to indicate the time taken before the completion of the charge” in “succession.” EX1004-Ishii, [0065]. A POSITA would have understood that both Ishii’s and either Hayashi’s or Fujita’s algorithms for calculating the time required to charge consider similar parameters and perform similar algorithms for determining the time required to charge. For example, Ishii teaches the time required to charge is calculated with the equation: “charging time = (battery capacity – remaining capacity)/ (charge current).” EX1004-Ishii, [0052]. Similarly, Fujita teaches that the charge time is calculated by “ $t=(C_L-C)/(k*I)$,” where C_L is the required amount of electric energy of the battery of the vehicle, C is the actual residual amount of the battery, I is the charging current, and k is an efficiency factor. EX1006-Fujita, 3:65-67, 4:27-34. Thus, Ishii’s “battery capacity” is identical to Fujita’s “ C_L ,” Ishii’s “remaining capacity” is identical to Fujita’s “ C ,” and Ishii’s “charge current” is identical to Ishii’s “ I .” Further, Ishii’s device already repeatedly compares the present time with the specified charging time while the charger is in

the charge mode and waiting for charging to begin at the specified time. EX1004-Ishii, [0063], FIG.4.

171. Accordingly, Modifying Ishii-Hayashi's system would have required only straightforward and routine modifications to the programming instructions of controller 6 and charger 8 microcomputer. For example, charger 8 microcomputer would be programmed to re-calculate the time required to charge if the present time does not meet the user-selected start time (i.e., during the delay period of the time-specified charge mode) and send the renewed calculations to controller 6, which would be programmed to send the renewed time to the display during the same delay period. Implementing either Hayashi's or Fujita's repeated operation in Ishii-Hayashi would have required nothing more than ordinary skill of a POSITA, given calculating time required to charge was well-known and simply updating a calculated time for display was trivial. *See* ¶¶ 52-56.

B. Claim 7: "The vehicle charger of claim 1, further comprising a user interface positioned within the vehicle, wherein the at least one condition includes a time of day and wherein the controller receives the time of day via the user interface."

a) Ishii's Teachings

172. Ishii teaches a *user interface*; namely, the "operation section" of "display and operation unit 13." EX1004-Ishii, [0021], [0029], FIG. 1. "The display and operation unit 13 is constituted by the display section...and **the operation section composed of a plurality of keys, buttons, a touch panel** or the like capable

of instructing the operation of the electric device 1.” EX1004-Ishii, [0029]. The operation section of the display and operation unit 13 is a *user interface* because **“charge starting time is inputted by key operation on the display and operation unit 13”** by a user that interfaces with the keys. EX1004-Ishii, [0029], [0050]. Therefore, Ishii’s operation section of the display and operation unit 13 would be a *user interface* for the user to input the charge starting time.

173. Ishii teaches that the *user interface is positioned within the vehicle* because the operation section is a part of the display and operation unit 13, which is included in the electric device 1 of an electric vehicle (or in view of Fujita). EX1004-Ishii, [0029] (“The display and operation unit 13 is constituted by the display section...and the operation section composed of a plurality of keys, buttons, a touch panel or the like capable of instructing the operation of the electric device 1...”), [0119] (teaching the “industrial applicability” is an “electric device of an electric vehicle”); *see also* Claim 1[a].

174. Ishii further teaches *wherein the at least one condition includes a time of day*; namely, the “charge starting time” that is input by the user during the setting of the time-specified charge mode. EX1004-Ishii, [0046-0049]; *see* Claim 1[c][1]. A POSITA would have recognized that the user inputting the charge starting time would specify a *time of day* at which they would like charging of the battery of the vehicle to begin, given charge starting time was commonly input as a time of day.

EX1008-Sutardja, [0264] (“For example, the user may input a request for charging at 5 PM on a given day.”).

175. Ishii’s controller 6 (part of Ishii’s *controller*) receives the charge start time via the operation unit (*receives the time of day via the user interface*) because the start time is “inputted by key operation on the display and operation unit 13” while setting the time-specified charge mode, which is carried out “via the controller 6.” EX1004-Ishii, [0050], [0047]; *see* Claim 1[c][1].

b) Hayashi’s Teachings

176. Hayashi specifies implementation details of the *at least one condition* including a *time of day*. Hayashi teaches the user inputting the “charging start **date** and **time**.” EX1005-Hayashi, [0099]. Hayashi’s input “charging date and time” provides further specificity to Ishii’s “charge starting time” that is input by the user. EX1004-Ishii, [0049]-[0050].

177. Hayashi teaches during the control processing executed by the charging control unit 20, the processing includes “start scheduling processing that initiates charging at a time that has been intentionally delayed.” EX1005-Hayashi, [0086], [0099]. Hayashi teaches *at least one condition includes a time of day* because during this processing “a screen is displayed on display unit 24 allowing the user to set the **charging start date and time**[.]” EX1005-Hayashi, [0099]. Hayashi teaches *the controller receives the time of day via the user interface* because the **start date and**

time is received by control unit 20 “based on a user input via the control panel 22.”

EX1005-Hayashi, [0099].

c) Motivation to Combine

178. A POSITA would have been motivated and found it obvious to modify Ishii’s operation section of the display and operation unit 13 to allow the user to input a “charging start date and time,” per Hayashi’s teachings, to make the time input easy and ubiquitous for the user. Ishii already teaches that inputting charge start time through the operation section of the display and operation unit 13. EX1004-Ishii, [0050] (“charge starting time is inputted by a key operation on the display and operation unit 13”).

179. To the extent not already taught in Ishii, a POSITA would have been motivated to modify Ishii’s operation section of the display and operation unit 13 to allow the user further specificity when setting a time-specified charge mode to include both a date and a time. A POSITA would have appreciated allowing the user to specify both the charging time and date increases charging schedule accuracy. For example, if a user desired to schedule a charge to begin overnight, the user could specify the following day’s date as well as the time to ensure that charging will begin on the correct day. This modification would increase the overall accuracy of the charging process, creating less room for error during scheduling by providing more detailed parameters. As a further example, if the user does not need to use the vehicle

for multiple days, the user could further specify the day on which they would like the charging to occur, rather than having to charge the same day the time was entered.

180. This combination would have been use of a known technique (Hayashi's inputting the charge starting date and time) to improve similar devices (vehicle charging systems) in the same way.

181. A POSITA would have had a reasonable expectation of success modifying Ishii's operation section of the display and operation unit 13, because Ishii already teaches that "charge starting time is inputted by key operation on the display and operation unit 13[.]" EX1004-Ishii, [0050]. Thus, modifying Ishii to implement the ability to input the charge start date and time, per Hayashi, would have required only minor and straightforward modifications to the operation section of the display and operation unit 13 as well as minor modifications to the programming instructions of controller 6. Ishii already has the hardware present for the user to input the charge starting time as the display and operation unit is "composed of keys, buttons, a touch panel, or the like. EX1004-Ishii, [0029], [0047]-[0049]. Thus, a POSITA would have recognized that the programming instructions of controller 6 would only need to be modified slightly to account for the charging date input by the user and relay that information to the charger 8. EX1004-Ishii, [0047].

C. Claim 8: “The vehicle charger of claim 7, wherein the user interface is defined at least in part by the display.”

182. Ishii’s operation section of the display and operation 13 is the *user interface*. See Claim 7. Further, Ishii teaches the operation section is a section of the **“display and operation unit 13.”** *Id.* **“The display and operation unit is constituted by the display section...and the operation section** composed of a plurality of keys, buttons, **a touch panel** or the like capable of instructing the operation of the electric device 1...” Ishii therefore teaches the operation section comprises a touch panel, which is part of *the user interface...defined at least in part by the display*. EX1004-Ishii, [0029].

183. A POSITA would have found obvious and been motivated to form Ishii’s display as a touch panel, to the extent not otherwise taught in Ishii. In the modification, Ishii’s operation unit that contains the touch panel (*user interface*) *is defined at least in part by the display*. A POSITA would have been motivated to modify Ishii to make the display of unit 13 a touch panel to reduce the amount of hardware required in unit 13 and make unit 13 less complex and accordingly more convenient for users. Implementing a touch panel as the display of unit 13 would reduce the hardware of the unit as fewer buttons, knobs, keys, etc. would be required. A POSITA would appreciate using the same interface to both view charging information and set charging information therefrom, as touch screens displays where known to be beneficial for use in a vehicle over alternative input options, including

keys. *See, e.g.*, EX1023-Pryor, 2:2-5. The modification would have had a reasonable expectation of success, given Ishii teaches part of unit 13 already containing a touch panel and teaches a display as being part of unit 13. Specifically, Ishii teaches, “the operation section” of the display and operation unit 13 is “composed of a plurality of keys, buttons, a touch panel, or the like.” EX1004-Ishii, [0029]. It was known to combine touch panels and displays, and thus the modification would have been within the skill of a POSITA. *See, e.g.*, EX1036-Obradovich, 6:20-24; EX1023-Pryor, 14:5, 39:1-2, FIG. 13B.

D. Claim 9

1. Claim 9[Pre]: “A method of charging a battery of a vehicle with a vehicle charger, the method comprising:”

184. Ishii teaches *a method for charging a battery of a vehicle with a vehicle charger*; namely the method performed by electric device 1. EX1004-Ishii, [0125], [0022-0023], [0046], [0059], FIG. 1, 3-4; Claim 1[Pre].

2. Claim 9[a]: “beginning an active charging session of the battery based on a programmed manner of charge and at least one condition, the programmed manner of charge starting charging of the battery in response to the at least one condition being met;”

185. Ishii teaches Claim 9[a]. *See* Claims 1[c][1]-1[c][2].

3. Claim 9[b]: “calculating, via a controller of the vehicle, an amount of time required to charge the battery;”

186. Ishii or Ishii-Hayashi teaches Claim 9[b]. *See* Claims 1[b], 1[d]. *See* Claim 1[d].

4. ***Claim 9[c]: "displaying, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon a display mounted within the vehicle;"***

187. Ishii-Hayashi teaches Claim 9[c]. *See* Claim 1[e].

5. ***Claim 9[d]: "supplying, under control of the controller of the vehicle, power to the battery of the vehicle to charge the battery; and"***

188. Ishii teaches *supplying...power to the battery of the vehicle to charge the battery*; namely, "supplies charge electric power to the secondary battery 2B or 3B of the selected battery unit to start the charge." EX1004-Ishii, [0065]. During Ishii's carrying out of the time-specified charge mode, Ishii teaches that "[w]hen the present time corresponds to the charge starting time, it proceeds to B4" where "the charger 8 turns ON either switch 19 or 20 according to the switch control signal S2, selects the battery unit 2 or 3 to be charged, and **supplies charge electric power to the secondary battery 2B or 3B of the selected battery unit to start the charge.**" EX1004-Ishii, [0059-64], FIG. 4; Claims 1[c][1]-[2]. Because Ishii's charger 8 microcomputer executes the time-specified charge mode, which includes supplying power to the batteries (step B4 of FIG.4), power is *suppl[ied] under the control of the controller of the vehicle* (Ishii's collective controllers 6 and charger 8 microcomputer). Ex1004-Ishii, [0060] (disclosing charger 8 performing time-specified charge mode via FIG. 4), [0065], [0044] (disclosing charger 8 microcomputer executing the time-specified charge mode).

