

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner

v.

GRANITE VEHICLE VENTURES LLC,
Patent Owner

Inter Partes Review Case No. IPR2025-00944
U.S. Patent No. 11,738,765

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,738,765**

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I. INTRODUCTION

Petitioner Tesla, Inc. (“Petitioner”) requests *Inter Partes* Review of Claims 1-8, 10-20 (collectively, the “Challenged Claims”) of USPN 11,738,765 (“the ’765 Patent”) assigned to Granite Vehicle Ventures LLC. ’765 Patent (Ex. 1001). The Challenged Claims are obvious over the prior art and accordingly, IPR should be instituted.

II. SUMMARY OF THE ’765 PATENT

A. Priority Date of the Challenged Claims

The ’765 Patent claims priority to USPN 9,566,986 filed on September 25, 2015. ’765 Patent, (63). For purposes of this Petition only, Petitioner applies September 25, 2015, as the priority date for the Challenged Claims.

B. Level of Skill of a Person Having Ordinary Skill in the Art

A POSITA at the time of the ’765 Patent would have had a bachelor’s degree in computer engineering, computer science, electrical engineering, mechanical engineering, physics, or a related field, with at least four years of experience in the field of vehicle telematics and safety systems, or a master’s degree in the same fields with at least three years of experience in the field of vehicle telematics and safety systems. Additional education or experience might substitute for the above requirements.

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

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

Petitioner certifies the '765 Patent is eligible for IPR.

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

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

Proposed Grounds of Unpatentability of the '765 Patent	Exhibits
<u>Ground 1:</u> Claims 1-2, 17 are obvious under 35 U.S.C. §103(a) over <i>Attard, Frazer, and McNew</i> .	1004, 1005, 1006
<u>Ground 2:</u> Claim 7 is obvious under §103(a) over <i>Hampiholi and Attard</i>	1007, 1004
<u>Ground 3:</u> Claims 3-4, 18-19 are obvious under §103(a) over <i>Attard, Frazer, McNew, An, Kang, and Schunder</i> .	1004, 1005, 1006, 1008, 1009, 1010
<u>Ground 4:</u> Claims 5, 20 are obvious under §103(a) over <i>Attard, Frazer, McNew, An, Kang, Schunder, DeRuyck, and Gunderson</i>	1004, 1005, 1006, 1008, 1009, 1010, 1011, 1012
<u>Ground 5:</u> Claim 6 is obvious under §103(a) over <i>Attard, Frazer, and Hampiholi</i>	1004, 1005, 1007

<u>Ground 6:</u> Claim 8 is obvious under §103(a) over <i>Hampiholi, Attard, Frazer, DeRuyck, and Schunder</i>	1007, 1004, 1005, 1011, 1010
<u>Ground 7:</u> Claims 10-11 are obvious under §103(a) over <i>Hampiholi, Attard, DeRuyck, and Gunderson</i>	1007, 1004, 1011, 1010
<u>Ground 8:</u> Claim 12 is obvious under §103(a) over <i>Hampiholi, Attard, DeRuyck, Gunderson, and McNew</i>	1007, 1004, 1011, 1010, 1006
<u>Ground 9:</u> Claim 13 is obvious under §103(a) over <i>Hampiholi, Attard, McNew, An, Kang, and Schunder</i>	1007, 1004, 1006, 1008, 1009, 1010
<u>Ground 10:</u> Claims 14-15 are obvious under §103(a) over <i>Hampiholi, Attard, McNew, DeRuyck, Gunderson, An, Kang, and Schunder</i>	1007, 1004, 1006, 1011, 1012, 1008, 1009, 1010
<u>Ground 11:</u> Claim 16 is obvious under §103(a) over <i>Hampiholi, Attard, McNew, DeRuyck, Gunderson, An, Kang, Schunder, and Frazer</i>	1007, 1004, 1006, 1011, 1012, 1008, 1009, 1010, 1005

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

In this proceeding, claims are interpreted under the same standard applied by Article III courts (i.e., the *Phillips* standard). 37 C.F.R. § 42.100(b); 83 Fed. Reg. 197 (Oct. 11, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). Petitioner applies the plain and ordinary meaning of all claim terms. Petitioner does not waive any argument in any litigation that claim terms in the '765 Patent are indefinite or additional terms need construction.

IV. SHOWING OF ANALOGOUS, PRIOR ART

The prior art is analogous to the claimed invention of the '765 Patent.

The prior art is from the same field of endeavor of the '765 Patent, namely vehicles. '765 Patent, 1:19-20, 8:46-53; *Attard*, 1:15-24, 9:63-67; *Frazer*, 1:18-23, 21:20-22:22; *McNew*, 1:17-30, 3:5-52, FIG. 1; *Hampiholi*, [0050]-[0051], [0057]-[0058]; *An*, 1:15-23, 1:52-63, 4:34-45; *Kang*, 2:7-29, 9:32-49, Fig. 7C; *Schunder*, Abstract, 1:63-2:7; *DeRuyck*, 1:16-34; *Gunderson*, [0002], [0004], [0025]. *Dec.*, 56-82¹.

The prior art is also reasonably pertinent to at least one problem facing the '765 Patent's inventors, namely at least one of:

¹ References to *Dec.* are to paragraphs of Ex. 1003, Declaration of Christopher Wilson.

(A) evaluating a computer's ability to autonomously operate a vehicle and determining actions to take when faults are detected; '765 *Patent*, 1:19-52, 8:7-12; *Attard*, 1:15-24, 2:28-54; *An*, 1:15-23, 1:52-63, 4:34-45, 4:46-6:24, 15:1-60; *McNew*, 20:7-31, 4:3-5, 8:41-44;

(B) autonomously controlling a device's operational mode; '765 *Patent*, 1:18-52, 3:10-17; *Frazer*, 19:23-25, 21:20-22:22, FIG. 6;

(C) selecting appropriate corrective actions for a given driving situation; '765 *Patent*, 7:53-8:12, 9:7-31, 10:27-57; *McNew*, 20:7-31, 4:3-5, 8:41-44; *Frazer*, 19:23-25, 21:20-22:22, FIG. 6;

(D) adjusting an operation of a vehicle based on driver competence; '765 *Patent*, 8:41-53; *Hampiholi*, [0001]-[0004], [0057]; *DeRuyck*, 1:16-34, 3:50-63;

(E) adapting to weather conditions to increase vehicle safety; '765 *Patent*, 7:38-52, 13:58-14:15, 15:29-46; *Kang*, 2:7-29, 9:32-49, 10:55-11:6, 13:3-18, Fig. 7C; *Schunder*, 1:63-2:7, 9:25-10:11, FIG. 4; and/or

(F) improving vehicle safety. '765 *Patent*, 9:7-13; *Gunderson*, [0062]. *Dec.*, 56-82.

V. GROUND 1: CLAIMS 1, 2, AND 17 ARE OBVIOUS OVER ATTARD, FRAZER AND MCNEW

A. Claim 1

1. Claim 1(Pre)²

To the extent the preamble is limiting, *Attard* teaches *a computer program product* that manages fault handling in an autonomous vehicle (“*self-driving vehicle (SDV)*”) including controlling a driving mode by changing from an autonomous driving mode to a manual driving mode (or semi-autonomous driving mode) in response to a detected fault (“*controlling a driving mode of a self-driving vehicle*”). Further, *Attard* teaches *computer readable storage medium* such as non-volatile memory and programming code stored thereon that is *readable and executable by a processor*.

a) Attard Teaches Controlling a Driving Mode

Attard’s vehicle 101 is capable of driving autonomously. *Attard*, 1:15-52, 2:28-32, 9:63-67. A POSITA would have understood that a vehicle capable of driving autonomously is a self-driving vehicle (SDV). *Dec.*, 84. Vehicle 101 includes three driving modes: (1) an autonomous driving mode (in which autonomous driving module 106 of computer 105 controls vehicle 101’s functions such as steering, braking, and speed), (2) a semi-autonomous mode (in which the driver/operator controls one or more of vehicle 101’s functions and computer 105

² See Claims Appendix for claim language.

controls one or more of vehicle 101's functions), and (3) a manual mode in which a human driver is in "complete" control of vehicle 101. *Attard*, 1:15-52, 1:62-2:9, 2:55-3:4, 3:22-27, 3:56-67, 7:39-46, 9:60-10:12, 10:36-41. Thus, a POSITA would have understood or found obvious that *Attard* teaches or renders obvious (1) an autonomous driving mode, (2) a semi-autonomous mode in which both driver and computer each control one or more vehicle functions, and (3) a manual mode in which a driver has "complete" manual control over vehicle functions including steering, braking, and speed. *Dec.*, 84.

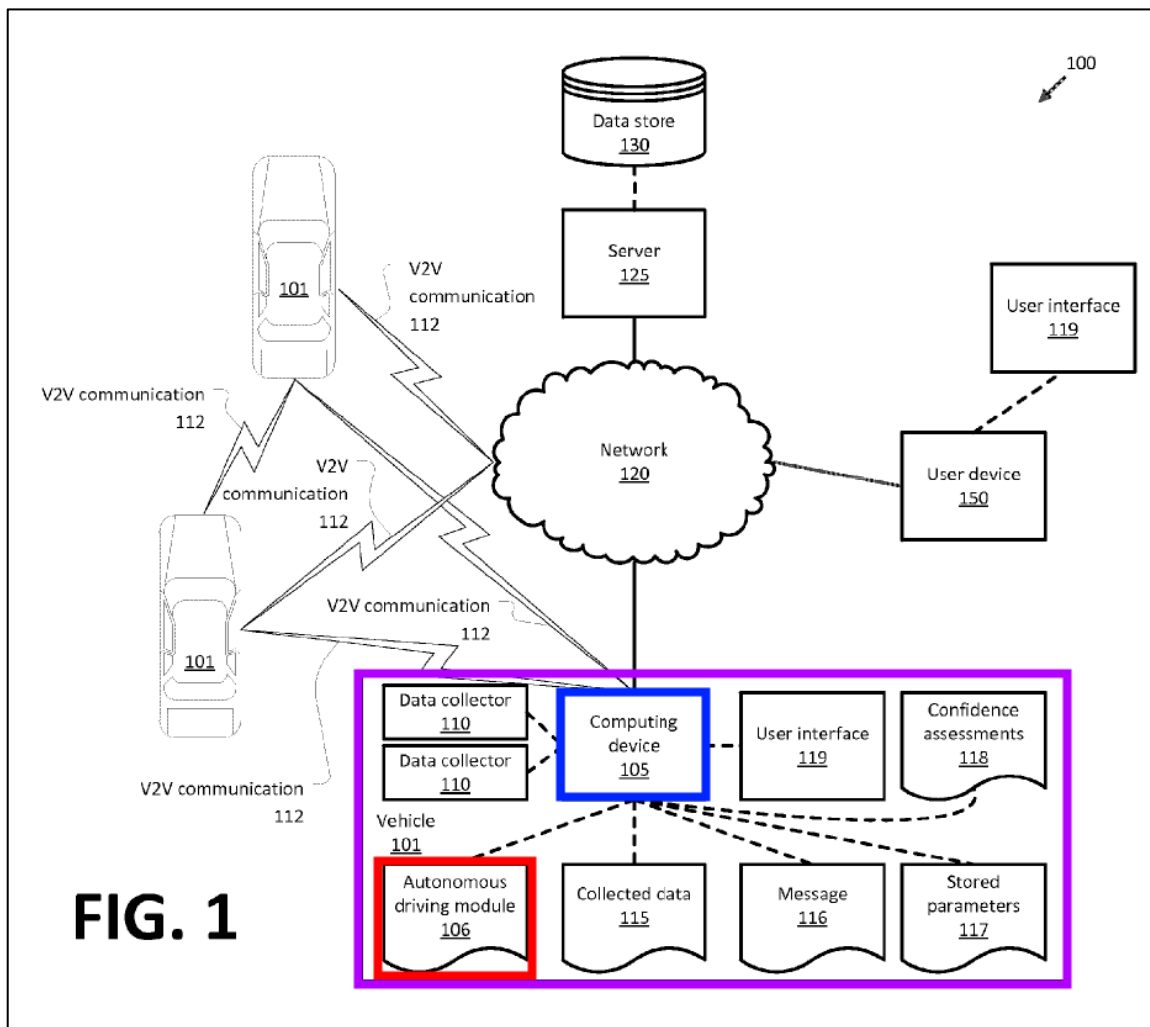
Regarding *controlling a driving mode*, *Attard* teaches disabling autonomous mode (that is, transitioning from autonomous mode to either semi-autonomous mode or manual mode) in response to a detected fault. *Attard*, 1:62-65, 2:55-3:4, 3:5-13.