6. ***Claim 9[e]: "updating the amount of time upon the display during the active charging session, repeatedly update the amount of time upon the display during the active charging session, including during the active charging session but before starting charging of the battery according to the at least one condition."***

189. Ishii-Hayashi alone or in further combination with Fujita teaches Claim 9[e]. *See* Claim 1[f].

- E. **Claim 13: "The method of claim 9, wherein the at least one condition includes a time of day and further comprising receiving, via a user interface of the vehicle charger, the time of day."**

190. *See* Claim 7.

- F. **Claim 14: "The method of claim 13, wherein the user interface is defined at least in part by the display."**

191. *See* Claim 8.

X. OPINIONS REGARDING GROUND 2: CLAIMS 2-4, 10, 15, 17, AND 18 ARE OBVIOUS OVER ISHII, HAYASHI, FUJITA, AND KELTY-078

- A. **Claim 2: "The vehicle charger of claim 1, wherein the controller is a first controller, the vehicle charger further comprising a receiver coupled to the first controller, the receiver configured to establish communication between the first controller and a second controller remote from the vehicle and the vehicle charger."**

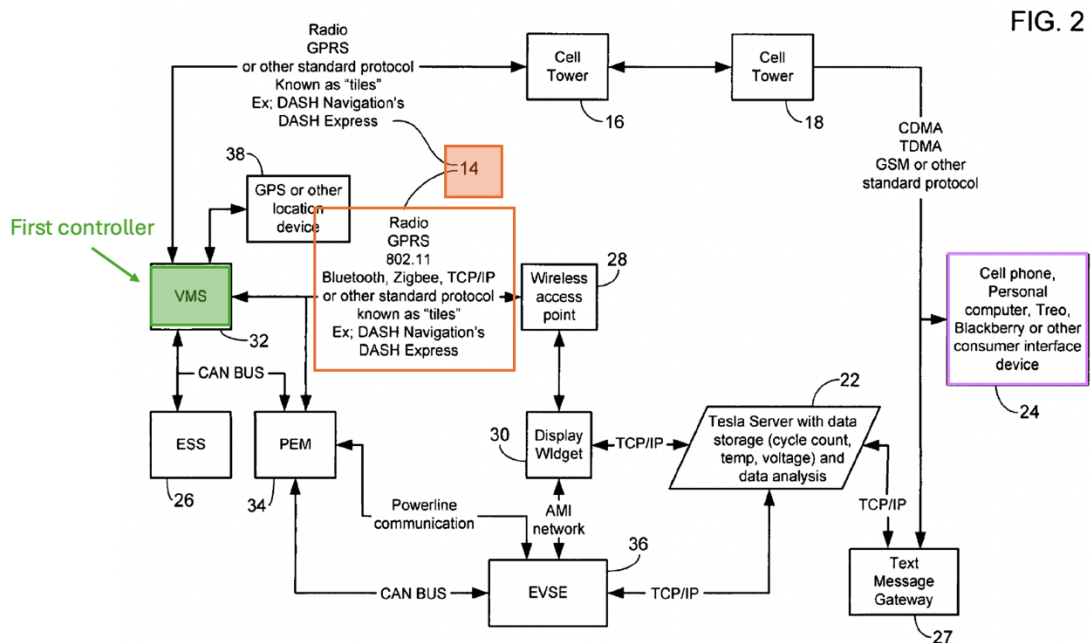
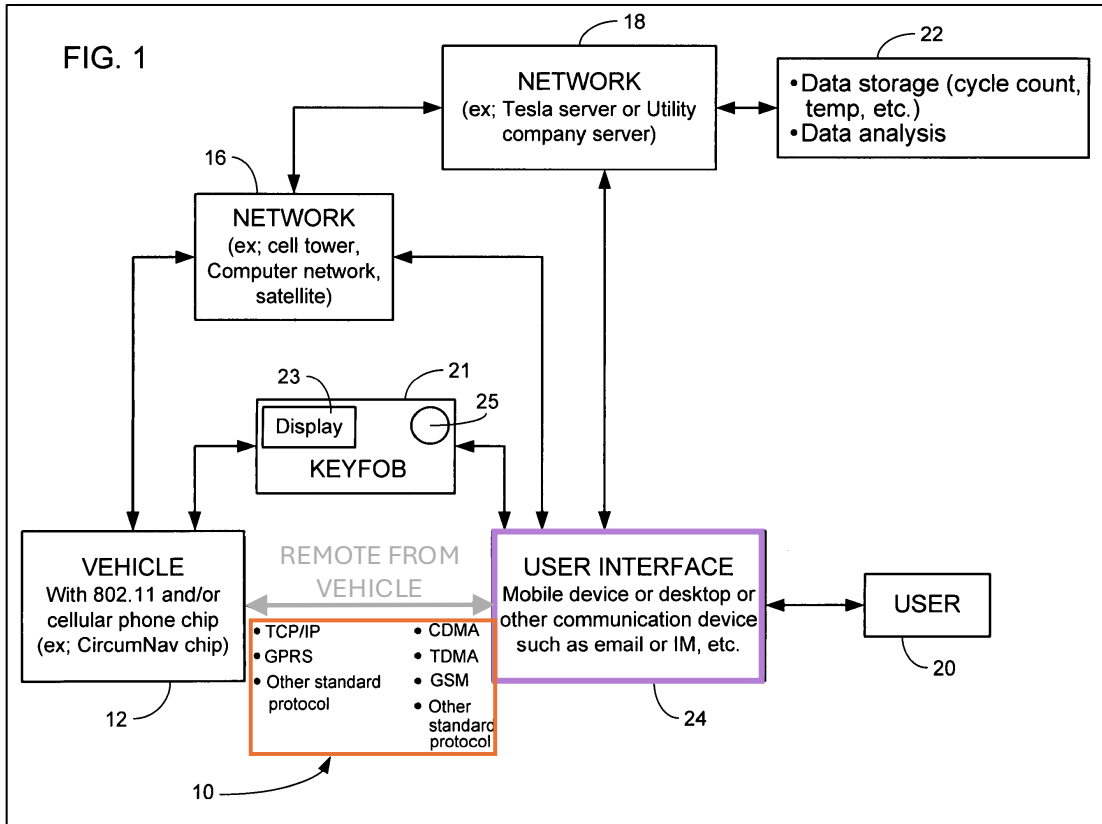
1. *"the controller is a first controller"*

192. Ishii teaches *the controller is a first controller*; namely, controller 6 and charger 8 microcomputer. *See* Claim 1[b]. Kelty-078 additionally teaches a *first controller*, namely vehicle management system (VMS) 32. Kelty-078 teaches VMS 32 "is the onboard computer that monitors, controls and coordinates various systems

in the electric vehicle 12[.]” EX1007-Kelty-078, 7:44-51, 4:1-39 (disclosing communication between vehicle and portable user interface device 24 via communication chip utilizing various known, wireless protocols), 4:53–5:9, 3:62–4:1. Kelty-078’s VMS 32 is an onboard vehicle computer, and therefore, includes a *first controller*, given computers were known to commonly include controllers and the ’010 repeatedly equates a controller with a computer. EX1007-Kelty-078, 7:44-5, EX1001, 28:34-35 (describing “controller 444 (e.g., computer)”), 21:53-54 (describing “another controller, such as a processor of a user’s computer”), 9:8-9 (describing that the “controller can be on or more processors of a personal computer”), 13:49-50 (describing “controller 50 of a computer of the power utility 48.”).

2. “*the vehicle charger further comprising a receiver coupled to the first controller*”

193. Kelty-078 teaches *a receiver*, namely a communication chip 14 using “standard” wireless protocols to communicate with Kelty-078’s vehicle computer (vehicle management system (VMS) 32; *first controller*). The communication chip 14 “may communicate with” VMS 32 to “allow for the vehicle 12 to contact the user 20 via the user interface device 24 by any known mobile device....” EX1007-Kelty-078, 4:43-58. Communication chip 14 uses “standard protocol[s]” such as Bluetooth. EX1007-Kelty-078, 3:62-65, 4:1-4, 4:24-30 (disclosing the user interface device 24 and vehicle 12 communicating via “Bluetooth”), 7:44-51, FIGS. 1-2.



EX1007-Kelty-078, FIGS. 1-2.

194. Because Kelty-078's communication chip 14 (which serves as a "radio" or transceiver) implements protocols such as Bluetooth, and further because VMS 32 is in communication with communication chip 14 and user interface 24 over such common wireless communication protocols, Kelty-078's communication chip 14 includes a *receiver*, as claimed. EX1007-Kelty-078, 4:53-58, 7:43-47. A POSITA would have understood that communicating via Bluetooth includes both a transmitter and receiver. EX1016-Sharma, 1:11-16 (disclosing "Bluetooth" as using a "receiver" for communication).

195. Communication chip 14 (*receiver*) is *coupled to the first controller*. Communication chip 14 (also referred to in Kelty-078 as "communication device 14") is "arranged and installed within the electric vehicle" and "may also be incorporated into the computer controlling the vehicle internal network." EX1007-Kelty-078, 3:53-59. Kelty-078 teaches various types of information exchanged between VMS and user interface device 24 using communication chip 14. EX1007-Kelty-078, 5:40-44 (discussing that the communication between the VMS 32 and the user interface device 24 "may have the user 20 capable of powering on and off in predetermined cycles and at predetermined times and at predetermined times the charging of the battery 26 from a user interface device"). Because the communication chip and VMS are both onboard or otherwise installed in the vehicle and because the communication chip and VMS communicate with each other, the

communication chip 14 (*receiver*) is *coupled to the first controller* (VMS). EX1001, 6:29-35 (stating “coupled” is “used broadly” in the ’010 Patent).

196. Kelty-078’s communication chip (*receiver*) and controller of VMS (*first controller*) are comprised in a *vehicle charger for charging a battery*. Kelty-078 teaches electric vehicle communication interface 10 includes communication chip 14 that is for “controlling and monitoring a battery in the electric vehicle.” EX1007-Kelty-078, Abstract, 3:26-53, FIGS. 1-2. The communication chip 14, VMS 32, and the power electronics module (PEM) 34 are collectively installed in the vehicle and communicate with one another. EX1007-Kelty-078, 3:53-59, 7:44-53, FIG. 1. The PEM 34 charges the batteries of the energy storage system (ESS) 26 based on control from the VMS 32. EX1007-Kelty, 7:59-64. Because Kelty-078’s communication chip 14, VMS 32, PEM 34, and ESS 26 collectively work together to charge the vehicle, the *vehicle charger for charging a battery compris[es] a receiver* (Kelty-078’s communication chip 14), which is *coupled to the first controller* (controller of Kelty-078’s VMS 32).