A POSITA would have recognized that *Attard's* computer 105 (including autonomous driving module 106) controlling vehicle 101 to transition from autonomous mode to either of semi-autonomous or manual modes would have been *controlling a driving mode*. *Dec.*, 86. A POSITA would have understood that when disabling vehicle 101's autonomous functions such as braking, steering, and acceleration, a human driver would have taken over managing such functions, as is done in a typical non-SDV (e.g., standard non-SDV car). *Id.* While *Attard* does not expressly use the phrase "manual mode," a POSITA would have understood or found

obvious that *Attard's* driving mode in which the driver takes “complete control” of the vehicle teaches a “manual mode.” *Id.*

b) *Attard's Computer Program Product Comprises Non-Transitory Computer-Readable Memory and Processor*

Attard's Fig. 1 below depicts vehicle 101 including computer 105 and autonomous driving module 106:



Attard, Fig. 1³, 1:41-52.

³ All annotations and emphases are added by Petitioner unless specified otherwise.

Attard teaches the autonomous operations of vehicle 101 may be stored as a set of instructions in vehicle 101's memory *and executable by a processor* of computer 105. *Attard*, 2:27-32 ("Autonomous operations of the vehicle 101, including generation and evaluation of confidence assessments 118, may be performed in an autonomous driving module 106, e.g., as a set of instructions stored in a memory of, and executable by a processor of, a computing device 105 in the vehicle 101."), 3:15-22 ("In any case, the vehicle 101 generally includes a vehicle computer 105 that includes a processor and a memory, the memory including one or more forms of computer-readable media, and storing instructions executable by the processor for performing various operations, including as disclosed herein."), 15:11-46 (teaching computer-executable instructions, processor, and computer-readable medium including non-volatile media). Thus, a POSITA would have understood or found obvious that *Attard* teaches a *computer program product* for vehicle 101 including for *controlling a driving mode* and that the computer program product comprises non-volatile memory and a processor for executing programming instructions. *Dec.*, 87-88.

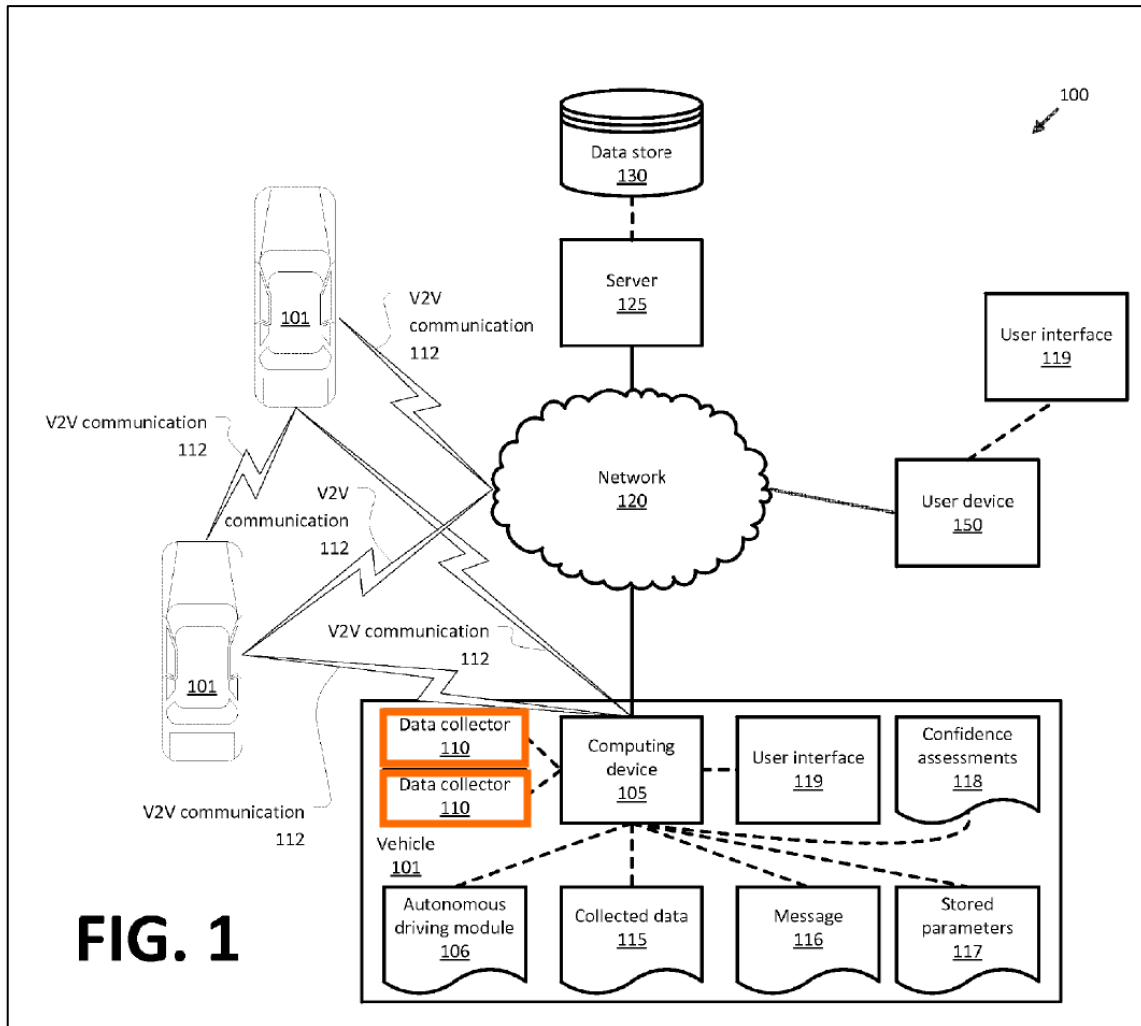
2. *Claim 1(a)*

a) *Attard's System of Sensors and Sensor Readings*

Attard's computer 105 receives collected data 115 ("*sensor readings*") from a plurality of sensors 110 ("*system of sensors*," also called data collectors 110 in

Attard), which include cameras, Global Positioning System (GPS) equipment, sensors relating to vehicle speed or acceleration, RADAR, LIDAR, and sonar. *Attard*, 4:1-31, 1:50-52, 1:62-2:9, 4:65-5:3, 6:16-35, 9:51-56, 10:13-17. *Attard*'s sensors 110 transmit collected data 115 to computer 105. *Attard*, 3:45-55 (“computer 105 ... generally includes instructions for receiving data, e.g., collected data 115 from one or more data collectors 110”), 4:1-17 (“data collectors 110 to provide data directly to the computer 105.”), 4:32-45 (“A memory of the computer 105 generally stores collected data 115.”), 6:14-35, 10:13-17.

Collected data 115 may include “a variety of data collected in a vehicle 101 from data collectors 110.” *Attard*, 4:32-45. *Dec.*, 90. Additionally, *Attard* teaches collected data 115 includes not only data gathered by one or more collection devices 115, but also includes data derived from the sensor readings. Specifically, *Attard* teaches collected data 115 includes “any data that may be gathered by a collection device 110 and/or derived from such data.” *Attard*, 4:32-45. *Attard*'s sensors 110 are depicted below:



Attard, Fig. 1; *Dec.*, 90.

A POSITA would have understood or found obvious that *Attard*'s sensors 110 are a *system of sensors* because *Attard* teaches a plurality of such sensors and the sensors work together with vehicle 101 including computer 105 and autonomous driving module 106 to collect data 115. *Dec.*, 91; *Attard*, 4:1-17, 1:61-2:6. To the extent PO argues *Attard* does not expressly teach *sensor readings*, a POSITA would

have understood or found obvious that *Attard's* cameras capture collected data 115, which are *sensor readings*. *Dec.*, 91.

b) *Attard's Sensor Readings Describe a Current Operational State of an SDV*

The '765 Patent describes that an “operational state” of a vehicle including states (e.g. presence/absence of snow tires), conditions (e.g., road conditions), and measured parameters (e.g., tire pressure, fluid volume) detected via its system of sensors. '765 *Patent*, 5:53-6:2; *Dec.*, 92-94. Operational states may, in some cases, indicate “anomalous” or “faulty” states, including failure of a particular system (e.g., an “all wheel traction system”) or a fault (e.g., a “faulty braking system.”). *Id.*

Attard teaches sensors which similarly “provide indicia related to collected data 115 pertaining to a particular vehicle 101 and/or vehicle 101 sub-system, environmental attribute, or condition,” where “an attribute or condition such as road conditions, weather conditions, braking capabilities, ability to detect a lane, ability to maintain a speed of the vehicle 101” are all taken into consideration and are related to collected data 115. *Attard*, 10:42-52. As described regarding Fig. 2, at block 210 the vehicle's sensors collect data, providing it to computer 105. *Attard*, 10:13-17, Figs. 1-2.

Because *Attard's* collected data 115 (*sensor readings*) detect conditions external to the vehicle (e.g., weather conditions, road attributes) and data internal to the vehicle (e.g., acceleration, speed) used to perform autonomous driving, *Attard's*

sensor readings describe a current operational state of a SDV. Compare Attard, 1:61-2:6, 4:1-17, 6:4-13, 10:13-27 with '765 Patent, 5:53-6:2; Dec., 92-94.

3. Claim 1(b)

Attard teaches “faults” as recited in limitation 1(b) via its “confidence attribute sub-assessments 118” (also denoted as “ φ_i ” below). *Attard*, 7:39-46; *Dec.*, 98-104. As mapped below, when φ_i falls below $\varphi_{\min}$, *Attard*’s vehicle makes a first determination that *a fault has occurred*. Claim 1(c) addresses a second determination of whether the fault exceeds a threshold for danger.

a) '765 Patent’s Fault Description

As discussed above regarding limitation 1(a), the “operational state” of a vehicle, as described by the '765 Patent, may indicate that a fault has occurred, such as a “faulty braking system.” '765 Patent, 5:53-6:2. Though a fault is sensed, in some instances the fault may be tolerable, so long as a threshold for danger has not yet been exceeded (further described below regarding limitation 1(c)). *Id.*, 7:67-8:12, 9:7-11; *Dec.*, 96.

b) *Attard's Fault Teachings*

As discussed above, *Attard* teaches computer 105 and at least one processor performing its steps. *See*, 1(Pre)-1(a).⁴ As further discussed above, *Attard* teaches collecting sensor data 115 describing a current operational state of the vehicle. *See*, 1(a).

Attard uses collected sensor data 115 to produce confidence assessments 118⁵ indicating whether the vehicle “can and/or should be operated autonomously.” *Attard*, 5:54-6:3, 5:21-53, 6:14-35; *Dec.*, 98-104. When expressed as a vector, each confidence assessment (ϕ) comprises a plurality of sub-assessments ϕ_i , each ϕ_i related to a single sensor (e.g., camera) or a group of sensors (e.g., lane-tracking

⁴ Any citation to a claim limitation is to the limitation’s mapping in this Petition, and such mapping is otherwise incorporated by reference in the section citing the limitation.