3. ***“the receiver configured to establish communication between the first controller and a second controller remote from the vehicle and the vehicle charger”***

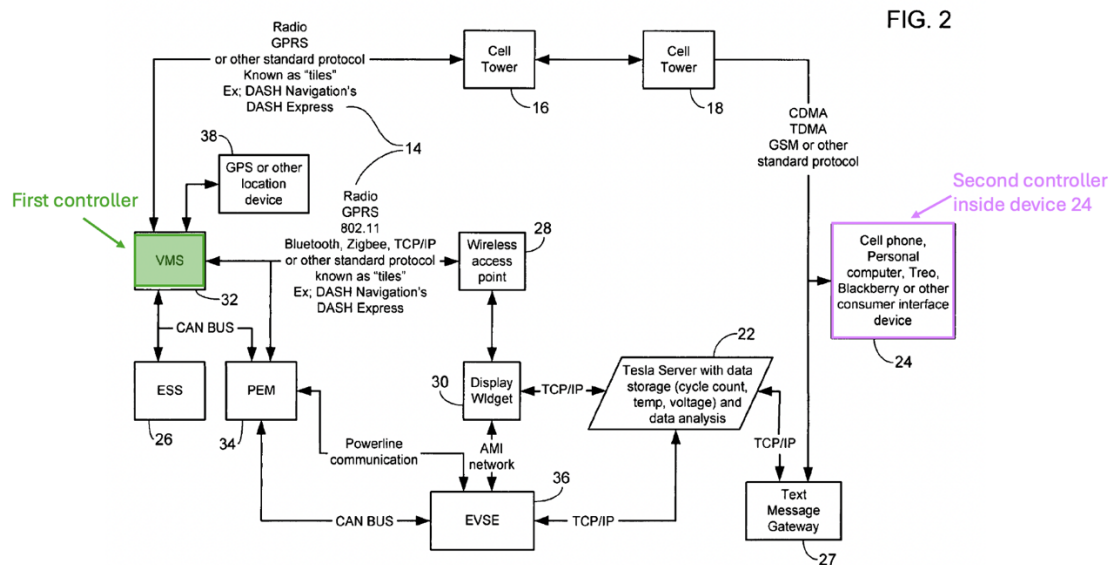
a) ***“second controller”***

197. The ’010 Patent states the “other controller can be one or more **processors of** a personal computer, **phone**, PDA, or other processor-based device

associated with a user...” EX1001, 9:8-10. Therefore, the claimed *second controller* includes at least a processor of a phone. EX1001, 9:8-10.

198. Kelty-078 teaches *a second controller*; namely, a processor of user interface device 24 that is a “portable device.”² EX1007-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 user interface devices 24 may include...mobile devices, such as **cellphones**.” EX1007-Kelty-078, 4:16-21, FIG. 3. Kelty-078 provides “Blackberry” and “Treo” as examples of interface 24 in FIG. 2 (below). EX1007-Kelty-078, FIG. 2; EX1037-PalmTreo700, 7 (describing the PalmTreo700 as an “advanced **mobile smartphone**”), 16 (further describing the PalmTreo700 as a “**mobile phone**”).

² As used herein, mappings referencing Kelty-078’s user interface device 24 and disclosed functionality should be understood to be referencing the **processor** of device 24.

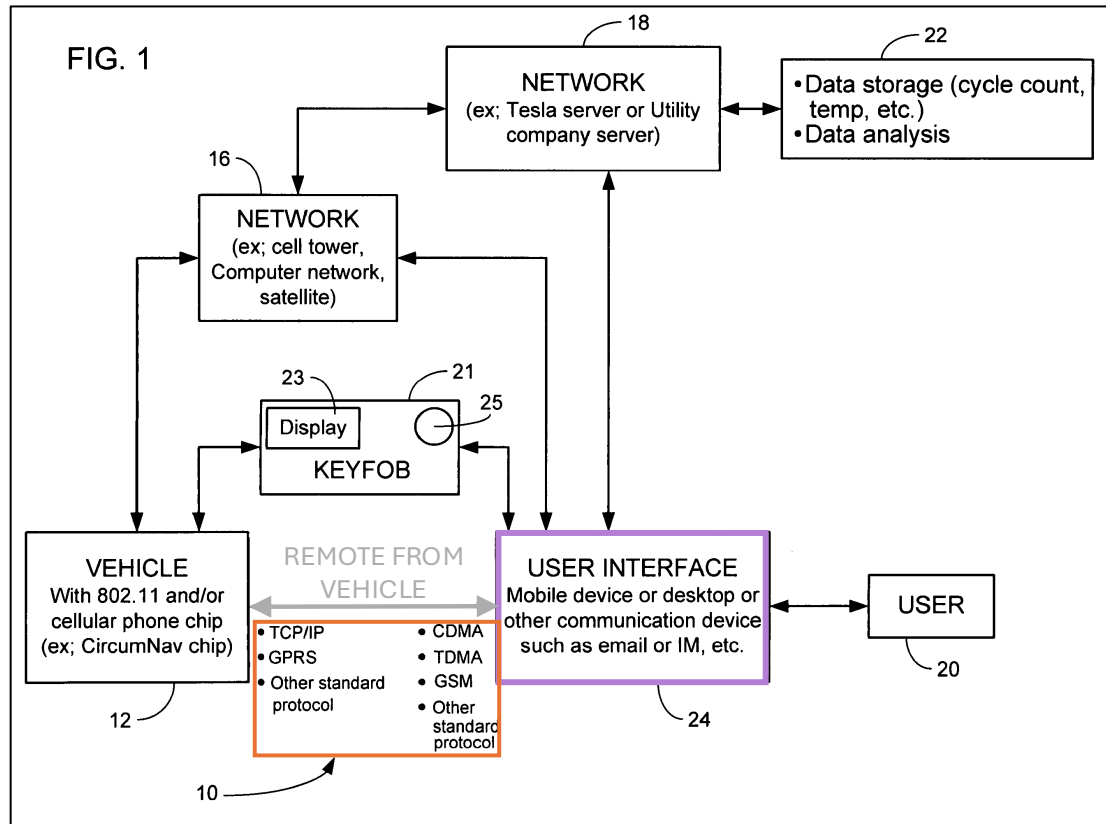


EX1007-Kelty-078, FIG. 2; *see also id.*, 4:53-54 (“...communication device arranged and installed within the electric vehicle), 6:32-35 (discussing display 30 may be an “in vehicle display”), 7:44-51 (discussing VMS 32, ESS 26, and PEM 34 are “in the electric vehicle”) , 8:58-61 (“...onboard location device, such as global positioning or satellite or system (GPS) or the like...”)

199. Kelty-078’s user interface device 24 comprises a *controller*, e.g., a processor. As previously discussed, the ’010 Patent states that the “other controller can be one or more processors...of a phone.” EX1001, 9:8-10. First, Kelty-078 discloses exemplary user interface devices are the Blackberry and Treo, each of which includes a processor. For example, it was well-known that the Palm Tree 700 included a processor. EX1037-PalmTreo700, 247 (“**Processor** technology. Intel Xscale® **processor**, 312MHz.”). Second, Kelty-078 repeatedly discusses

functionality performed by user interface 24 requiring a processor, such as “**controlling** and monitoring the battery for charging the vehicle,” communicating with networks or the vehicle via user interface 24, remotely powering on/off the vehicle’s battery, implementing functionality “via programming by a user interface device 24,” and storing location data in the interface device 24. EX1007-Kelty-078, 4:16-39, 4:58–5:1, 5:40-44, 8:32-37, 9:3-8. Additionally, cellphones were well known to include processors. *See e.g.*, EX1038-Hayes, 4:33-43 (discussing the processor of a mobile terminal device being “**any standard mobile phone processor** that handles user inputs”); EX1039-Aikawa [0036]-[0037] (discussing how “mobile terminal 200” includes “information processing unit 270, which is based on a microprocessor or the like”), FIG. 1 (illustrating that “mobile telephone 200” includes “information processing unit 270”). Because (1) the ’010 Patent states “the other controller can be one or more processors of a personal computer, **phone**, PDA, or other processor-based device associated with a user...” and Kelty-078 describes cellphones as exemplary user interface devices 24; (2) Kelty-078 teaches an exemplary user interface is a commercially-available device known to have a processor; (3) Kelty-078’s user interface device 24 performs functionality requiring a processor; and (4) cellphones were well known to include processors, Kelty-078 teaches a *second controller*.

200. Additionally, Kelty-078 teaches that “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 the vehicle charger.*” EX1007-Kelty-078, 4:58-65, 5:2-5, 8:40-44, FIG. 1.



EX1007-Kelty-078, FIG. 1. As explained above and illustrated in FIG. 1, the user interface 24 can be in the “location of the user” and thus not within the vehicle when the user is not in the vehicle. EX1007-Kelty-078, 5:2-5.

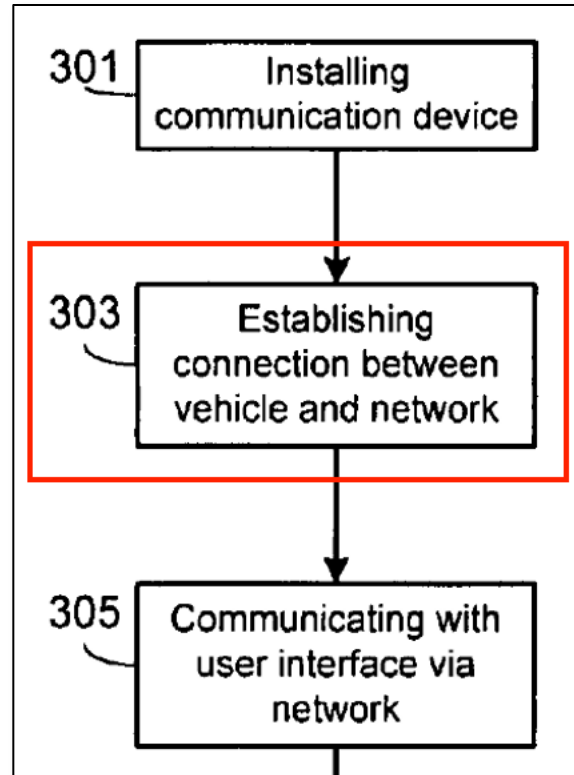
b) “establish communication”

201. Kelty-078 teaches communication chip 14 (*receiver*) *establishes communication (via Bluetooth) between the first controller (controller of VMS 32)*

and the second controller (processor of interface device 24), as controlled by VMS

32. Kelty-078's VMS 32 communicates with the user interface 24 via communication chip 14. EX1007-Kelty-078, 4:53-58 (discussing the communication chip allowing for communication between the user interface device 24 and vehicle), 7:43-47 (discussing communication chip 14 communicating with VMS 32 using known communication protocols); 8:44-48 ("It should also be noted that the manufacturer may use this data to broadcast specific messages to the user or driver 20 through the onboard communication chip 14 or through. Cellular connection which will allow for displaying on the dashboard touch screen device 30.").

202. Kelty-078 expressly teaches communication chip 14 (*receiver*) *establish[es] communication* under control by VMS 32. Kelty-078 teaches "[e]stablishing connection between vehicle and network" and "[c]ommunicating with user interface [24] via network":

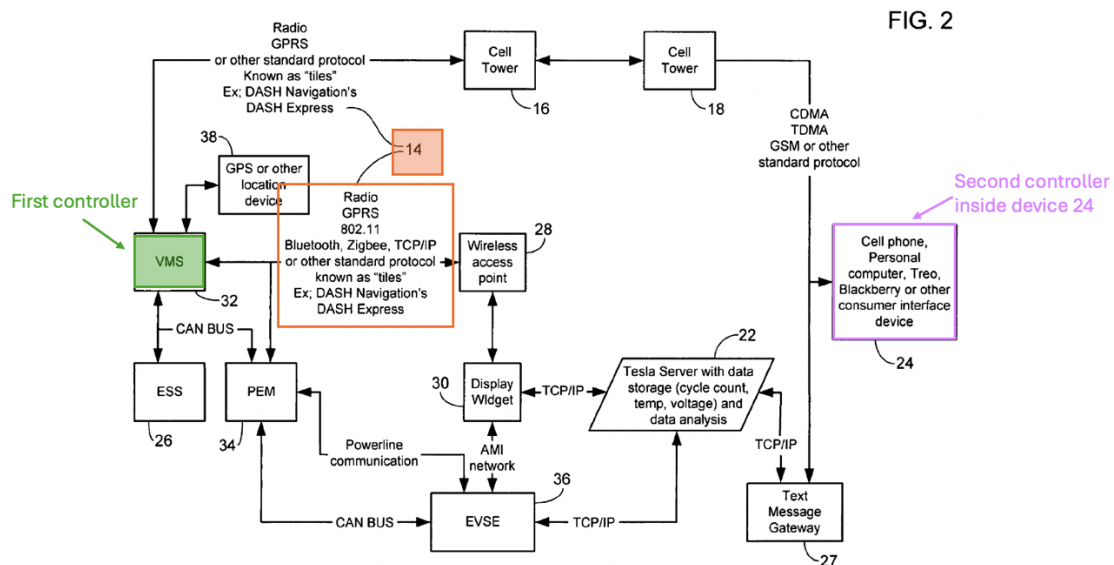


EX1007-Kelty-078, FIG. 3 (excerpt), Abstract (“establishing a connection **from** the vehicle to a network”), 2:25-30 (disclosing “establishing a connection,” including “contacting a user interface device via the network”), 9:64 (Claim 1).