⁵ *Attard* uses element 118 to refer to both overall confidence assessment Φ and vector confidence assessments ϕ . *Attard*, 2:10-48, 5:54-6:44, 6:61-7:23, 7:39-46, 7:62-8:45. Each of Φ and ϕ will be further discussed regarding limitation 1(h), below. Hereinafter, element “118” is omitted, and each confidence assessment is referred to as its specific type (i.e., overall, vector, sub-assessment) for clarity.

system). *Attard* names φ_i “confidence attribute sub-assessments 118.”⁶ *Attard*, 7:39-46, 8:1-39; *Dec.*, 105-108. Each of *Attard*’s vector components φ_i may indicate a potential fault within one sensor or a group of related sensors, if it is determined that the particular φ_i falls below a threshold. *Dec.*, 103-108 *citing Attard* 6:4-13, 7:39-46, 7:65-8:13.

Attard explains each sub-assessment φ_i is compared with threshold(s) specified by *Attard*’s parameter 117 corresponding to that particular sub-assessment. *Attard*, 5:21-65; *Dec.*, 106-108. That is, for each sub-assessment φ_i , an associated parameter 117 is stored comprising thresholds ($\varphi_{\min}$) for comparison with sub-assessment φ_i to determine when associated collected data 115 indicates a particular driving condition/attribute has become problematic (i.e., that *a fault has occurred*). *Attard*, 5:21-29, 6:4-13; *Dec.*, 106-108. Thus, each sub-assessment φ_i represents a potential fault. *Id.*

In one example, *Attard* describes a sub-assessment φ_1 representing optical lane-tracking confidence. *Attard*, 8:10-39. A POSITA would have understood this particular sub-assessment φ_1 would have been based on collected data 115 received

⁶ *Attard* refers to φ_i as “confidence attribute sub-assessments,” “vector component,” and other related phrasing. *Attard*, 7:65-8:4, 11:10-15. For clarity, Petitioner refers to φ_i as “sub-assessment” throughout.

from a component such as an external camera or infrared sensor used for lane tracking. *Dec.*, 107 citing *Attard*, 4:67-5:3. In any case, *Attard* explains sub-assessment φ_1 is compared to a threshold $\varphi_{\min}$ (from an associated parameter 117), and if $\varphi_1 < \varphi_{\min}$, a message may be generated regarding the fault, where the urgency/severity of the fault may be indicated in the message. *Attard*, 8:10-39, 14:63-15:4, 1:65-2:9, 7:6-17; *Dec.*, 107-108. Thus, sub-assessment φ_i falling below threshold $\varphi_{\min}$ determines *a fault has occurred*, as claimed. *Id.*

As will be further discussed below regarding limitation 1(c), this “fault” may, in some cases, be tolerable to *Attard*’s SDV, much like the method described by the ’765 Patent. For example, when a sub-assessment φ_i falls below a particular threshold, a low-urgency fault message may be presented such as “Notice,” “Caution,” or “Warning.” *Attard*, 8:10-25. Here, the fault may not yet have exceeded the threshold for “Danger,” which would warrant a message indicating higher urgency. *Id.*; *Dec.*, 108. In another example, a fault may indicate that one of multiple cameras has failed, but, due to redundancy, the vehicle may continue operating autonomously. *Attard*, 14:64-15:1; *Dec.*, 108.

4. Claim 1(c)

As discussed regarding limitation 1(b), *Attard* teaches determining a fault when a sub-assessment φ_i falls below a threshold $\varphi_{\min}$, triggering message generation such as “Notice,” “Caution,” or “Warning.” *See*, 1(b) citing *Attard*, 8:10-25. As

further explained, *Attard* teaches computer 105 and at least one processor performing its steps. *See*, 1(Pre)-1(a).

Attard continues, explaining that a second determination is made, where if the confidence assessment ϕ_i component continues to fall below another threshold, a message for “Danger” is generated. *Attard*, 8:10-25; *Dec.*, 110. Thus, *Attard* teaches determining, by its processor(s), whether the fault (such as poor lane-tracking confidence, as explained above regarding 1(b), or a weather condition, such as icy roads as explained below regarding 1(g)) falls below a *threshold for danger*, as claimed. *Id.*

Though *Attard*’s disclosure describes sub-assessment ϕ_i falling below a threshold for danger, a POSITA would have understood that *Attard* teaches surpassing, and thus “*exceeding*” the threshold for danger, as claimed. *Attard*, 8:10-25; *Dec.*, 111. Particularly, *Attard* expressly uses “exceed” to describe surpassing a threshold in the negative direction, i.e. the quantity “exceeds” a threshold by dropping below the threshold, though the value of the parameter is becoming smaller. *Id.* A POSITA would also have had the skill and found it obvious to simply reprogram *Attard*’s scale, perhaps multiplying by -1, such that the *threshold for danger* was exceeded in the positive direction. *Dec.*, 111.

a) Overall Confidence Assessment – Capital Φ

As detailed below regarding limitation 1(h), *Attard's* process of determining if a sub-assessment ϕ_i *exceeds a threshold for danger* only occurs if overall confidence assessment Φ falls below a threshold $\Phi_{\min}$. These two sub-steps of *Attard's* process, wherein Φ falls below $\Phi_{\min}$ AND ϕ_i falls *below* a threshold for danger, are collectively mapped as limitation 1(c).

Thus, *Attard's* overall confidence assessment Φ (mapped as the *control processor confidence level*) is *determin[ed]* as part of the step of “determining, by the one or more processors, whether the fault exceeds a threshold for danger,” which is required per 1(h).

5. Claim 1(d)

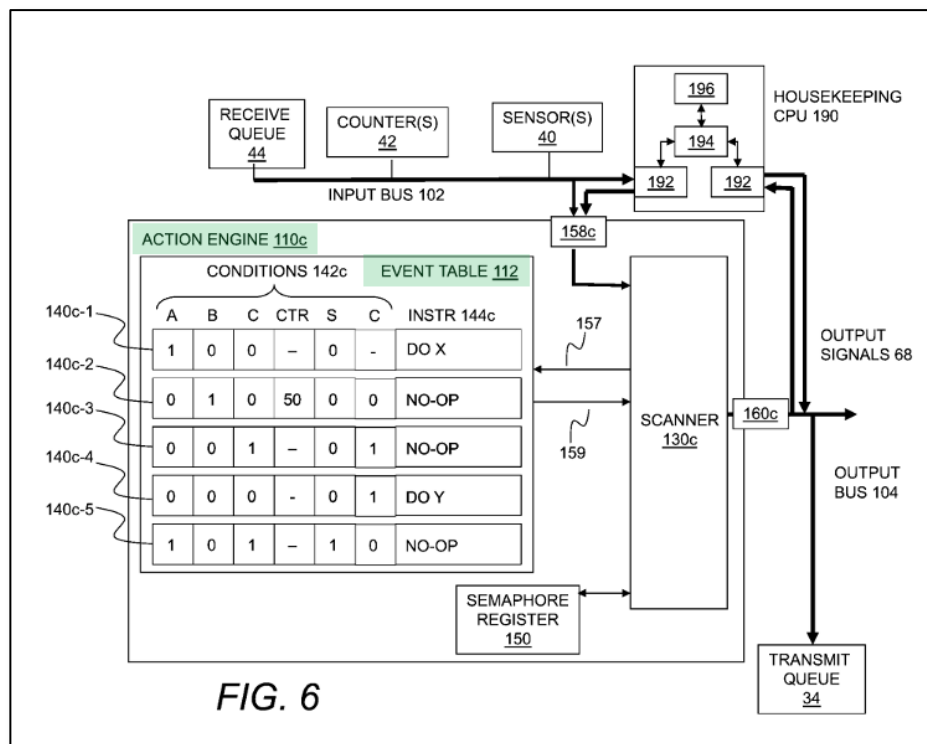
a) *Attard Teaches a Corrective Action Associated with a Fault*

Attard teaches a fault. *See*, 1(b). Further, *Attard* teaches taking one or more corrective actions based on the fault that occurs. *Compare Attard*, 3:9-13 (including “ceasing one or more autonomous operations”), 14:63-15:4. For example, like the '765 Patent, corrective actions may include sending a message (e.g. “Caution” or “Danger”) or performing an action (e.g., slowing the vehicle to a stop) based on the fault. *Compare Attard*, 2:28-3:4, 3:9-13, 7:18-57, 8:10-39, 14:27-33 *with '765 Patent*, 8:17-22, 11:64-12:3. In one example, content of message 116 to be displayed “may be determined according to an identity of the component that has dropped

below” (i.e., “exceeded”) the threshold. *Attard*, 8:1-13; *Dec.*, 114 (explaining “component” here refers to sub-assessment ϕ_i , and thus the message is related to the specific fault that has occurred). Additionally, a requested action (“RA”) may be included in the message, where the RA is a function of the vehicle “subsystem i” and sub-assessment ϕ_i . *Attard*, 8:36-38 (“A requested action (RA); in the example above, $RA=f(i, \phi_i)$ is the phrase “Driver intervention.”). Thus, a POSITA would have recognized *Attard* teaches determining performing particular corrective actions in response to particular determined faults. *Dec.*, 114.

b) *Frazer Teaches a Fault-Remediation Table*

Frazer teaches action engine 110c including event table 112 for autonomous or semi-autonomous vehicles. *Frazer*, 21:20-32. Event table 112 includes registers (rows 140c-1, 140c-2, etc.) containing particular sets of conditions 142c and an instruction/action 144c to be taken when conditions are met. *Frazer*, 21:20-22:22. In more detail, *Frazer* teaches conditions of a “dynamic environment” monitored by sensors. *Frazer*, 21:52-56. If input signals match a given condition 142c stored in event table register 140c, corresponding action(s) 144c in event table register 140c are executed. *Frazer*, 22:6-22. *Frazer’s* event table 112 is depicted below:



Frazer, FIG. 6, 21:19-43.

A POSITA would have recognized *Frazer*'s event table 112 mirrors the '765 Patent's description of a fault-remediation table. See '765 Patent, 8:23-40 ("fault-remediation table, where each row refers to a fault condition, a first column refers to a condition that gets manifested by that fault, and a second column that refers to the mode in which the vehicle should be driven when that condition is manifested.") compared with *Frazer*, 21:19-43, FIG. 6; *Dec.*, 117. In particular, *Frazer*'s rows 140c represent fault conditions, a first column 142c refers to a condition manifested by that fault, and a second column 144c refers to the action to be taken when the conditions are manifested ("DO X"); *Dec.*, 117-118.

ACTION ENGINE 110c						
CONDITIONS 142c						EVENT TABLE 112
A	B	C	CTR	S	C	INSTR 144c
1	0	0	-	0	-	DO X
0	1	0	50	0	0	NO-OP
0	0	1	-	0	1	NO-OP
0	0	0	-	0	1	DO Y
1	0	1	-	1	0	NO-OP

Frazer, FIG. 6 (excerpt).

Therefore, because *Frazer*'s event table 112 includes faults 140c specified by conditions 142c and actions 144c that are triggered when conditions are met, *Frazer*'s event table 112 teaches a *fault-remediation table*. Dec., 118.

c) *Motivation to Combine Attard-Frazer*

A POSITA would have found obvious and been motivated to modify *Attard*'s fault handling (including determining a corrective action, such as a "Danger" message) with *Frazer*'s teachings of organizing faults, conditions, and action(s) to take for each fault in an event table (i.e., *fault-remediation table*), which would have resulted in *determining a corrective action associated with the fault using a fault-remediation table*. Dec., 119. A POSITA would have found obvious and been motivated to determine which corrective action to take using *Frazer*'s event table to

enable easy access and quick determination of actions to take in response to detected faults. *Id.* A POSITA would have recognized formatting data into a table was a well-known and widely-used method of efficiently organizing data for retrieval, reference, and potential modification. *Dec.*, 119-120. A POSITA would have specifically appreciated the if/then type of fault remediation data already present in *Attard's* vehicle would have been particularly apt for organizing into a table, concisely and efficiently cross-referencing an array of detectable conditions to quickly determine appropriate responses, improving the safety of the vehicle while reducing its memory requirements compared to an otherwise unorganized list of fault responses. *Dec.*, 122. A POSITA would have understood *Frazer* provides an express teaching, suggestion, and motivation for the combination, stating its action engine “exhibits a significantly low latency with respect to processing information relating to respective states of the dynamic environment and taking actions in response to same.” *Frazer*, 23:64-67; *Dec.*, 121.

A POSITA would have recognized the usefulness of storing these associations in a table reduces latency, as *Frazer* expressly teaches. *Frazer*, 23:64-67; *Dec.*, 123. The proposed combination constitutes application of a known technique (*Frazer's* event tables) to a known method (*Attard's* fault handling method) ready for improvement to yield predictable results. Based on *Attard's* teachings that faults have associated actions (*see, e.g., Attard*, 2:1-6, 14:27-33, 14:63–15:4), a POSITA

would have looked to other references that describe specific ways to associate faults with actions and to store such information in computer memory. *Dec.*, 121-123.

A POSITA would have appreciated that modifying *Attard* per *Frazer* would have had a reasonable expectation of success (“REOS”). *Dec.*, 124-127. *Attard* and *Frazer* teach implementing programs and functions using programming instructions executed by a processor. *Attard*, 15:12-46 (teaching computer-executable instructions, processor, memory); *Frazer*, 21:20-51 (“The event table 112 and event table registers 140c can be implemented in any suitable type of memory, including but not limited to computer readable storage media such as a volatile or nonvolatile computer memory.”); *Dec.*, 124-127. Modifying *Attard* would have merely required straightforward changes to programming instructions. *Id.* Indeed, *Attard* already teaches computer hardware including a processor for executing instructions and memory that stores instructions. *Attard*, 2:28-41, 3:15-27, 4:32-45, 5:21-57, 15:12-46 (teaching examples of memory).

Thus, a POSITA would have understood or found obvious that *Attard* already has necessary computer hardware for implementing an event table, such as *Frazer*’s. *Dec.*, 126. Modifying *Attard* to utilize *Frazer*’s table would have been use of a known technique of using a fault-remediation table to group data such as faults, conditions that indicate the faults, and actions to take when the fault conditions are met, and this known technique would have improved *Attard*’s similar autonomous

vehicle (including determining a corrective action in response to a fault) in the same way as *Frazer's* autonomous vehicle. *Dec.*, 122-123. To the extent it is argued that *Attard's* hardware is insufficient for this modification, a POSITA would have understood that it would have been straightforward to modify *Attard* to include additional memory or processing power as needed, and that this would have been a tradeoff to capture *Frazer's* advantages. *Dec.*, 126.

Further, a POSITA would have recognized the ease of modifying *Attard's* computer 105 (or other memory of vehicle 101) to include an event table per *Frazer*. *Dec.*, 127. Both *Attard* and *Frazer* are similar in that they both describe detecting faults/events based on sensor data. *Compare Attard* 1:50-52, 12:53-62 with *Frazer*, 21:52-56, 22:31-47. Additionally, both *Frazer* and *Attard* teach applying their systems and methods to an autonomous or semi-autonomous vehicle, such that a POSITA would have had a REOS when modifying *Attard* per *Frazer's* teachings. *Dec.*, 127.

6. Claim 1(e)

Attard-Frazer teaches determining a corrective action associated with the fault using a fault-remediation table. *See*, 1(d). Further, *Attard-Frazer's* SDV implements the corrective action(s) based on its fault-remediation table.

ACTION ENGINE 110c						
CONDITIONS 142c						EVENT TABLE 112
A	B	C	CTR	S	C	INSTR 144c
1	0	0	-	0	-	DO X
0	1	0	50	0	0	NO-OP
0	0	1	-	0	1	NO-OP
0	0	0	-	0	1	DO Y
1	0	1	-	1	0	NO-OP

Frazer, FIG. 6 (excerpt); *Dec.*, 128.

For example, *Attard* teaches that when Φ falls below $\Phi_{\min}$, computer 105 may *implement[] the corrective action*, such as sending a message or performing an action (e.g., presenting a “Danger” message to the driver and/or slowing the vehicle to a stop) where the action taken is based on the fault, i.e., when ϕ_i is below a $\phi_{\min}$. *Attard*, 1:62-2:6, 2:46-3:4, 8:10-39, 14:27-33, 14:63-15:4, *generally* 7:18-9:10, 11:26-12:22 (teaching details of messages 116, e.g., a corrective action). In *Attard-Frazer*, a suitable *corrective action* (instruction 144c) for a fault would have been determined using its fault-remediation table. *Dec.*, 129. *See*, 1(d). After selection, the corrective action would have been implemented by *Attard’s* vehicle 101. *Attard*, 14:63-64 (“[T]he nature of a fault may indicate an action **directed by the computer.**”); *Dec.*, 129.

In this manner, modifying *Attard* to use *Frazer's fault-remediation table* would have merely been providing a particular data storage arrangement (an event table) for selecting *Attard's* corrective action(s) to implement. *Dec.*, 130. Thus, when a condition of the event table is met (e.g., fault, such as a threshold exceeded), a corresponding *corrective action* is implemented in response. *Id.* A motivation to modify *Attard* per *Frazer's* teachings is provided above. *See*, 1(d).

7. Claim 1(f)

As discussed above, *Attard* teaches vehicle 101 includes sensors 110 that perform *sensor readings*. *See*, 1(a). In particular, *Attard* teaches sensors 110 include *a GPS sensor* that sends GPS (global positioning system) sensor readings to computer 105. *Attard*, 4:4-11, 4:32-45, 6:4-13, 7:14-17, 10:42-52, 13:22-24, 13:56-58, 14:41-48; *Dec.*, 131. *See*, 1(a). Petitioner notes claim 1 requires only mere presence of GPS sensor readings.

8. Claim 1(g)

As discussed above, *Attard* teaches or renders obvious an SDV currently *traveling on a roadway*, taking *sensor readings*, and sending said sensor readings to computer 105. *See*, 1(a). *Attard* teaches determining based on sensor readings whether a fault has occurred. *See*, 1(b).

Further, *Attard* teaches or renders obvious *a fault comprises a current weather condition of the roadway on which vehicle 101 ("the SDV") is currently traveling*.

In particular, *Attard* teaches various weather conditions (e.g., ice, snow, rain) may cause a fault. *Attard*, 2:10-21, 2:61-3:4, 4:1-17, 4:32-56, 6:4-13, 6:61-7:5, 7:51-57, 10:42-52; *Dec.*, 133-134.

In one example, *Attard* teaches weather conditions may cause a fault by lowering a confidence assessment below a threshold irrespective of whether there is no problem with a sensor 110 (*i.e.*, the fault is not due to hardware malfunction). That is, the fault comprises an effect of the current weather condition itself. *Attard*, 7:14-17; *Dec.*, 134. Thus, *Attard* teaches a particular sub-assessment ϕ_i corresponding to a weather condition on the roadway on which the SDV is traveling (wet or icy roads) that may result in a fault, and particularly a fault that may “exceed a threshold for danger.” *Id.*

9. Claim 1(h)

As discussed above, *Attard* teaches or renders obvious *determining ... whether a fault has occurred and determining whether the fault exceeds a threshold for danger. See, 1(b)-1(c).* Further, *Attard* teaches that this determination as to *whether the fault exceeds a threshold for danger*, further comprises *determining a control processor competence level (CPCL), Φ .*

a) '765 Patent's CPCL

The '765 Patent characterizes a CPCL as “a competence level of the SDV control processor in controlling the SDV while the SDV experiences the current operational anomaly.” *'765 Patent*, 1:34-41, 10:3-9, 10:27-47.

b) *Attard's CPCL – Capital Φ*

Attard's vehicle confidence assessments 118 are generated in two coexisting forms:

(1) ϕ , a **vector**, “where each value in the vector relates to an attribute [] of the vehicle [] and/or a surrounding environment...such as vehicle speed, braking performance, acceleration,...weather conditions, road conditions, etc. *Attard*, 6:4-13; *Dec.*, 137-140. *Attard* teaches determining a fault has occurred due to a particular sub-assessment ϕ_i falling below an associated threshold $\phi_{\min}$, triggering message generation specific to the particular sub-assessment ϕ_i . *See*, 1(b)-(c).

(2) Φ , which may be “a **scalar** value, e.g., as a number [] in the range of 0 to 1. *Attard*, 5:54-6:3; *Dec.*, 137-140. *Attard's* Φ is mapped as the claimed *computer processor competence level* (CPCL) because it “indicates an overall confidence value that the vehicle 101 can and/or should be operated autonomously.” *Attard*, 5:54-62, 1:44-50; *Dec.*, 137.

Though *Attard* does not provide detailed mathematical description regarding Φ , a POSITA would have known various approaches for its calculation. *Dec.*, 104.

As Mr. Wilson opines, a POSITA would have understood or found obvious techniques for converting *Attard's* **vector** confidence assessments ϕ directly to a **scalar** via a well-known mathematical method. *Id.* However, Petitioner notes claim 1 does not require any particular mathematical relationship between Φ and ϕ . Any mathematical approach for calculating *Attard's* Φ would have satisfied claim 1, including approaches in which Φ is not directly calculated from ϕ , but rather each are independently calculated from sensor data. *Id.*

c) *During “determining whether the fault exceeds a threshold for danger”*

As discussed regarding 1(c), *Attard* teaches a range of $\phi_{\min}$ thresholds per sub-assessment ϕ_i , where each value of ϕ_i may influence the message generation. *Attard*, 7:62-8:39, 7:18-28; *Dec.*, 109-111. In particular, one $\phi_{\min}$ threshold is a “threshold for danger.” *See*, 1(c).

Attard explains the functionality of comparing sub-assessment ϕ_i to $\phi_{\min}$ thresholds is “triggered when the overall confidence assessment 118 (Φ) drops below a specified predetermined threshold $\Phi_{\min}$.” *Attard*, 7:18-28, 10:18-52, 11:26-42, Fig. 2; *Dec.*, 137-140. Thus, the process of determining if a sub-assessment ϕ_i exceeds a threshold for danger only occurs if *Attard's* overall confidence assessment Φ falls below a threshold $\Phi_{\min}$. Because these two sub-steps of *Attard's* process (Φ falling below $\Phi_{\min}$ AND ϕ_i falling below a threshold for danger) are collectively mapped as *determining, by the one or more processors, whether the fault exceeds a*

threshold for danger, Attard teaches determining whether the fault exceeds a threshold for danger comprises determining a control processor competence level.

10. Claim 1(i)

As discussed above, *Attard* teaches implementing corrective action(s) and *Attard-Frazer* teaches using a fault-remediation table to determine and implement a corrective action associated with the fault. *See*, 1(d)-1(e).

a) *Attard Teaches Alerting a Human Driver to Take Over Immediately*

Attard teaches *corrective action[s]* including providing a message to a human driver including audio and/or visual alerts. *See*, 1(e). *Attard* teaches the alerts can include an “urgency” component, for example, indicating a need for the driver to take over manual control immediately. For example, *Attard* teaches messages 116 (“e.g., an alert”) can “convey a level of urgency or importance to a vehicle 101 operator, e.g., by using prosody techniques to include emotional content in a voice alert, a visual avatar having an appearance tailored to a level of urgency, etc.” *Attard*, 2:28-46. In particular, *Attard* teaches alerting the driver with a high level of urgency to take over manual control immediately. *Attard*, 2:55-61, 2:62-3:4, 7:39-61, *Dec.*, 143.