203. Because Kelty-078 teaches (1) the controller of VMS 32, i.e., the *first controller* in the vehicle, establishes a connection with a network (FIG. 3, Step 303) via communication chip 14 (*receiver*) (2) the connection can be established **from** the vehicle; (3) the controller of VMS 32 “controls” the “various systems in the electric vehicle”; and (4) the communication chip/device 14 is arranged in the vehicle and “may also be incorporated into the computer controlling the vehicle

internal network,” the communication chip 14 (*receiver*) is configured to establish *wireless communication* under control by the VMS 32.

204. Regarding communication *between the first controller and the second controller*, Kelty-078 further teaches “[t]he 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).” EX1007-Kelty-078, 4:16-19. A disclosed exemplary communication protocol includes a Bluetooth connection established through **communication chip 14**. EX1007-Kelty-078, 3:53-67, 4:24-39, FIG. 2; Thus, the controller of the VMS 32 and the user interface device 24 communicate via Bluetooth connection that was established through the communication chip 14.



EX1007-Kelty-078, FIG. 2; *see also id.*, 7:44-47 (discussing the communication protocol used to communicate with VMS 32). It is well known that Bluetooth is a communication protocol that establishes wireless communication between devices.

205. The Bluetooth Specification describes that “**Bluetooth wireless technology** is a short range **communications system** intended to replace the cable(s) connection portable and/or fixed electronic devices.” EX1012-Bluetooth, 13. “The Bluetooth core system consists of an RF [radio frequency] transceiver, baseband, and protocol stack. The system offers services that **enable the connection of devices** and the exchange of a variety of classes of data between these devices.” EX1012-Bluetooth, 13. Further, the radio frequency is wireless. EX1012-Bluetooth, 13 (“The Bluetooth RF (physical layer) operates in the unlicensed ISM band at 2.4 GHz.”).

206. “The Bluetooth system provides a point-to-point connection” wherein “the physical channel is shared between two Bluetooth devices.” EX1012-Bluetooth, 63, FIG. 1.1(a). “Two Bluetooth devices use a shared physical channel for communication. To achieve this their transceivers need to be tuned to the same RF frequency at the same time, and they need to be within a nominal range of each other.” EX1012-Bluetooth, 34, 63, FIG. 1.1.

207. “In order to establish new connections the paging procedure is used.” EX1012-Bluetooth, 154. In the Kelty-078 system using Bluetooth communications, the paging procedure establish[es] wireless communication between a master (“the

paging device,” Kelty-078’s communication chip 14 under the control of VMS 32) and slave (“the page scanning device,” similar Bluetooth functionality connected to the processor of Kelty-078’s portable device 24) devices. EX1012-Bluetooth, 76. Steps of the paging procedure including both devices for pairing entering a “CONNECTION” state and sending packets between the two devices. EX1012-Bluetooth, 159-162, FIGs. 8.1, 8.3, Table 8.3.

208. Because Kelty-078 teaches vehicle wirelessly communicates with *user interface device 24* via the network and the established communication (FIG. 3, Step 305), Kelty-078 teaches the *receiver (communication chip 14)* is *configured to establish communication* under control by *VMS 32* and over Bluetooth *between the first controller* (the *controller of VMS 32*, much like Ishii’s controller 6) *and a second controller* remote from the vehicle and the vehicle charger, namely *user interface device 24 including a processor*.

4. Motivation to Combine

209. A POSITA would have been motivated to and found obvious implementing Kelty-078’s communication chip 14 in Ishii’s otherwise modified electric device to provide for wireless communication between the Ishii *first controller* (controller 6 and charger 8 microcomputer) and a remote user interface device, such as user interface 24, per Kelty-078 to (1) allow a user to control charging remotely and (2) increase access to charging information.

210. Kelty-078 teaches an exemplary, commercially-available communication chip and further teaches “standard” wireless protocols utilized by the communication chip, indicating that communication of an onboard vehicle computer with portable devices, such as cellphones, was known and common. EX1007-Kelty-078, 3:65–4:1, 7:44-51; *see* ¶¶ 57-59 (discussing how communicating between vehicle and remote devices was known). Kelty-078 even expressly suggests the modification, explaining there “is a need in the art for a communication interface for an electric vehicle...that will be able to control remotely the charging of the battery,” and provides various advantages that also apply to the proposed combination, as the combination is simply providing a communication interface (e.g., Kelty-078’s communication chip 14) in the existing Ishii electric device including controller 6 for communicating wirelessly with a user’s cell phone, as otherwise taught by Kelty-078. EX1007-Kelty-078, 1:35-39, 2:32-50.

211. For example, Kelty-078 teaches that the communication with VMS 32 via user interface would allow “the vehicle to notify the user when the battery is fully charged for or if a problem has occurred during charging thus affecting the operability of the electric vehicle,” and thus in certain situations a user of the vehicle would appreciate being able to receive information while outside the vehicle via this wireless communication. EX1007-Kelty-078, 2:46-50. For instance, if the user were

to leave their vehicle on the charger while in the grocery store, the user would be able to see information regarding the charging status of the vehicle on their mobile phone (user interface device 24). Thus, this would increase user accessibility to charging information.

212. A POSITA would have also appreciated controlling the charging remotely at, e.g., a phone, to allow the user to start the charge when they are away from the vehicle. Kelty-078, 7:35-43. For example, in certain situations where the user is away from their vehicle but needs to unexpectedly start charging (e.g., had an unexpected event added to their schedule), a POSITA would appreciate the user being able to start the charging remotely so the vehicle is adequately charged, especially in emergencies.

213. This modification would have been the use of a known technique (Kelty-078's communication chip 14 and user interface device 24) to improve similar device (vehicle chargers) in the same way.

214. A POSITA would have had a reasonable expectation of success modifying Ishii-Hayashi-Fujita's electric device per Kelty-078. Ishii already teaches controller 6 and charger 8 microcomputer being capable of receiving information from the components of the electric device. EX1004-Ishii, [0030]. Additionally, Ishii teaches that controller 6 interfaces with the system bus 26 and receives information from the other components of the electric device via system bus 26. EX1004-Ishii,

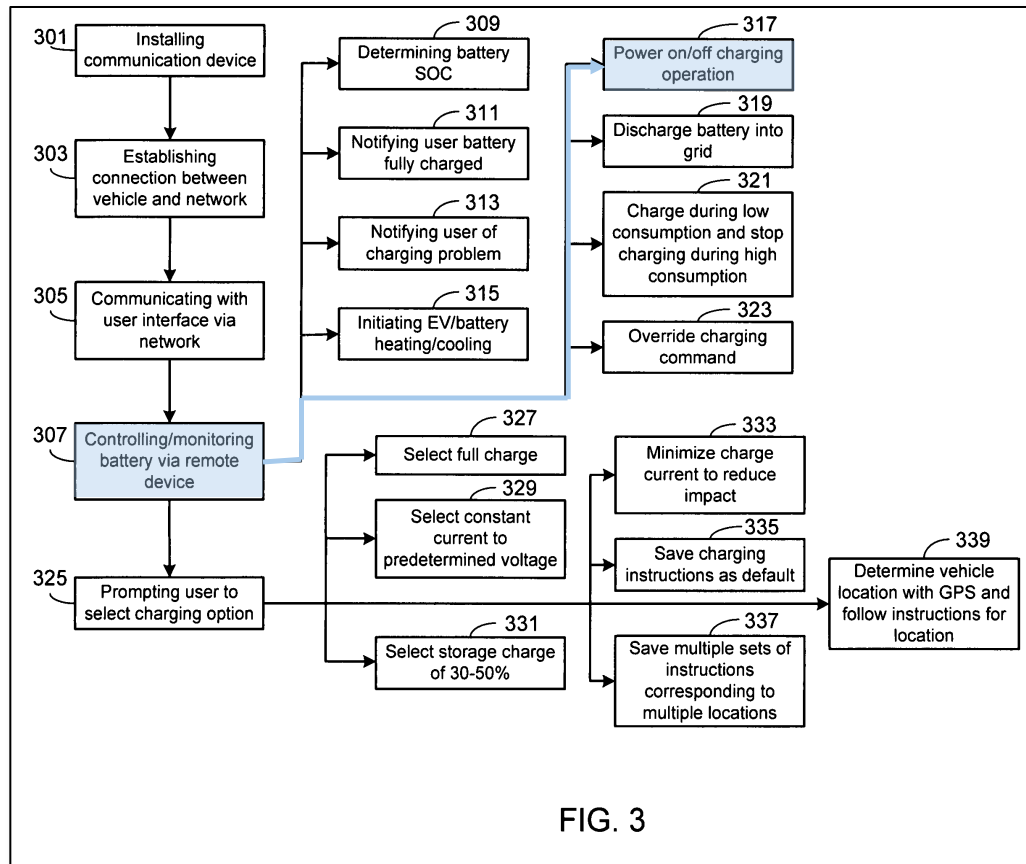
[0025], [0030], FIG. 1. Implementing Kelty-078's communication chip 14 to communicate with known user interface devices (e.g., cellphones), such as user interface 24, would require nothing more than the addition of a well-known hardware component into the electric device, especially given Kelty-078 teaches an exemplary, commercially-available communication chip and commercially-available cellphones. EX1007-Kelty-078, 3:66–4:1 (“In one specific embodiment, a **communication chip 14 developed by CircumNav Network** may be used for the communication device 14...”); FIG. 2 (teaching that “user interface device 24” can be “**Treo**” or “**Blackberry**” mobile phones). In addition to implementing Kelty-078's communication chip 14 and user interface device 24 into Ishii's system, straightforward modifications to the programming instructions of controller 6 and charger 8 microcomputer would also be implemented and communication chip 14 would be connected to the controller 6 and charger 8 microcomputer, which are well within the POSITA's expertise. A POSITA would have recognized that the connection of the communication chip to controller 6 and charger 8 microcomputer would have been a straightforward hardware implementation in Ishii's electric device, given Bluetooth communication was known and implemented in vehicles. EX1015-Bauman (generally discussing a vehicle communicating information to a phone via Bluetooth).

- B. Claim 3: “The vehicle charger of claim 2, wherein the first controller is further configured to control power supply to the battery of the vehicle responsive at least in part to data received from the second controller via the receiver.”**

215. Ishii teaches *the first controller*; namely, controller 6 and charger 8 microcomputer. *See* Claims 1[b], 2. Ishii’s modified system includes Kelty-078’s user interface 24 (*the second controller*) and the modified electric device 1 includes Kelty-078’s communication chip 14 *to establish communication between the first controller* (controller 6 and charger 8 microcomputer) *and a second controller* (user interface 24). The *first controller* of the Ishii system (collective controller 6 and charger 8 microcomputer) is further modified by Kelty-078 *to control power supply to the battery of the vehicle responsive at least in part to data received from the second controller via the receiver* (control charging the vehicle battery responsive to instructions received from user interface 24 via communication chip 14).