To the extent it is argued *Attard* does not transfer driver controls to manual control, *McNew* teaches it.

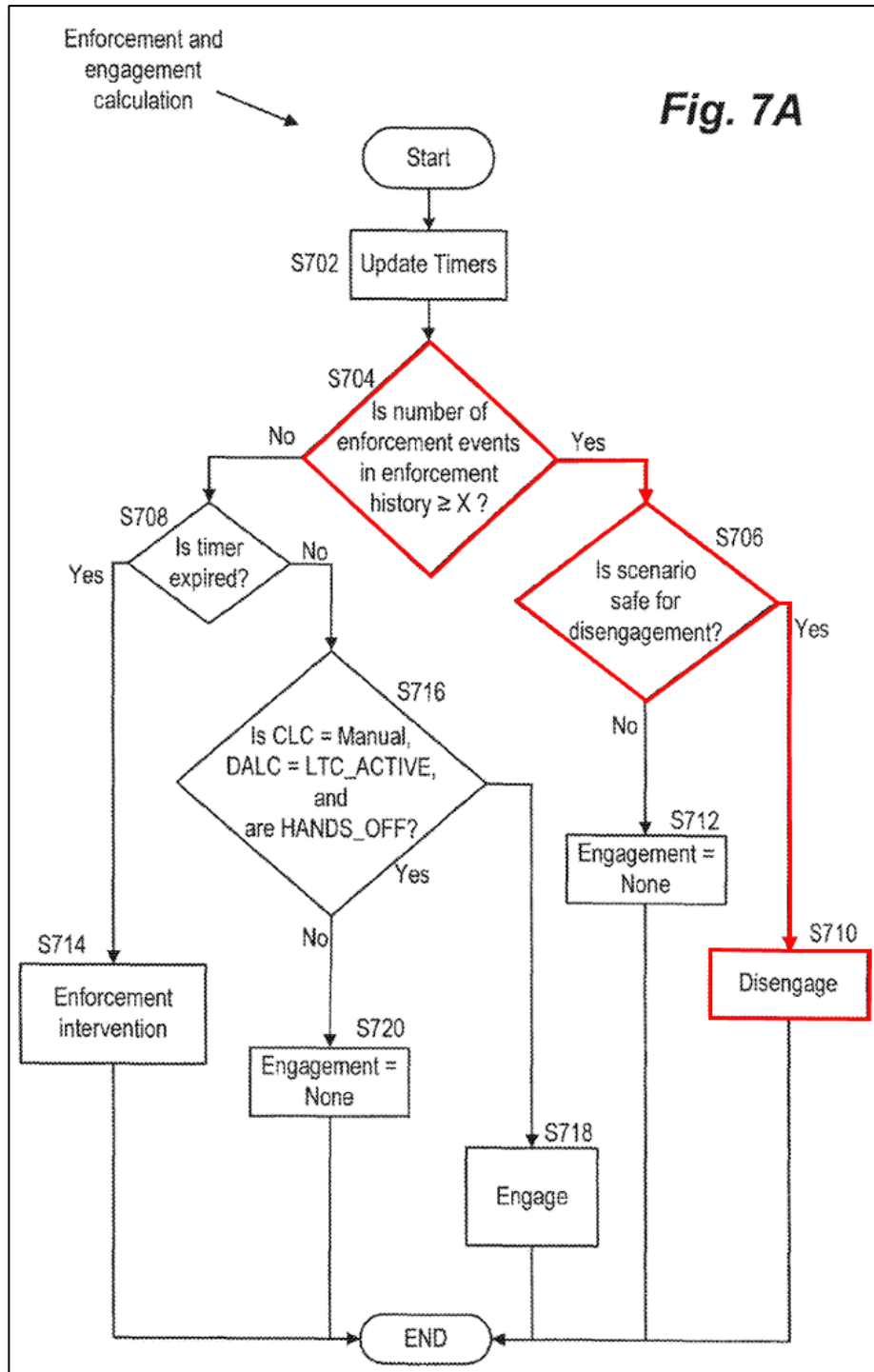
b) *McNew Teaches Transferring Driver Controls to Manual Control*

McNew teaches managing vehicle control states of a semi-autonomous vehicle (e.g., semi-autonomous, manual) while also managing a driver state (e.g., whether the driver is paying attention to the road). *McNew*, 1:17-21. *McNew*'s vehicle has a semi-autonomous mode manager (SAMM) to manage the control states, including control states of a lane trace control (LTC) system. *McNew*, 3:15-21. The LTC system includes several states, including MANUAL (where the LTC system is on and sensing, but the driver is in control) and OFF (where the LTC system is off). *McNew*, 3:59-4:5. To enhance safety of the semi-autonomous driving system, *McNew* teaches monitoring driver states such as driver attention and taking actions such as warning the driver or reducing speed if the driver is not paying sufficient attention. *McNew*, 1:17-30, 1:59-65, 6:15-28.

In one example, if a driver continues ignoring warnings, *McNew* teaches disengaging the semi-autonomous⁷ driving system as long as the current driving

⁷ *McNew* refers to its system as both “semi-autonomous” and “semi-automatic.” *McNew*, 1:7-13, 1:59-65, 6:15-28 (referring to both “semi-autonomous” and “semi-automatic” driving system), 20:7-31. A POSITA would have recognized *McNew* uses these terms synonymously. *Dec.*, 146. “Semi-autonomous” is used herein for simplicity.

scenario is “safe enough.” *McNew*, 20:7-31, 4:3-5, 8:41-44. Specifically, *McNew*’s system determines if the semi-autonomous mode should be disengaged due to a factor such as driver inattention (Step S704), determines if it is safe enough to disengage the semi-autonomous mode (Step S706), and disengages the semi-automatic driving system by “shutting down the semi-automatic driving system...[where] the LTC system transitions through the CO-STEER and **MANUAL** settings before being turned off.” (Step S710). *Id.* Fig. 7A below depicts **Steps 704, 706, and 710** where the end result is disengaging the vehicle’s semi-autonomous system and transferring the driver controls to manual control:



McNew, Fig. 7A; Dec., 146.

c) *Motivation to Combine Attard-Frazer-McNew*

As discussed above, a POSITA would have been motivated and found obvious to modify *Attard* per *Frazer's* event table (“*fault-remediation table*”) to advantageously decrease latency when determining a corrective action associated with a fault. *See*, 1(d)-1(e).

Further, a POSITA would have been motivated and found it obvious to include transferring driver controls to manual control as a corrective action in *Attard-Frazer's* event table in response to particular faults per *McNew's* teachings. *Dec.*, 148. A POSITA would have been motivated because *Attard* includes a specific suggestion via *Attard's* repeated disclosures of recommending transferring driver controls to manual. *See, e.g., Attard*, 2:55-3:4. Modifying *Attard-Frazer* in this way would have simply been use of a known technique of taking a particular corrective action (e.g., transition from autonomous/semi-autonomous mode to manual control) in response to a fault and would have improved *Attard-Frazer's* similar autonomous/semi-autonomous vehicle in the same way as *McNew's*. *Dec.*, 158. Further, modifying *Attard-Frazer* per *McNew's* teachings would have allowed *Attard-Frazer's* vehicle to advantageously both (1) alert a driver of a need to transition from autonomous/semi-autonomous mode to manual mode and (2) actually perform the transition to manual mode. *Dec.*, 150. Another advantage would have been increased safety and security by alerting the driver to assume control in

situations in which the computer deems itself to be insufficiently competent at self-driving. *Dec.*, 151.

A POSITA would have been motivated and found it obvious to include transferring driver controls to manual control as a corrective action for numerous reasons. *Dec.*, 148-151. For example, if one or more sensors needed to perform autonomous driving experience a fault but the vehicle is otherwise safe to drive, transitioning from autonomous/semi-autonomous mode to manual mode would have allowed a driver to continue to their destination. *Id.* Similarly, even if no hardware fault exists, but adverse weather/road conditions are severe enough to prevent safely continuing driving in autonomous mode, alerting the driver and transitioning to manual mode would have allowed the human driver to take over and continue driving to the destination. *Id.*

A POSITA would have understood modifying *Attard-Frazer* to include a corrective action such as transferring driver controls to manual control would have had a REOS. *Dec.*, 152. Modifying *Attard-Frazer* per *McNew*'s teachings would have required only straightforward changes to programming instructions; indeed, *McNew* teaches implementing its system in computer program instructions. *Id.* For example, the straightforward changes would have included modifying *Attard-Frazer*'s event table to include transferring driver controls to manual control as a corrective action. *Dec.*, 153. Additionally, *Attard* expressly contemplates transition

to manual control and teaches vehicle 101 is manually drivable, such that a POSITA would not have had to modify vehicle 101 to be able to drive using manual control.

Attard, 2:55-3:4; *Dec.*, 153.

B. Claim 2

1. Claim 2(Pre)

See, 1(Pre).

2. Claim 2(a)

See, 1(f).

3. Claim 2(b)

Attard expressly envisions a fault due to its lane tracking system being “unable to see the lane-markings.” *Attard*, 8:10-13, 10:42-52; *Dec.*, 156. *See also*, 1(a).

4. Claim 2(c)

See, 1(h).

5. Claim 2(d)

See, 1(i).

C. Claim 17

1. Claim 17(Pre)

See, 1(Pre).

2. Claim 17(a)

See, 1(a).

3. Claim 17(b)

See, 1(b).

4. Claim 17(c)

See, 1(c).

5. Claim 17(d)

See, 1(d).

6. Claim 17(f)

See, 1(f).

7. Claim 17(g)

See, 1(g).

8. Claim 17(h)

See, 1(h).

9. Claim 17(i)

See, 1(i).

VI. GROUND 2: CLAIM 7 IS OBVIOUS OVER HAMPIHOLI AND ATTARD

A. The *Hampiholi-Attard* SDV and Motivation to Combine

Claim 7 is obvious over a combined *Hampiholi-Attard* SDV, operating according to *Hampiholi's* disclosure and modified to incorporate *Attard's* self-driving modes, functions, features, and CPCL, as well as any hardware and software necessary to provide an operable SDV practicing the techniques taught by both *Hampiholi* and *Attard*. The combined *Hampiholi-Attard* vehicle would have

desirably been capable of self-driving and implementing corrective actions when appropriate, whether due to detected reduced human competence (per *Hampiholi*) or detected reduced processor competence (per *Attard*). *Dec.*, 168. A POSITA would have appreciated the resulting vehicle would have furthered *Hampiholi*'s stated goal of increasing driver, passenger, and bystander safety by controlling a driving mode of an SDV to respond to faults such as hardware failures or weather conditions as well as decreased driver competence. *Hampiholi*, [0002], [0017]; *Dec.*, 168. *See* 7(c) for additional motivation to modify *Hampiholi* per *Attard* to include features for self-driving functionality.