1. Kelty-078’s Teachings

216. Kelty-078’s user interface 24 can communicate with the vehicle 12 through networks 16, 18 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).” EX1007-Kelty-078, 4:59-5:1. An instruction from user interface device 24 to the vehicle can include “the user 20 capable of powering on and off in predetermined cycles and at predetermined times the charging of the battery 26 from a user interface device 24 (step 317).” EX1007-Kelty-078, 5:40-44.



EX1007-Kelty-078, 6:16-21, FIG. 3 (Steps 307, 317), 7:44–8:6 (describing communication between user interface 24 and the VMS 32 via communication chip 14 (*receiver*)), 7:35-43 (disclosing “control[ing] the starting and stopping of charging of the battery pack” via a cell phone connection and choosing charging options via user interface device 24). Kelty-078’s teaching of “charging” the battery pack (7:345-38), powering on/off charging of the battery (5:40-44), or powering on/off charging operation (FIG. 3, Step 317) individually or collectively teaches *control[ing] power supply to the battery of the vehicle*. Specifically, Kelty-078 teaches “[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 as described **above to allow for choosing of one the charging options and setting any default via any user interface device 24.**” EX1007-Kelty-078, 7:35-43.

217. Kelty-078’s *control[ing] power supply* is *responsive at least in part to data received from the second controller via the receiver* because user interface device 24 provides instruction to the VMS 32 to “power on and off in predetermined cycles and at predetermined times for charging the battery 26.” EX1007-Kelty-078, 5:40-44. The VMS 32 controls charging by controlling the PEM 34 and ESS 26, and thus *control[s] power supply...responsive* to the instructions received to “power on and off” charging. Additionally, Kelty-078’s controller of VMS 32 (*first controller*) controls the *power supply....* based on the *data received*. EX1007-Kelty-078, 4:65-5:1, 5:40-44.

2. Motivation to Combine

218. For the same reasons discussed above at claim 2, a POSITA would have been motivated and found it obvious to modify Ishii’s *first controller* (controller 6 and charger 8 microcomputer) to perform Kelty-078’s functionality such that the collective controller starts and stops charging the battery pack based on

communications from user interface 24 via communication chip 14, such as controller 6 communicating with user interface 24 via communication chip 14 to control the starting and stopping of charging the battery via controlling charger 8 microcomputer and/or instructing charger 8 microcomputer, per Kelty-078; namely, to increase user accessibility to charging control. *See* Claim 2. Kelty-078 further expressly teaches, suggests, or motivates the modification, stating a benefit being “to enable the user to control certain aspects of charging of the battery.” EX1007-Kelty-078, 2:40-45. As discussed above, this modification would provide the benefit of allowing the user the option of being remote from the vehicle and still have the ability to control and monitor charging of their electric vehicle. This modification entails the use of a known technique (starting and stopping charging of a battery from a remote device) to improve a similar device (vehicle chargers) in the same way.

219. For the same reasons discussed above at Claim 2, a POSITA would have had a reasonable expectation of success modifying Ishii-Hayashi-Fujita’s electric device per Kelty-078, given the modified Ishii already includes the user interface 24 and communication chip 14 for wireless communication and the collective controller is already connected to battery units of the vehicle. EX1004-Ishii, [0022], [0030]. Specifically, Ishii teaches “system bus 26 is a bus used for transferring information to and from the charger 8 of the charger unit 5, the

measuring means 16 and 17 and the memories 11 and 12 of the battery units 2 and 3.” EX1004-Ishii, [0030]; *see also id.*, FIG. 1. Thus, all that is required for the modification is simple programming to Ishii’s collective controller to communicate with the battery to start/stop charging per the data received from user interface 24. For example, such a modification would simply require programming controller 6 to receive the data and instruct charger 8 to start/stop charging per the data received and programming charger 8 microcomputer to start/stop charging according to the controller 6 instruction. *Id.*

C. Claim 4: “The vehicle charger of claim 2, wherein the first controller is further configured to receive the at least one condition from the second controller via the receiver.”

220. Ishii’s *first controller receive[s] the at least one condition* when the user selects the charging start time when setting the time-specified charge via charger 8 under controller 6’s control. *See* Claim 1[c][1]. Additionally, Ishii’s modified system includes a communication chip 14 (*the receiver*) for communicating with user interface 24 (*the second controller*), per Kelty-078. *See* Claim 2. As discussed below, Ishii’s controller 6 is further modified to receive the charging start time (*receive the at least one condition*) from user interface 24 via communication chip 14, per Kelty-078.

221. Kelty-078 teaches user interface device 24 sending a predetermined start time to the VMS. Kelty-078 teaches user interface device 24 communicates

with VMS 32 via communication chip 14 and provides an instruction to the VMS 32 that includes “predetermined times” for “powering on” the “charging of the battery.” EX1007-Kelty-078, 4:53–5:1 (discussing communication chip 14 allowing for communication between the vehicle and the user interface 24), 7:44-47 (discussing communication protocols the communication chip 14 uses to communicate with VMS 32), 5:40-44 (“...have the user 20 capable of powering on and off in predetermined cycles and at predetermined times the charging of the battery 26 from the user interface device 24.”), 1:57-67 (discussing and providing examples of the standard protocol used by communication chip 14). Kelty-078 also teaches VMS 32 controls the charging of the vehicle. EX1007-Kelty-078, 7:44-51; *see also*, Claim 2 Mapping. Thus, Kelty-078’s controller of VMS 32 (*first controller*) powers on the charging of the battery at a “predetermined time” responsive to an instruction that includes the predetermined time (*at least one condition*) from Kelty-078’s user interface 24 (*from second controller*) via Kelty-078’s communication chip 14 (*via the receiver*). EX1007-Kelty-078, 5:40-44, (discussing teaching of the instruction that of “powering on and off in predetermined cycles and at predetermined times the charging of the battery 26 from a user interface device 24.”).

1. Motivation to Combine

222. For the reasons discussed above at claims 2-3, a POSITA would have been motivated and found it obvious to modify Ishii's controller 6 to receive the charging start time from the user interface device 24 via communication chip 14, such that Ishii's *first controller...receive[s] the at least one condition from the second controller via the receiver*. For the same motivations discussed above at Claims 2-3, a POSITA would have found it obvious and been motivated to modify Ishii's controller 6 to receive the charging start time, per Kelty's teachings, from the user interface 24 via communication chip 14 to increase user accessibility to charging while remote from the vehicle. *See* Claims 2-3. Allowing the user to enter a predetermined time to start charging at the user interface device 24, and Ishii's controller 6 receiving and responsively setting the time-specified charge mode based on the user-set predetermined time allows for controlling the charging process when the user is away from the vehicle. For example, the user would not have to return to their car to set a time-specified charge mode while they are away, and would therefore be able to ensure that the vehicle would have sufficient charge for the next use.

223. This modification would have entailed the use of a known technique (Kelty-078's receiving the "predetermined time" from user interface device 24 via communication chip 14) to improve a similar device (vehicle chargers) in the same way, thus leading to a reasonable expectation of success given all that is required is

modifying programming of controller 6 to receive the charging starting time from the remote user interface 24 and storing the charging start time received. EX1004-Ishii, [0047], [0049]-[0050]; Ishii already teaches controller 6 receiving an input charge starting time from the display and operation unit 13. EX1004-Ishii, [0047], [0049]-[0050]. Thus, the modifications to the programming instructions to receive and store the information from a remote user interface 24 would be simple modifications well within the skillset of a POSITA.

D. Claim 10

1. ***Claim 10[a]: “The method of claim 9, further comprising: establishing wireless communication between the controller of the vehicle and another controller remote from the vehicle and the vehicle charger;”***

224. See Claim 2. The modified Ishii system *establish[es] wireless communication between the controller of the vehicle and another controller remote from the vehicle....* via the communication chip 14 in the electric device 1 that establishes Bluetooth (i.e., *wireless*) communication between the collective controller (charger 8 microcomputer and controller 6, *the controller of the vehicle*) and Kelty-078’s user interface 24 (*another controller remote from the vehicle....*). A POSITA would have understood that Bluetooth is a wireless communication protocol, and thus the *communication* over a Bluetooth link is *wireless*. EX1012-Bluetooth, 1 (“wireless connections made easy”).

2. ***Claim 10[b]: “starting or stopping supply of power to the battery based at least in part upon a signal received by the controller of the vehicle from the controller remote from the vehicle and the vehicle charger.”***

225. Ishii’s controller 6 and charger 8 microcomputer are modified to control power supply to the vehicle battery responsive to data received from the user interface 24 via communication chip 14, per Kelty-078. *See* Claim 2-3. Thus, the modified Ishii system controls power to the battery based on data received from user interface 24 via chip 14 providing Bluetooth communication.

226. Regarding the *signal received by the controller of the vehicle...*, the ’010 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:39-44 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user’s computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:38-53 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”). Kelty-078 similarly sends signals (for example, instructions) using wireless communication (for example, Bluetooth). Specifically, Kelty-078

teaches wirelessly communicating using Bluetooth to “send...instructions” from device 24 to VMS 32. EX1007-Kelty-078, 4:4-39, 4:53–5:18, 8:44-48, FIG. 2. Because VMS 32 receives the instruction from device 24 via communication chip 14, Kelty-078 teaches *a signal* (Kelty-078’s instructions transmitted via Bluetooth) *received by the controller of the vehicle* (VMS 32 receives instructions from device 24). EX1012-Bluetooth (generally describing signals being sent between paired devices via Bluetooth when sending information).

227. Regarding the *starting or stopping supply of power based on a signal received...*, the instructions received by Kelty-078’s VMS 32 from device 24 include instructions to power on and off or start/stop charging of battery 26. EX1007-Kelty-078, 4:58–5:1, 5:40-52 (disclosing user “**powering on and off...**charging of the battery 26 **from a user interface device 24**”), 7:29-43 (“The vehicle user 20 may also control the **starting and stopping of charging...**”), FIG. 3 (Steps 317, 319). Examples of such “instructions” are illustrated in FIG. 3 and include user 20 “powering on and off” charging of battery 26 and “discharging the battery 26 into the electricity or electric grid [.]” EX1007-Kelty-078, 4:66, 5:40-52, FIG. 3 (*see* steps 317 and 319).

228. *See* Claims 2-3 for a Motivation to Combine regarding implementing Kelty-078’s communication chip 14 in Ishii’s electric device 1 for establishing

communication between Ishii's controller 6 and charger 8 microcomputer and Kelty-078's user interface 24.

229. A POSITA also would have found obvious and been motivated to modify Ishii's controller 6 and charger 8 microcomputer to *start[] or stop[] supply of power to the battery based at least in part* upon a received signal to allow the user the benefit of controlling charging remotely. As discussed above, a user would appreciate being able to start charging remotely from their vehicle in certain situations, including in emergency situations where the vehicle is unexpectedly needed for driving. *See* Claim 2. Kelty-078 expressly teaches advantages from allowing the user to "control certain aspects of charging of the battery" across networks and via a portable device. EX1007-Kelty-078, 2:34-45. Automated charging schedules may not always match the user's immediate needs, and providing start and stop control, per Kelty-078, would have allowed the user to override or adjust scheduled charging when circumstances changed, such as an unexpected trip, an early departure, or a change in desired charge level. A POSITA would have appreciated the convenience of allowing for manual override of charging if necessary when circumstances change.