B. Claim 7

1. Claim 7(Pre)

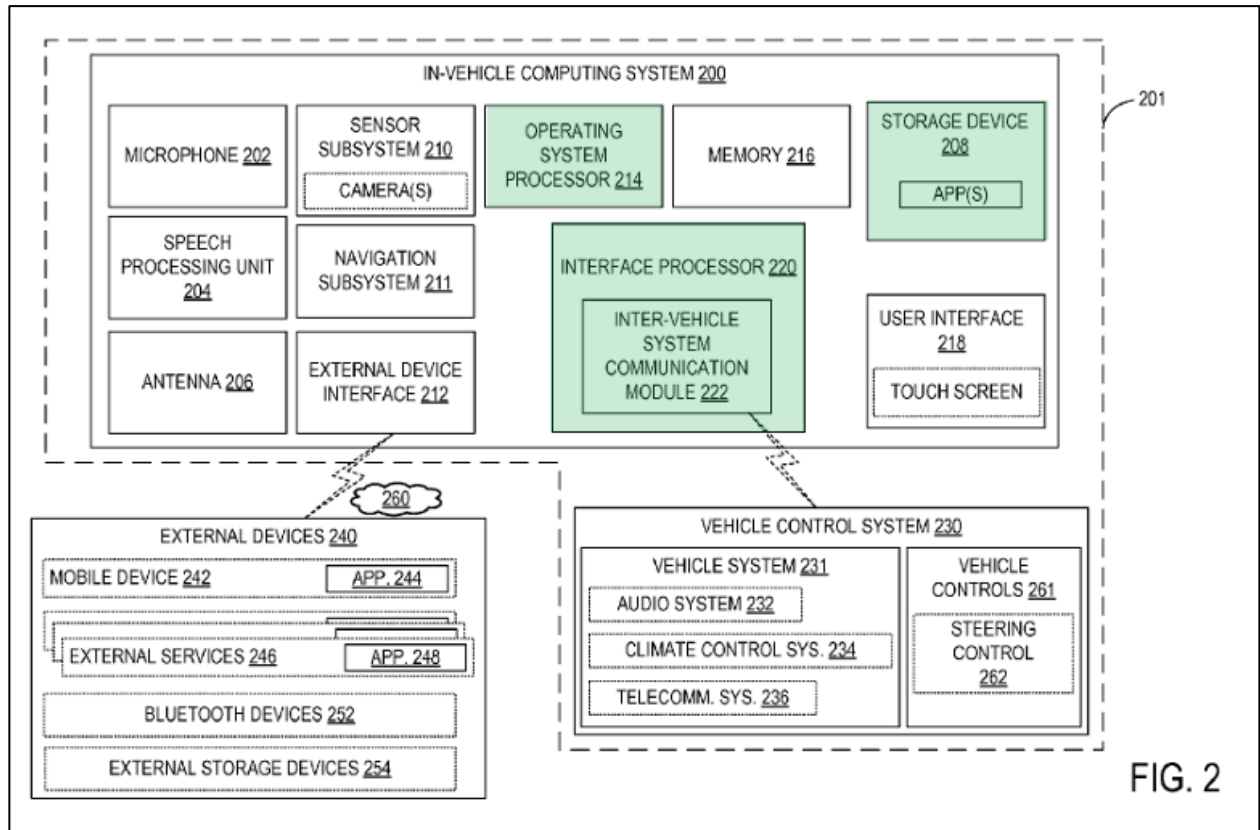
To the extent the preamble is limiting, *Hampiholi-Attard* teaches a computer program product that manages fault handling in a vehicle having automatic operation (an “SDV”) including controlling a driving mode by automatically engaging responses detected faults (“controlling a driving mode of a self-driving vehicle”). Further, *Hampiholi-Attard* teaches non-volatile memory and programming code readable and executable by a processor. A motivation to combine the overall vehicles, systems, and techniques described by *Hampiholi* and *Attard* is described above, and particular SDV features are described at Claim 7(c); both of these discussions are incorporated herein by reference.

a) ***Hampiholi-Attard Teaches Controlling a Driving Mode***

Hampiholi's vehicle is capable of driving automatically. *Hampiholi*, [0057] (describing “**automatically** controlling the vehicle speed or braking” and “**automatically** bringing the vehicle to a complete stop”), [0073], [0076] (“**automatic** adjustment of engine operation”), Fig. 4; *Dec.*, 171. A POSITA would have understood that a vehicle capable of driving automatically is an SDV. *Dec.*, 84. Additionally, as discussed for claim 1, *Attard* teaches an autonomous SDV. *See*, 1(Pre); *Dec.*, 84. As further discussed, *Attard* teaches *controlling a driving mode*, transitioning from autonomous mode to either semi-autonomous mode or manual mode responsive to detecting a fault. *Id. citing Attard*, 1:62-65, 2:55-3:4. Thus, the combined *Hampiholi-Attard* vehicle is an SDV controlling a driving mode. *Id.*

b) ***Hampiholi's Computer Program Product Comprises Non-Transitory Computer-Readable Memory and Processor***

Hampiholi's Fig. 2 below depicts vehicle 201 including vehicle storage device 208 including “instructions executable by processors 214 and 220 in non-volatile form.”



Hampiholi, Fig. 2, [0029], [0032].

Hampiholi teaches storage device 208 may store instructions and/or code that, when executed by a processor (e.g., operating system processor 214 and/or interface processor 220), controls the in-vehicle computing system 200 to perform one or more actions. *Hampiholi*, [0032]. These instructions would have included those taught by both *Hampiholi* and *Attard* in the combined vehicle, including specifically the instructions for “controlling a driving mode” according to *Attard*’s disclosure. *Hampiholi*, [0003], [0032]; *Attard*, 3:22-27, 3:56-67, 9:60-10:12. *Dec.*, 173. Thus, a POSITA would have understood or found obvious that *Hampiholi-Attard* teaches a computer program product for a vehicle including for controlling a driving mode

and that the computer program product comprises non-volatile memory and a processor for executing programming instructions. *Id.*

2. *Claim 7(a)*

Hampiholi teaches a system and method of determining a competence level of a human driver in controlling its vehicle, as measured by the severity level of distraction the driver is experiencing. Examples given of distractions experienced by drivers include not looking at the road for upcoming turns, being distracted by music, handling infotainment units, being sleepy or tired, and/or other driver states. *Hampiholi*, [0001]-[0004], [0050]. *Hampiholi* teaches a severity rank R is determined measuring the distraction level of the driver.

For example, a low-level severity rank R may indicate a short-lived driver distraction while the vehicle is not in immediate danger of collision, while a medium-level severity rank R may include a more serious driver distraction, (e.g., droopy eyes indicating sleepiness) while the vehicle is in an otherwise safe environment (e.g., no objects within a trajectory/path of the vehicle, driving at a low speed), and a high-level severity rank R may include any driver distraction while an object in the vehicle's environment is on a colliding course with the vehicle. *Hampiholi*, [0057]; *Dec.*, 175. Exemplary severity ranks R are illustrated in Fig. 7 below, corresponding to detected human behaviors and road/vehicle conditions indicating the situation.

700

Distraction	Road/Vehicle Condition	Severity Rank (R)
Driver not looking ahead	Vehicle stopped at traffic signal	1
Parking light off	Vehicle parked in garage	1
Driver talking on the phone	Using hands free, freeway, no upcoming turns, medium speed	4
Parking light off	Vehicle parked on side of freeway	5
Driver not looking ahead	Vehicle not in reverse gear, high vehicle speed, upcoming turn within city limits	8
Driver talking on the phone	Not using hands free, upcoming turns within city limits, high speed	8

Less Distracted/
Higher
Competence

 More Distracted/
Lower
Competence

FIG. 7

Hampiholi, FIG. 7; *Dec.*, 175.

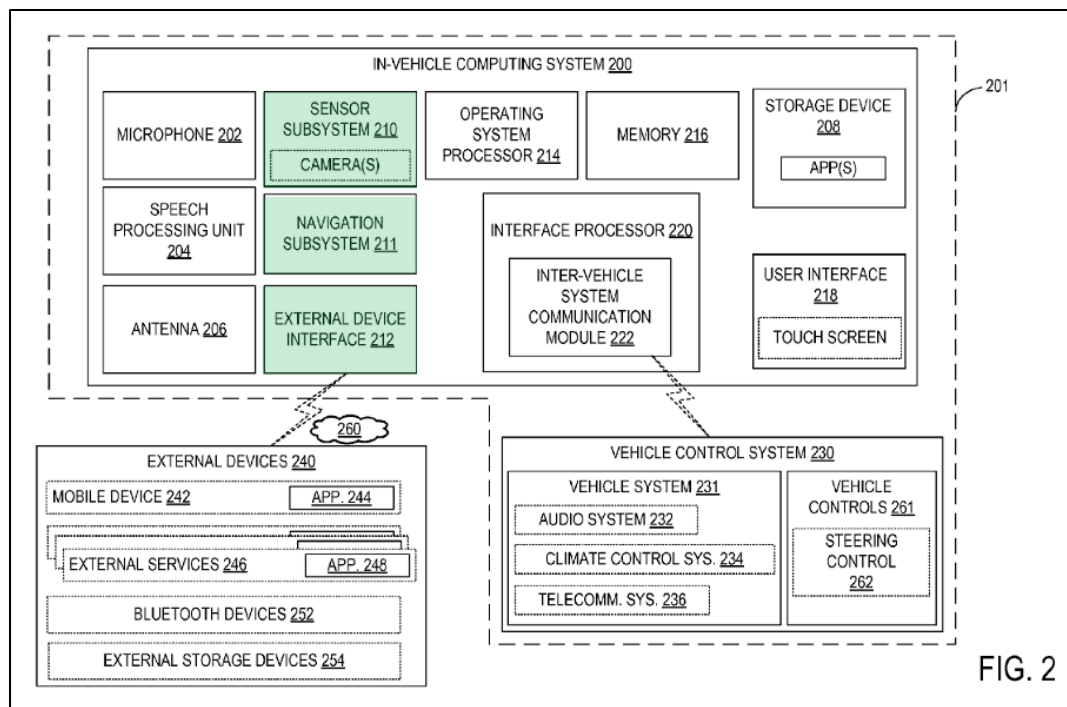
Hampiholi's severity rank R teaches a competence level of the human driver in controlling the SDV. *Dec.*, 176. For example, a driver that is paying more attention is more competent at taking control of the vehicle if a transition to manual mode is required. *Id.* Also, a driver paying more attention would allow for more possible corrective actions (e.g., transition to manual, disable one or more autonomous driving features, automatically slow to a stop) because a driver paying more attention would allow for sufficient lead time to safely transition to manual mode or disable an autonomous driving feature. *Id.* If a driver is fatigued, asleep, or otherwise not

paying sufficient attention (lower competence level), transitioning to manual mode would be more dangerous, and corrective actions may be limited to automatically slowing/stopping the vehicle. *Id.*