230. The combination would have been the use of a known technique (start and stop charging options) to improve similar devices (Kelty-078's device 24 combined with Ishii's electric device 1) in the same way. This would have been

combining prior art elements (start/stop charging via a signal) according to known methods (user input) to yield predictable results of Hobbs being able to start and stop when a user wishes to charge their vehicle.

231. A POSITA would have had reasonable expectation of success in implementing Kelty-078's device 24 with the taught start/stop functionality for the reasons described for Claim 2.

E. Claim 15

1. ***Claim 15[Pre]: "A vehicle charger for charging a battery of a vehicle, the vehicle charger comprising:"***

232. *See* Claim 1[Pre].

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

233. *See* Claim 1[a].

3. ***Claim 15[b]: "a controller onboard the vehicle and coupled to the display, the controller configured to"***

234. *See* Claim 1[b]. Ishii's *controller* alone or as modified by Hayashi and/or Fujita is configured to perform the claimed functions. *See* Claims 1[c]-[f], 15[c]-15[h].

4. ***Claim 15[c]: ["the controller configured to"]... "begin an active charging session of the battery based on a programmed manner of charge and at least one condition, the programmed manner of charge starting charging of the battery in response to the at least one condition being met,"***

235. *See* Claims 1[c][1]-1[c][2].

5. ***Claim 15[d]: [“the controller configured to”]...“calculate an amount of time required to charge the battery, and”***

236. See Claim 1[d].

6. ***Claim 15[e]: [“the controller configured to”]...“display, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display; and”***

237. See Claim 1[e].

7. ***Claim 15[f]: “a receiver electrically coupled to the controller;”***

238. The modified Ishii system includes *a receiver* (Kelty-078’s communication chip 14) in the electric device 1 that is *coupled to the first controller* (Ishii’s controller 6 and microcomputer of charger 8). See Claim 2.

239. Claim 15[f] recites the receiver is *electrically* coupled to the controller. The ’010 Patent describes controller 44 communicating (wired or wirelessly) with a user’s computer through, e.g., Bluetooth or other wireless protocols. EX1001, 10:38-60. Therefore, because Kelty-078’s VMS 32 communicates with communication chip 14 in the same manner described in the ’010 Patent, e.g., via Bluetooth, Kelty-078’s VMS 32 is likewise *electrically coupled* to communication chip 14. EX1001, 6:29-35; EX1007-Kelty-078, 4:25-37 (discussing “BlueTooth” as communication protocol that is used for communication between communication chip 14 and VMS). Additionally and/or alternatively, because the VMS communicates with communication chip with wireless protocols, which were known to include sending electric signals (i.e., electromagnetic waves), the Kelty-078’s VMS is *electrically*

coupled to communication chip 14. EX1012-Bluetooth, 28, 32 (generally describing Bluetooth as exchanging signals). Indeed, electrical paths such as those used in Bluetooth were known to provide “electrical[] coupl[ing].” EX1040-Kern, [0025].

240. A POSITA would have found obvious implementing Kelty-078’s communication chip 14 as *electrically* coupled to Ishii’s controller 6 and charger 8 microcomputer for the same reasons provided for Claim 2, namely to allow communication between the chip and controller to occur. Further, as discussed above, the modification would allow for increased user accessibility and increased user control over vehicle charging when away from the vehicle. *See* Claim 2.

8. ***Claim 15[g]: “wherein the controller onboard the vehicle is further configured to repeatedly update the amount of time upon the display during the active charging session, and”***

241. *See* Claim 1[f].

9. ***Claim 15[h]: “wherein the controller onboard the vehicle is further configured to, responsive to data received from another controller remote from the vehicle and the vehicle charger via the receiver, to change a charging state of the vehicle charger by at least one of a group consisting of increasing a rate of charge of the battery, decreasing a rate of charge of the battery, starting battery charging, or stopping battery charging.”***

242. The modified Ishii system’s *controller on-board the vehicle* (controller 6 and charger 8 microcomputer) *control[s] power supply to the battery of the vehicle responsive to data received from the second controller* (user interface 24, which is remote from the charger and vehicle) *via the receiver* (communication chip 14), per

Claim 3. *See* Claim 3. The Ishii system is further modified to *start[] or stop[] supply of power to the battery*, per Claim 10, based on information *received* by Ishii's controller 6, *from the controller remote from the vehicle and the vehicle charger* (from the user interface 24) via communication chip 14 and by controller 6 further instructing charger 8 microcomputer. *See* Claim 10[b]. Thus, *the controller onboard the vehicle* (controller 6 and charger 8 microcomputer) of the modified Ishii system is *configured to, responsive to data received from another controller remote from the vehicle...via the receiver, to change a charging state of the vehicle charger by at least one of...starting battery charging, or stopping battery charging* by the modified controller receiving data from user interface 24 via communication chip 14 and, in response, starting or stopping charging of the vehicle battery. *See* Claims 3 and 10 motivations to combine.

F. Claim 17: “The vehicle charger of claim 15, further comprising a user interface positioned within the vehicle, wherein the at least one condition includes a time of day and wherein the controller receives the time of day via the user interface.”

243. *See* Claim 7.

G. Claim 18: “The vehicle charger of claim 17, wherein the user interface is defined at least in part by the display.”

244. *See* Claim 8.

XI. OPINIONS REGARDING GROUND 3: CLAIMS 5, 11, AND 19 ARE OBVIOUS OVER ISHII, HAYASHI, FUJITA, KELTY-078, SUTARDJA, AND KELTY-218

- A. Claim 5: “The vehicle charger of claim 2, wherein the first controller is further configured to supply power to the battery of the vehicle based at least in part upon data indicative of a cost of power received from the second controller via the receiver.”**

245. I have been instructed to apply the claim construction for *cost of power* as “monetary price of power.” *See* Section III.C.

1. Sutardja’s Teachings and Motivation to Combine

246. Sutardja is directed to “systems and methods for charging batteries in vehicles.” EX1008-Sutardja, [0002]. Sutardja teaches the user using a user interface module 108 to “set charging parameters for charging the battery 14,” including “**costs the users may pay** if batteries are charged at higher than normal priority, etc.,” expressly teaching receiving data indicative of a monetary price (cost) of power. EX1008-Sutardja, [0235] (further teaching “users may indicate that the utility company may choose the time to charge the batteries **when the cost is lowest**”), [0243], [0236], [0264-0265]. As a further example, Sutardja teaches that the user may include “pre-approval for a determined amount of additional cost that the user may pay if the utility company supplies power as requested.” EX1008-Sutardja, [0265]. 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. For example, Sutardja’s “costs the users may pay” can be

the price when the “the cost is the lowest” or be of an input higher price (“costs the users may pay if batteries are charged at higher than normal priority”) EX1008-Sutardja, [0235].

247. Sutardja’s user interface module 108 communicates with control module 112 of a charge management module 104-1 (a *first controller*) of vehicle 12. EX1008-Sutardja, [0234], [0241], [0243], [0247], FIGs. 3A-3B. When the charging parameters are input and communicated to the control module 112, the batteries are supplied power “**according to the charging parameters generated by the users**” (*supply power to the battery of the vehicle based at least in part upon data indicative of a cost of power*). EX1008-Sutardja, [0233].

248. Ishii’s modified charging system uses Kelty-078’s user interface device (*second controller*) to send instructions to Ishii’s controller 6 for controlling battery charging operation (together with charger 8 microcomputer). *See* Claims 3-4. Thus, the modified Ishii in combination with Sutardja teaches Claim 5 because Ishii’s *first controller* (controller 6 and charger 8 microcomputer) will begin the charge of the vehicle (*configured to supply power to the battery of the vehicle*) based on costs the users may pay, per Sutardja (*based at least in part upon data indicative of a cost of power*), that is received from Kelty-078’s user interface device 24 (akin to Sutardja’s user interface module 108) via the communication chip 14 (*received from the second controller via the receiver*). EX1008-Sutardja, [0233]-[0234].

249. A POSITA would have been motivated and found it obvious to implement Sutardja's functionality of controlling charging based on a cost of power input at a user device in the modified Ishii system to increase user convenience when charging. A POSITA would have been motivated to make the modification because allowing a user to control charging based on the cost of power increases user convenience when charging, as the user would be able to charge at a time that is suitable for their budget and vehicle user needs. Ishii expressly teaches, suggests, or motivates the modification as one of Ishii's objectives is reducing charging cost: "The time-specified charge makes it possible to charge the secondary battery of the battery unit using, for example, midnight electric power, and **reduce charging cost** and use electric facilities uniformly." EX1004-Ishii, [0117]. It was well known that lowering the cost of charging was desirable to a vehicle user. EX1007-Kelty-078, 2:9-11 ("...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."); see ¶¶ 60-63.

250. The modification is the simple of use of a known technique (receiving costs a user is willing to pay from a user interface for vehicle charging, per Sutardja) to improve similar devices (user interfaces in a charging system) in the same way by allowing a user to provide cost information to an electric vehicle as part of its charging, leading to a reasonable expectation of success. Because Sutardja teaches

receiving costs a user is willing to pay via user interface 108, a POSITA would have recognized that modifying user interface 24 in the same way would allow the user to provide cost information that they are willing to pay for charging the vehicle.

251. A POSITA would have had a reasonable expectation of success in modifying the modified Ishii system per Sutardja. The modified system already teaches controller 6 receiving information from the user interface 24 regarding the charging of the batteries and controller 6 would instruct charger 8 microcomputer to execute charging accordingly. Namely, in the combination, Ishii's controller 6 would receive the cost of power from the operation unit and charger 8 microcomputer would supply power to batteries 2B, 3B of battery units 2, 3 based on the costs the users may pay if batteries are charged at higher than normal priority input by the user at Kelty-078's user interface 24. A POSITA would have recognized modifying the system per Sutardja would have required only straightforward programming modifications to user interface 24 and Ishii's collective controllers. For example, a POSITA would have recognized that modifications would include the simple programming of user interface 24 to allow the user to input the cost of power and for instructions to be sent to Ishii's collective controllers, and, for example, programming Ishii's controller 6 to receive the cost and instruct charger 8 microcomputer to execute charging based on the cost, in addition to the timing input by the user (per Ishii). This modification would have required nothing more than

ordinary skill in the art and would have been well within the skillset of a POSITA, given communicating information between a remote device and vehicle related to charging was well-known. *See* ¶¶ 57-59.

2. *Kelty-218's Teachings and Motivation to Combine*

252. 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).” EX1010-Kelty-218, [0024]. Meaning, the “\$0.06 United States Dollar per kilowatt hour” is a “monetary price of power” per energy transferred over time. *Id.* Kelty-218 also teaches estimating that it will cost “\$5.00 to charge an electric vehicle based on measured conditions and optionally learned conditions.” EX1010-Kelty-218, [0028]. Therefore, Kelty-218 expressly teaches a *cost of power* that is a “monetary price of power,” applying the claim construction.

253. A POSITA would have been motivated and found it obvious to use monetary value (e.g., \$0.06, per Kelty-218) as the costs the user may pay in the Sutardja-modified Ishii system. A monetary price based in U.S. dollars per common units of energy, e.g., kilowatt per hour, is a well-recognized, commonly-understood, and well-accepted method of exchanging services (e.g., supplying power) for

payment (e.g., U.S. dollars). *See e.g.*, EX1041-Nor, 10:30-33 (discussing indicators of its system that provide a “running indication of the amount of energy being delivered in kWh **or its cost in local currency, such as dollars.**”). The end user would have easily recognized the cost of power in terms of U.S. dollars, given the ubiquity of payment for services rendered in U.S. dollars. There would have been a reasonable expectation of success, at least because payment in money is well accepted. A POSITA would have readily recognized that this modification would have been simple and straightforward as the operation unit of the modified Ishii system would simply be further programmed to receive a monetary value (e.g., dollar amount) from the user.

254. Additionally, for the same reasons discussed for Claim 5’s MTC with Sutardja (*see* Section XI.A.1), utilizing Kelty-078’s device 24 to input Kelty-218’s cost of power is convenient by allowing a user to input charging parameters from any location with the user’s phone including inputting cost parameters.

B. Claim 11: “The method of claim 10, wherein the signal includes data indicative of a cost of power.”

255. As discussed for Claim 10, the modified Ishii system teaches *a signal* being received by Ishii’s controller 6 from the user interface 24 via communication chip 14, per Kelty-078. *See* Claim 10[b]. Ishii’s system is further modified to supply power to batteries 2B, 3B of battery units 2, 3 based on the cost of power input at user interface 24, per Sutardja and Kelty-218. *See* Claim 5. For the same reasons

discussed above at Claim 5, a POSITA would have found it obvious and been motivated to implement Sutardja's functionality of controlling charging based on a cost of power input at a user device in the modified Ishii system. *See* Claim 5. Further, for the same reasons discussed above at Claim 5, a POSITA would have found it obvious and been motivated to use monetary value (e.g., \$0.06, per Kelty-218) as the costs the user may pay in the Sutardja-modified Ishii system. *See* Claim 5. Because user interface 24 communicates with Ishii's controller 6 through signals via chip 14 and communicates the *cost of power* to Ishii's controller 6, *the signal includes data indicative of cost of power*. Thus, the instructions that are being communicated with Ishii's controller 6 from user interface 24 through *a signal* would include the data the instruction is based on, including the *cost of power*.

- C. **Claim 19: "The vehicle charger of claim 15, wherein the controller onboard the vehicle is further configured to supply power to the battery of the vehicle based at least in part upon data indicative of a cost of power received from the controller remote from the vehicle and the vehicle charger via the receiver."**

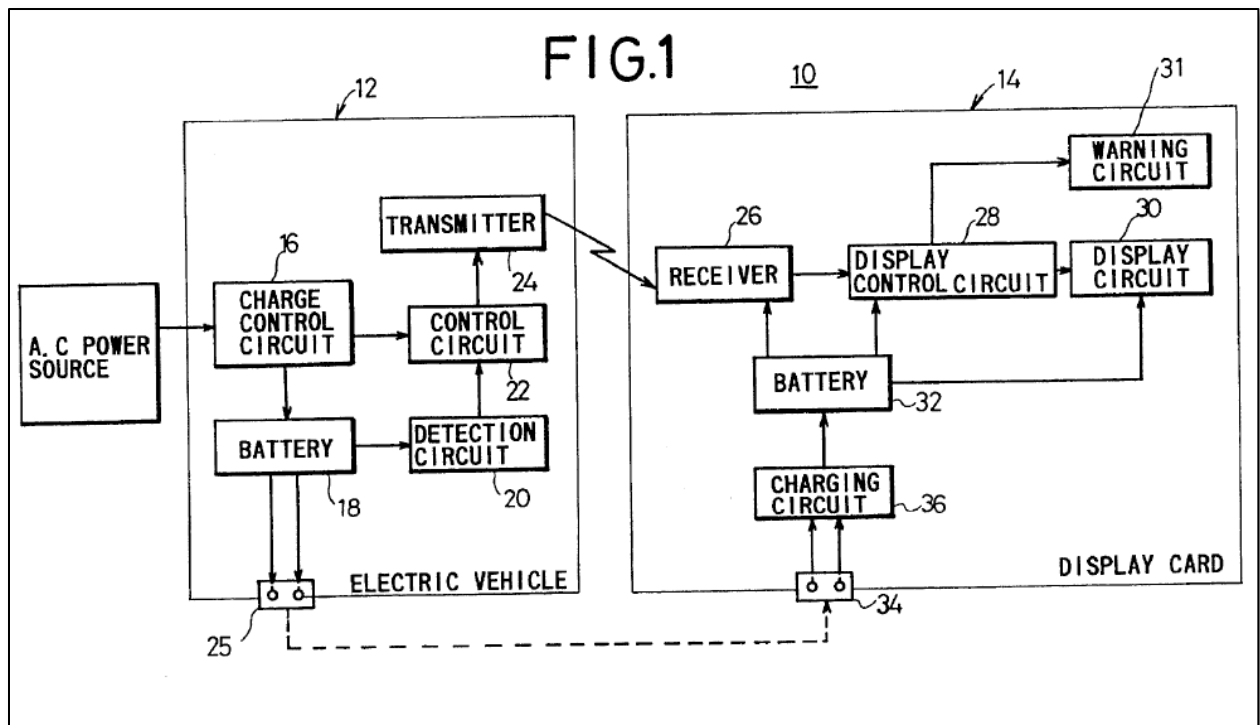
256. *See* Claim 5, Claim 15.

XII. OPINIONS REGARDING GROUND 4: CLAIMS 6 AND 12 ARE OBVIOUS OVER ISHII, HAYASHI, FUJITA, AND SUYAMA

- A. **Claim 6: "The vehicle charger of claim 1, wherein the controller is further configured to display, during the active charging session, a level of charge of battery on the display."**

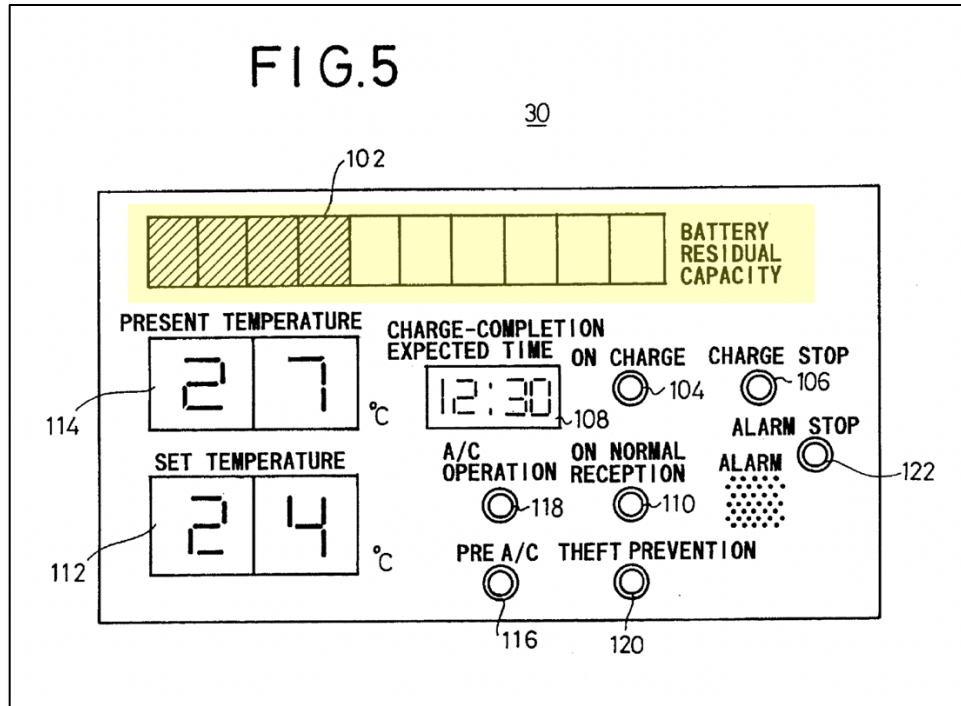
257. *See* Claim 1. The modified Ishii in combination with Suyama teaches Claim 6.

258. Suyama is directed to a “charge-status display system 10” for an “electric automobile or vehicle 12” and a “portable display card 14 for displaying the state of charging of the electric vehicle 12.” EX1009-Suyama, 5:48-50. “The display card 14 includes” a “display circuit 30 for displaying data outputted from the display control circuit 28.” EX1009-Suyama, 5:66–6:13, FIGS. 1, 3, 7:55-62 (disclosing display system 10 receives signals indicative of the state of charging for display).



EX1009-Suyama, FIG. 1.

259. Suyama teaches *display...a level of charge of battery on the display*; namely, a display with a “battery residual-capacity indicator 102.” EX1009-Suyama, 7:43-45, FIG. 5,



EX1009-Suyama, FIG. 5. Suyama's indicator 102 is a "bar chart displaying charges ranging from 0% to 100%," as described in the '010 Patent, because Suyama's "battery residual-capacity indicator 102 is 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. EX1001, 12:47-51; EX1009-Suyama, 8:4-5, 9:13-15; EX1042-Barsoukov, 4:56-62 (describing DOD as being "expressed as a percentage").

260. Suyama further teaches a "charge status determining ECU 48 computes" (Step S3-1) and then "compares the residual capacity DOD with a capacity D1 produced when the main battery 18 is fully charged" (StepS3-2). EX1009-Suyama, 8:59-67. The computed residual capacity is then indicated on the

battery-residual capacity indicator 102 “so as to correspond to the computed residual capacity DOD.” EX1009-Suyama, 9:13-16.

261. Suyama teaches the residual capacity is displayed *during an active charging session*. Suyama teaches that “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).” EX1009-Suyama, 8:36-39.

262. In the combination, Ishii’s controller 6 of the *controller* is configured to display on Ishii’s onboard display 13 (*display*) Suyama’s indicator 102 showing the level of charge of the battery, where the level of charge is displayed while the battery is being charged (*during the active charging session*). A POSITA would have been motivated and found the combination obvious to increase the information provided by the display to the user. Ishii already teaches that the “display and operation unit 13” is provided to display “necessary states and information such as a state of the electric device.” EX1004-Ishii, [0029]. A POSITA would have appreciated that by providing an indication of the residual capacity of the battery, the user of the vehicle would be able to determine how far along the charging process is, and when the battery has reached a desired capacity. For example, if the user knows a capacity that is needed to make a particular trip with the vehicle, it would be desirable for the user to see when the vehicle has reached the desired capacity.

EX1043-Frey, 1:10-13 (“...users desire to know when a charger has transmitted a sufficient charge to a battery such that it is appropriate to drive the electric vehicle.”). This would increase the convenience as the user could end charging at a time when use of the vehicle is needed, especially in fast charging circumstances where the user is needing only a limited, but fast, charging of the vehicle. Further, it was known that displays would be provided in vehicles “for displaying information **for the driver**” to “improve occupant safety, environmental friendliness, ergonomics, and compatibility to modify, add, or upgrade vehicle features.” EX1044-Cramer, [0307]. And, there are situations where a driver would appreciate staying in the car during charging, such as for safety reasons if the driver is alone at a potentially dangerous area or for convenience if the driver pulled over to quickly charge while on their way to another location. Therefore, when the “driver” is sitting in the vehicle while charging, a POSITA would have recognized that providing the *level of charge* on the vehicle display would have provided the user with important information while the vehicle is charging. EX1044-Cramer, [0307].