3. Claim 7(b)

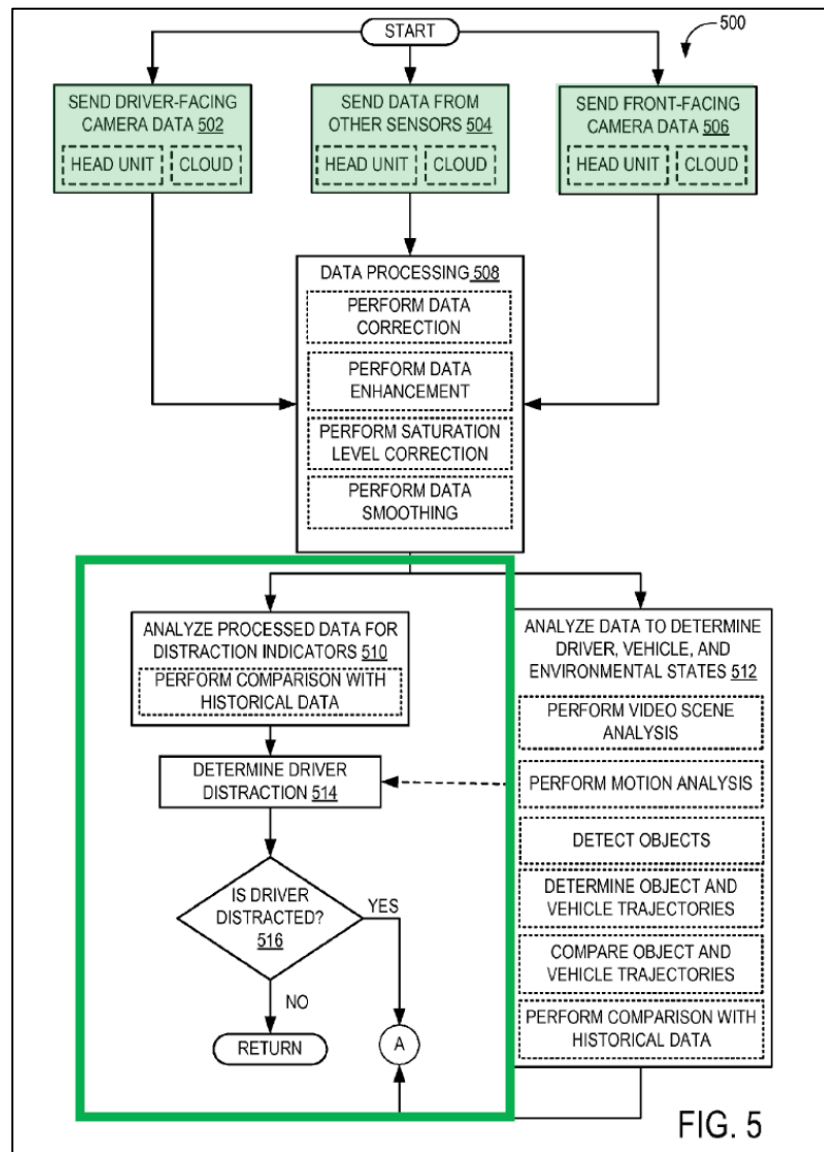
a) Hampiholi's System of Sensors

Hampiholi teaches receiving inputs from a plurality of sensors in sensor subsystem 210, external device interface 212, and navigation subsystem 211 including signals regarding gas pedal and brake inputs, temperatures, vehicle and engine speed, cameras, and the vehicle's location.



Hampiholi, Fig. 2, [0031], [0034], [0046], [0055]; *Dec.*, 177. Specific sensors described by *Hampiholi* include driver-facing and exterior cameras, thermometers, and a GPS sensor. *Id.* These sensors are collectively mapped as the *system of sensors*.

As illustrated in Fig. 5 below, *Hampiholi* expressly describes sending sensor readings from this system of sensors to determine the driver's distraction level (quantified as severity rank R, the mapped “*competence level of the human driver*”).



Hampiholi, FIG. 5; *Dec.*, 178. Examples of sensor readings used to determine *Hampiholi*'s competence level of the driver (severity rank R) may include the

driver's eyelid position as determined by the video from a driver facing-camera ([0062], [0046], [0055]) and the speed or location of the vehicle ([0057]).

As discussed below regarding 7(d), a POSITA would have been motivated to also determine a competence level of a processor (Φ) as taught by *Attard* in the *Hampiholi-Attard* SDV. *See*, 7(d). A POSITA would have been motivated to include in the combined *Hampiholi-Attard* vehicle any sensors necessary to determine Φ , such as *Attard's* cameras, Global Positioning System (GPS) equipment, sensors relating to vehicle speed or acceleration, RADAR, LIDAR, and sonar. *See*, 1(a). A POSITA would have recognized such a combination constitutes use of well-known techniques combining known technologies resulting in a REOS without undue experimentation. *Dec.*, 179. A full motivation to combine *Hampiholi* and *Attard* is provided below regarding 7(d) and incorporated herein by reference.

4. Claim 7(c)

As discussed above, the *Hampiholi-Attard* vehicle is configured to automatically modify particular operations of the vehicle, including specifically autonomously controlling the vehicle speed and bringing the vehicle to a complete stop (per *Hampiholi*) and disabling one or more autonomous operations, such as in response to a fault (per *Attard*). *See*, Section VI.A., 7(pre).

Attard teaches its vehicle is operated partially or completely autonomously by autonomous driving module 106 in its computer 105, including specifically the

operation of the vehicle's "steering, braking, [and] speed," as well as "navigation." *Attard*, 9:63-10:12, 14:13-48. A POSITA would have recognized or at least found obvious that controlling the vehicle's "steering" teaches controlling its "steering mechanism," controlling its "braking" teaches controlling its "braking system," and controlling its "speed" teaches controlling its "engine throttle." *Dec.*, 181.

A POSITA would have understood or found obvious that because *Attard* teaches a vehicle operable in manual and autonomous modes and *Attard* defines an autonomous vehicle as being "operated wholly ... without human intervention, i.e., ... autonomous" and its vehicle computer making "decisions concerning vehicle speed, course, etc." that *Attard's* vehicle would have included autonomous control of vehicle controls performing these functions, including changing the vehicle's speed (engine throttle and braking) and direction (steering mechanism and navigation). *Dec.*, 182 *citing Attard*, 1:15-24. In specific examples, *Attard's* vehicle may take an autonomous actions such as a "slow to a stop," "pull over and stop," or "limp home" operation. *Attard*, 2:46-54. A POSITA would have recognized each of these autonomous operations would have required control of the engine throttle, steering mechanism, braking system, and navigation as recited in 7(c). *Dec.*, 182. In another example, *Attard* directly describes how the vehicle's navigation is used to autonomously used for avoiding obstacles, pulling to a road shoulder, or slowing to a stop. *Attard*, 14:13-48; *Dec.*, 182.

Though *Attard* does not say “*engine throttle*,” a POSITA would have recognized *Attard*’s description of a vehicle autonomously controlling its speed to teach the claimed “*engine throttle*.” *Dec.*, 181-182.

a) *Motivation to Combine*

A POSITA would have incorporated *Attard*’s teachings regarding autonomous control of the driver controls listed in 7(c) in the *Hampiholi-Attard* SDV to provide an SDV operable to provide convenience and safety afforded by *Attard*’s autonomous features in *Hampiholi*’s vehicle that is already intended to increase the safety of the driver. *Dec.*, 183. Such a modification combines known prior art elements (*Attard*’s sensors and controls) according to known methods to yield predictable results of a car operable to autonomously perform corrective actions such as “slow to a stop,” “pull over and stop,” and/or “limp home” operations. *Id.* Further, these modifications would have been use of a known technique of applying various vehicle hardware and software to allow for additional self-driving functionality in the *Hampiholi-Attard* vehicle and would have improved *Hampiholi* and *Attard*’s similar vehicles in the same way. *Id.* While this modification may add additional complexity to *Hampiholi*’s vehicle, a POSITA would have been motivated to make such a tradeoff to achieve *Attard*’s benefits of being able to autonomously drive. *Dec.*, 183. POSITAs would have been aware that SDVs provide desirable features to users, benefitting sales of the vehicles while improving safety. *Dec.*, 183, 187.

A POSITA would have had a REOS for the combination because *Hampiholi* already includes an engine throttle, steering mechanism, braking system, and navigation, as well as a processor and memory necessary for performing autonomous functions; *Attard* is merely used to teach autonomous control of these driver controls. *Dec.*, 184. Methods of autonomously controlling each of the recited driver controls were known, and the predictable result would have been an SDV better-suited to respond to unsafe driving situations, including driver distraction (per *Hampiholi*). *Id.*

5. Claim 7(d)

As mapped above, *Attard* teaches determining a competence level of a processor via its scalar form of its confidence assessment 118, Φ . *See*, 1(b), 1(e). Petitioner notes claim 1 requires only mere presence of a competence level of a processor. Thus, *Hampiholi* modified to include *Attard's* Φ teaches limitation 7(d).

a) Motivation to Combine *Hampiholi-Attard*

A POSITA would have been motivated and found obvious to modify *Hampiholi* to implement *Attard's* known technique of determining a competence level of an SDV using one or more sensor readings to assist *Hampiholi-Attard's* SDV in driving in an autonomous mode, which is reliant upon sensors such as cameras, GPS, LIDAR to perform the autonomous driving actions (e.g., to avoid obstacles, maintain a safe distance in traffic, switch lanes or turn without wrecking).

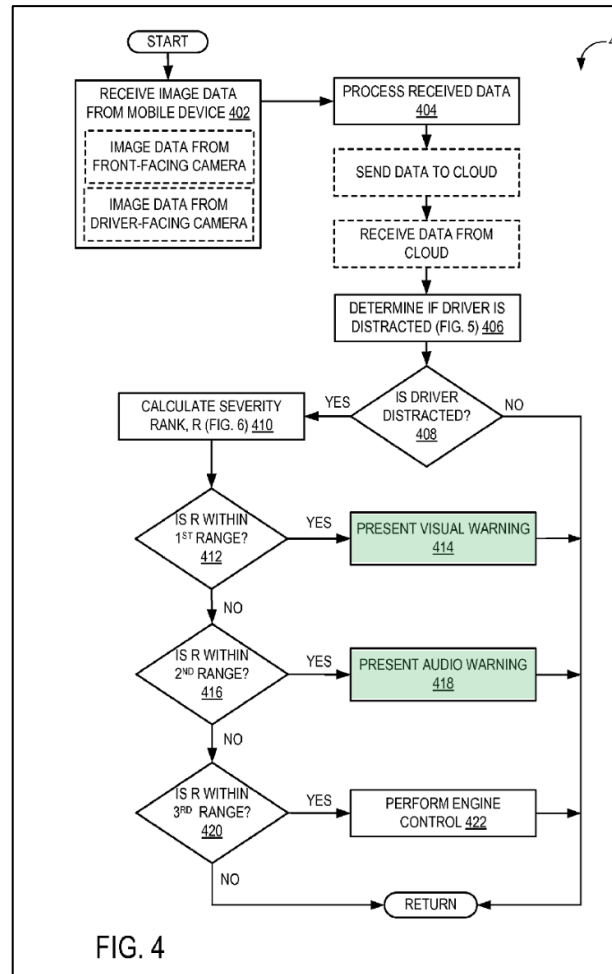
Dec., 186. For example, if a sensor such as a speed controller needed for SDV functionality is malfunctioning, *Attard's* known technique would have provided for a corrective action in *Hampiholi-Attard. Id.*, citing *Attard*, 15:1-4. *Hampiholi's* technique of monitoring user distraction would have coexisted with *Attard's* Φ technique, and a POSITA would have configured the combined SDV to operably mitigate any simultaneous automatic actions that the vehicle may have taken pursuant to *Hampiholi's* responses to severity rank R and *Attard's* responses to Φ dropping below $\Phi_{\min}$. *Dec.*, 186-187. Without requiring bodily incorporation, POSITAs would have had the skills and knowledge necessary to produce/modify SDVs incorporating the concepts taught by each of *Hampiholi* and *Attard* to result in a safer SDV, capable of accounting for hardware faults, weather faults, and driver incompetence. *Id.*

Incorporating *Attard's* technique of determining the competence level of the processor would have resulted in a safer, and thus more desirable, SDV. *Id.* Such a modification would have had a REOS because *Hampiholi* already teaches a vehicle and sensors, along with computer hardware and programming instructions. Fig. 2, [0029], [0032]. Similarly, *Attard* teaches an autonomous vehicle and computer hardware and programming instructions, such that modifying *Hampiholi* would have required only modifying programming instructions and providing hardware to perform autonomous driving. A POSITA would have had a REOS for the

combination because *Hampiholi* already includes a processor and memory necessary for performing automatic functions, as well as a system of sensors, to which any sensors described by *Attard* necessary for determining the competence level of the processor may have been added, as discussed above regarding 7(b). *Dec.*, 187.