263. The combination also allows the user to quickly interpret the charging information. As discussed above and illustrated in FIG. 5, Suyama’s residual-capacity indicator 102 is displayed as a bar graph to display the battery’s residual capacity. EX1009-Suyama, 9:12-15 (“...the battery residual-capacity indicator 102 is lighted so as correspond to the computed residual capacity DOD.”). A POSITA

would have appreciated that a quick-reference visual, such as Suyama's bar graph, on Ishii's display and operation unit would have allowed the user to easily receive and interpret the information regarding the charge of their vehicle. It was known that it was desirable for the charge level of the battery to be displayed in a manner that was easy to interpret. EX1045-Myslinski, 1:46-49 ("Also, it would be desirable if the charge level of the battery was displayed in a pleasant manner which allows easy determination of such charge level."). Further, it was known that "bar-graphs" were a common way of indicating the remaining battery energy. EX1046-Kawaguchi, 3:43-47 ("In a remaining battery energy indicating instrument according to the present invention, the display means comprises a bar-graph meter for displaying an amount of electric energy to or smaller than the amount of electric energy stored in the battery at the fully charged time.").

264. This modification is a simple combination of known prior art elements (Suyama's residual capacity indicator 102 and Ishii's display and operation unit 13) according to known methods (implementing Suyama's indicator 102 on display and operation unit 13) to yield predictable results (providing a driver information about the residual capacity of the battery of the vehicle).

265. A POSITA would have had a reasonable expectation of success in modifying Ishii's display and operation unit 13 to include Suyama's residual capacity indicator 102. As discussed above, the display and operation unit 13 already

provides and indicates information to the user regarding the state of the electric device 1 which charges the batteries of the vehicle. EX1004-Ishii, [0029]. Further, Ishii already teaches charger 8 is given “remaining capacity information from each of the memories 11 and 12 of the battery units 2 and 3” and “calculates a charging time (time required to charge) from the remaining capacity.” EX1004-Ishii, [0051]. Thus, a POSITA would have recognized that modifying Ishii to implement Suyama’s residual capacity indicator 102 would not have required any additional programmed calculations to occur but rather just providing another item of information on the display related to charging. For example, Ishii’s display and operation unit 13 would be programmed to indicate the remaining capacity stored at step A4 through a bar graph, as it already indicates “a time required to charge and/or the inputted charge starting time, or a time after the time required to charge from the charge starting time, which is a charge completion time.” EX1004-Ishii, [0057]. The modification would have thus required only straightforward programming modifications to the Ishii-Hayashi-Fujita’s display and operation unit 13 and programming instruction modifications to the collective controllers (e.g., charger 8 microcomputer programmed to send remaining capacity to controller 6 and controller programmed to cause display of unit 13 to display the remaining capacity). The display section of Ishii’s display and operation unit 13 is already composed of

an LCD display, which would only need to be programmed to display the remaining capacity of the battery unit. EX1004-Ishii, [0029].

- B. Claim 12: “The method of claim 9, further comprising displaying on the display a level of charge of the battery.”**

266. *See* Claim 6.

XIII. OPINIONS REGARDING GROUND 5: CLAIM 16 IS OBVIOUS OVER ISHII, HAYASHI, FUJITA, KELTY-078, AND SUYAMA

- A. Claim 16: “The vehicle charger of claim 15, wherein the controller onboard the vehicle is further configured to display a level of charge of the battery on the display during the active charging session.”**

267. *See* Claim 15, Claim 6.

XIV. OPINIONS REGARDING GROUND 6: CLAIM 20 IS OBVIOUS OVER ISHII, HAYASHI, KELTY-078, AND IZUNO

- A. Claim 20: “The vehicle charger of claim 15, further comprising a user interface for receiving an input from a user, wherein the controller is configured to receive the input and stop charging of the battery during the active charging session responsive to the input.”**

268. I have been instructed to apply Claim 20’s *a user interface* as a user interface associated with Claim 15[b]’s *controller onboard the vehicle*. The Ishii modified system further modified by Izuno’s stop charging input during an *active charging session* renders obvious Claim 20.

269. Ishii’s electric device 1 (*vehicle charger*) comprises *a user interface for receiving an input from a user*; namely, operation section of display and operation

unit 13, which sends user inputs to Ishii's controller 6 (part of Ishii's collective *controller of the vehicle*). See Claim 1[b] Mapping, Claim 7 Mapping; EX1004-Ishii, [0028], [0047]-[0050]. Accordingly, Ishii's *controller is configured to receive the input from the user interface*.

270. Izuno teaches a “battery charging system” (*vehicle charger*) including “a vehicle system 10 installed in the user's electric vehicle that is controlled via “an electronic control unit (ECU) 11” (controller of the vehicle) and contains a “communication terminal 50” having a display and audio device installed in the vehicle. EX1011-Izuno, [0012], [0014]-[0015]. Izuno teaches “when charging the battery 12,” a service system server 100 “controls charging of the battery” based on “information received from the vehicle system 10 (the ECU 11)” by transmitting **“charging start/end signals to the charging station 60 in response to instructions from the user.”** EX1011-Izuno, [0018], [0022] (disclosing **“depending on what the user selects—automatic charging, start charging, or stop charging—it** transmits a charging instruction to the charging station 60).

271. For example, Izuno teaches vehicle system 10 performing the steps of FIG. 3, which includes step S8 where the user “selects the charging mode” using “their own communication terminal 50 **or an input device in the vehicle system 10**” (e.g., communication terminal 50 installed in the vehicle system 10). EX1011-Izuno, [0023]-[0024], [0027]. If the user selects the automatic charging mode and

then **after selects “stop charging”** via the input device, the vehicle system 10 controlled via ECU 11 “transmits a charging stop” signal to server 100. EX1011-Izuno, [0027]-[0028].

272. Because Izuno teaches the communication terminal 50 either being the “user’s” remote terminal 50 or a terminal 50 in the vehicle, Izuno’s “input device” within the vehicle used to select charging modes, including to select “stop charging,” is either the communication terminal 50 in the vehicle (*a user interface*) or the remote terminal. EX1011-Izuno, [0013]-[0014] (“The communication terminal 50 may also be a display device or audio device installed in the vehicle system 10 of the user’s vehicle.”), [0027] (“Users selects the charging mode using, for example, their own communication terminal 50 or an input device in the vehicle system 10.”). Thus, the user enters the “stop charging” selection via the *user interface* (communication terminal 50 in the vehicle). The “stop charging” selected by the user via the communication terminal 50 in the vehicle (*user interface*) causes ECU 11 (*the controller*) to send a stop charge signal to server 100 *during an active charging session*, because server 100 receives the “stop charging” signal **after the charging station 60 “initiates charging.”** EX1011-Izuno, [0034]-[0035] (describing after receiving a “charging stop signal,” calculating a “post-charging” battery capacity). Thus, because Izuno calculates values related to what was charged after the stop charging signal (e.g., “post-charging” battery capacity), charging is taking place

when the ECU 11 sends the “charging stop” signal to the server 100, and accordingly occurs *during an active charging session*. Accordingly, Izuno’s charging system includes *a user interface for receiving an input from a user* (communication terminal 50 that receives user’s “stop charging” selection) and *the controller* (ECU 11) *is configured to receive the input and stop charging of the battery during the active charging session responsive to the input* (receives the “stop charging” selection and stops charging of the battery during charging by transmitting the “charging stop” signal to server 100).

273. A POSITA would have found it obvious and been motivated to modify the modified Ishii system’s operation unit to receive a stop charging selection from the user and the controller 6 then stop charging during the time-specified charge mode (*during the active charging session*) responsive to the stop charging selection received, per Izuno, to allow a user to more easily control charging of the their own vehicle.

274. A POSITA would have been motivated to make the modification to increase user control of the charging operation, as a user would appreciate having the ability to stop charging in the event of an emergency or when the user needs to use the vehicle before charging is complete. If the user were able to stop charging of the battery of the vehicle while it is in the *active charging session*, the user would be able to use the vehicle in the event of an emergency or needing to make a quick

errand, thus increasing the control the user has in the charging process. Additionally, if the charger is malfunctioning, a POSITA would have appreciated being able to manually override the charging session to stop charging to avoid a dangerous situation. This modification would thus increase the overall control the user has over charging of their own vehicle. The modification is simply use of a known technique (a user selecting stop charging and the controller of the vehicle stopping charge responsive thereto) to improve similar devices (vehicle chargers) in the same way by increasing user control over the charging process. The modification would have had a reasonable expectation of success given the modified Ishii system already includes a user interface in the vehicle and a controller 6 receiving information selected by a user via the user interface (operation unit of display and operation unit 13) . *See* Claim 7; EX1004-Ishii, [0028], [0047] (“Setting of the time-specified charge is carried out by the charger 8 of the charger unit 5 via the controller 6 **according to an instruction from the display and operation unit 13...**”), ([0048]-[0050]). Thus, all that is required is programming modifications to the controller 6 and charger microcomputer 8 and simple modification of the operation unit that would have been well within the skill of a POSITA. For example, the modification would simply require modifying the operation unit to include a stop charging option for the user to select and programming controller 6 to send a signal and/or otherwise

control charger 8 to stop charging when the stop charging signal is received from the operation unit.

XV. CONCLUSION

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

Dated: 17 June 2026

By: 

Scott Andrews

Scott Andrews

(650) 279-0242

scott@cogenia.com

Petaluma, CA

Summary

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

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

Experience

12/2001-Present Cogenia Partners, LLC

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

Current Engagements:

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

Prior Engagements/Projects:

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

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

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

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

4/2000 to 12/2001 Cogenia, Inc.

President and Chief Executive Officer, Founder

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

1996 to 4/2000 Toyota Motor Corporation, Japan

Project General Manager, R&D Management Division

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

1983 to 1996 TRW, Inc.

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

1993 to 1996 TRW Automotive Electronics Group

Director, Advanced Product Planning/Development

Specific responsibilities included leadership and overall management of advanced

Scott Andrews

Page 3

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

1983 to 1993 TRW Space & Electronics Group

Manager, MMIC Products Organization

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

1979-1983 Teledyne Microwave

Developed high reliability microwave components. Developed CAD tools.

1977-1979 Ford Aerospace, Advanced Development Operation

Designed, tested and delivered microwave radar receiver systems

Education

MSEE Stanford University, 1982

BSEE University of CA, Irvine 1977

TRW Senior Leadership Program 1992

Publications

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

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

Patents

1. Mobile Body Reporting Device And Its System; Patent Number: JP11118902; 4/30/1999
2. Multiformat Auto-Handoff Communications Handset; Patent Number: US5,649,308; 07/15/1997
3. A Communications Terminal Device, A Communications System, And A Storing Medium For Storing A Program To Control Data Processing By The Communications Terminal Device; Patent Number: EP0867850, A3; 09/30/1998
4. Communication System For Controlling Data Processing According To A State Of A Communication Terminal Device; Patent Number: US 6,122,682 3/23/1998
5. Method And Apparatus For Controlling An Adjustable Device; Patent Number: US 5,864,105; 01/26/1999
6. Automatic Brake Device; Patent Number: JP2000108866; 4/18/2000
7. Visual Field Base Display System; Patent Number: JP2000029618; 01/28/2000
8. Intersection Warning System; Patent Number: US 5,926,114; 07/20/1999
9. Security For Anonymous Vehicular Broadcast Messages; Patent Number: US 7,742,603 3/27/2006
10. Digital Certificate Pool; Patent Number: US7,734,050 3/27/2006
11. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 7,802,263 9/21/2010
12. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 8,209,705 6/26/2012
13. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 8,566,843 10/22/2013
14. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 9,575,817 2/21/2017
15. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 9,705,765 7/11/2017
16. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 10,002,036 6/19/2018

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