6. Claim 7(e)

Hampiholi teaches determining and implementing a corrective action, such as an audio warning, visual warning, or engine control. *Hampiholi*, [0051], [0057], Fig. 4. Although not expressly recited in claim 7, *Hampiholi* teaches corrective actions may be determined by the vehicle's processor in response to severity rank R, as illustrated in Fig. 4.



Hampiholi, FIG. 4. For example, *Hampiholi* envisions determining and implementing a visual warning message in response to determining a low R distraction level, an audio warning response to a medium R distraction, and/or controlling engine speed or braking response to a high R distraction. *Hampiholi*, [0057]; *Dec.*, 188. A very low distraction level, outside any of the three ranges, may result in no corrective action at all. *Id.*

VII. GROUND 3: CLAIMS 3-4, 18-19 ARE OBVIOUS OVER ATTARD, FRAZER, MCNEW, AN, KANG, AND SCHUNDER

A. Claim 3

1. Claim 3(Pre)

See, 1(Pre).

2. Claim 3(a)

a) '765 Patent's Weighted Voting

The '765 Patent describes weighted voting with inputs and where an “input’s weight (w) is the number of ‘votes’ associated with the input.” *'765 Patent*, 8:54-64.⁸

b) Attard's Weighting Teachings

Attard teaches determining a *control processor competence level* Φ . *See*, 1(h). *Attard* also teaches weighting sensor determinations when computing Φ , i.e., a *weighted voting system*. For example, *Attard* teaches weighting determinations of collected data 115 from sensors 110 (*plurality of inputs*) based on factors including road conditions to generate confidence assessments about the ability of vehicle 101 to operate autonomously. *Attard*, 6:28-35. To the extent it is argued *Attard* does not teach a *weighted voting system*, *An* teaches such.

⁸ While the '765 Patent also describes a quota is sometimes utilized in a weighted voting system, “quota” is not recited in Claim 3. *'765 Patent*, 8:54-64, Claim 3.

c) *An's Teachings*

An teaches “cooperative autonomous driving...between a vehicle and a driver.” *An*, 1:16-23. An “autonomous driving state risk index” is computed that indicates “whether basic autonomous driving is possible in the driving environment.” *An*, 5:64-6:2.

$$\begin{aligned} \text{autonomous driving state risk index} = & W1 * \text{recognition} \\ & \text{error} + W2 * \text{determination error} + W3 * \text{control} \\ & \text{error} + W4 * \text{map data error} \end{aligned}$$

(7)

An, 6:4-8, Eq. 7. Here, the index “is calculated by multiplying weights W1, W2, W3, W4” by the respective errors. *An*, 6:8-24. Each of *An*’s errors is an input because each is used (*input*) to the risk index equation to determine the index value. *Dec.*, 192. In the *Attard* combination, inputs include *Attard*’s camera sensor readings, which are weighted per *An*. *See*, 3(a)(i). Because *An* teaches multiplying inputs by weights, *An*’s index teaches a *weighted voting system*. *Dec.*, 192.

d) *Motivation to Combine Attard-Frazer-McNew-An*

A POSITA would have been motivated and found obvious to modify *Attard*’s Φ computation, per *An*’s teachings of weighting inputs to determine whether to drive autonomously, thereby yielding the predictable result of Φ being computed by weighting the various inputs (e.g., sensor determinations). *Dec.*, 194-195. *Attard* provides an express teaching, suggestion, and motivation for combining with *An* by teaching “weighting various determinations” for computing Φ . *Attard*, 6:28-35;

Dec., 194. Using the known technique of weighted voting would have improved *Attard*'s similar system in the same way as *An*'s by providing greater accuracy in computing Φ . *Dec.*, 194.

A POSITA would have had a REOS at least because (a) weighting inputs was well-known prior to the '765 Patent, and (b) modifying *Attard* would have required only straightforward programming modifications to multiply *Attard*'s determinations by weights, per *An. Dec.*, 195

3. ***Claim 3(a)(i)***

As discussed, *Attard* teaches a system of sensors 110 ("*sensor readings*"). *See*, 1(a). The readings from sensors 110 are *a first plurality of inputs. Dec.*, 196-197. Because sensors 110 include cameras (*first camera sensor*), the *first plurality of inputs comprise sensor readings* (image data captured by the cameras) *from a first camera sensor. Id.*

As discussed, *An* teaches weights W1-W4 (*a first plurality of weights*). Therefore, *Attard-An* teaches Claim 3(a)(i). The motivation provided above is incorporated herein. *See*, 3(a).

4. ***Claim 3(b)***

The *Attard-An* weighted voting system multipl[ies] at least one of the first plurality of inputs (*Attard*'s camera readings) by a weight (e.g., W1) from among the

first plurality of weights (W1-W4). See, 3(a)-(ii); Dec., 199. The motivation to modify Attard is set forth above.

5. Claim 3(b)(i))

An's weights W1-W4 are not expressly taught as based on active learning data...compris[ing] weather condition data. Kang teaches such.

a) Kang's Weights

Kang teaches vehicle 1 includes a road and weather information collecting unit 135. Kang, 9:32-49. Kang teaches unit 135 obtains weather information (weather condition data) from an external source (Internet) based on the vehicle's GPS information or using onboard sensors. Kang, 9:32-49.

Kang teaches a plurality of weights based on the type of weather condition. Kang, 5:26-29, 13:3-18. Fig. 7C depicts environment information including clear weather weighted as 1, rain weighted as 2, and snow weighted as 3.

FIG. 7C

ENVIRONMENT INFORMATION (2)			
ROAD TYPE	WEIGHT	WEATHER	WEIGHT
LOCAL ROAD	1	CLEAR	1
UNPAVED ROAD	2	RAIN	2
GENERAL ROAD	3	SNOW	3
HIGHWAY	4		

Kang, Fig. 7C. *Kang* teaches multiplying weather weights by inputs to yield weighted results. *Kang*, 15:40-59; Dec., 201. Thus, *Kang* teaches *weights based on active learning data* that is *weather condition data*, i.e., the clear/rain/snow weights. *Id.*

b) Motivation to Combine Attard-Frazer-McNew-Kang

A POSITA would have been motivated and found obvious to modify *Attard-Frazer-McNew-An* per *Kang* to provide *a plurality of weights based on...weather condition data* to weight inputs (e.g., collected data 115), where both weights and inputs are used in generating CPCL Φ . Dec., 202. Modifying *Attard-Frazer-McNew-An* would have advantageously improved *Attard's* weighted Φ computation to account for various weather conditions based on their severity when generating Φ , thereby improving safety and desirability. Dec., 202-203. This modification would

have given more weight to inputs that indicate faults that are more likely to impede autonomous driving functionality. *Id.* For example, icy road conditions are more dangerous than clear weather, so weighting icy weather higher, per *Kang*, would have improved *Attard-An's weighted voting system* (which does not expressly teach weighting various weather conditions). This modification would have been use of a known technique of using weights based on weather conditions and would have improved *Attard-Frazer-McNew-An's* similar computer program product and SDV in the same way as *Kang's* vehicle and computer program product. *Id.* Combining these prior art elements (inputs and weights) according to known methods would have yielded the predictable result of a functional and advantageous weighted voting system. *Id.*

A POSITA would have had a REOS for modifying *Attard-Frazer-McNew-An* per *Kang* to utilize *weights based on...weather condition data* in a *weighted voting system*. *Dec.*,204. As discussed above, *Attard-An* already teaches weighting a plurality of determinations (*inputs*). *Attard*, 6:16-35. *Attard* teaches implementing its autonomous vehicle and methods using computer program instructions. *Attard*, 15:12-46. *Kang* similarly teaches implementing its methods and vehicle using program instructions. *Kang*, 6:10-21. A POSITA would have recognized that modifying *Attard-Frazer-McNew-An* per *Kang* would have required merely

straightforward changes to programming instructions, which would have been well-within the skillset of a POSITA. *Dec.*, 204.

6. Claim 3(b)(ii)

As discussed above, *Kang* teaches a plurality of weights based on weather data and that said weather data may be either obtained via the vehicle's sensors or from an external source. *See*, 3(b)(i). *Attard* teaches vehicle-to-vehicle communications and receiving weather data from server 125. *Attard*, 6:61-7:5. However, neither *Attard*, *An*, nor *Kang* expressly teaches receiving *weather condition data from a cohort of other vehicles*.

a) Schunder's Weather Condition Data

Schunder teaches a vehicle receives weather condition data (*active learning data*) from a server, which is based on weather condition data from other vehicles, including vehicles on the same roadway. *Schunder*, 5:31-38, 7:15-22. Thus, the combination would have utilized *weights* based on weather conditions, such as *Kang's* weights, and weather condition data from other vehicles as taught by *Schunder*. *Dec.*, 206.

Schunder teaches vehicles include sensors for gathering *weather condition data*. *Schunder*, 1:63-2:58. *Schunder* teaches various weather-related conditions. *Schunder*, 5:12-15, 8:62-9:3. Weather data is “crowd-sourc[ed]” from “millions of

automobiles,” which is “cataloged based on GPS coordinates associated with the vehicle’s position where the data reading was taken.” *Schunder*, 5:31-38, 7:15-22.

Schunder teaches a server receives weather data and GPS coordinates from vehicles, and either automatically or responsive to a request, the server transmits weather data to vehicles including based on their location along a route. *Schunder*, 9:4-24, 9:38-54. *Schunder* teaches utilizing this system to avoid certain weather conditions and/or to inform a driver weather conditions are unavoidable. *Schunder*, 10:17-22, 10:47-11:4. Thus, the weather report includes *active learning data* from other vehicles including vehicles in the same area or roadway, i.e., *a cohort*, as the requesting vehicle. *Dec.*, 209.

Further, *Schunder* teaches *the weather condition data shares one or more traits with the current weather condition of the roadway on which the SDV is currently traveling*. *Dec.*, 210. Namely, *Schunder* teaches prioritizing/weighting weather data sent to the requesting vehicle based on the location of the requesting vehicle, including the roadway on which the requesting vehicle is traveling. *Schunder*, 9:38-54; *Dec.*, 210. Because the vehicles on the same roadway as the requesting vehicle send weather data “at a time in close proximity to a present time,” this weather data *shares one or more traits with the current weather condition of the roadway*. *Dec.*, 210.

b) *Motivation to Combine Attard-Frazer-McNew-An-Kang-Schunder*

A POSITA would have been motivated and found obvious to modify *Attard-Frazer-McNew-An-Kang* per *Schunder* to utilize *active learning data* from other vehicles to receive more accurate weather reports for a vehicle traveling a roadway. *Dec.*, 211-213. The weather conditions experienced by a vehicle in one location may share one or more traits with another vehicle or cohort of vehicles (including other SDVs) along the same roadway. *Id. Schunder* teaches several advantages including more accurate weather data for weather reports because the weather data is gathered by many vehicles and informing other vehicles on the same roadway of future weather conditions on the road. *Id. Schunder* also advantageously plots a route to avoid particular weather conditions or warns a driver when weather is unavoidable. *Schunder*, 10:17-11:4; *Dec.*, 212.

Modifying *Attard-Frazer-McNew-An-Kang* per *Schunder* to gather active learning data regarding weather conditions from other vehicles would have been use of *Schunder's* known technique to improve the *Attard-Frazer-McNew-An-Kang* system in the same way as *Schunder's* system. *Dec.*, 213. Indeed, modifying *Attard's* server 125 functionality per *Schunder's* teachings or simply substituting *Schunder's* server and its functionality for *Attard's* server 125 would have obtained predictable results of more accurate weather condition reporting. *Dec.*, 214-215.

A POSITA would have had a REOS when making this modification. Indeed, *Attard* teaches receiving weather information from server 125 and *Attard's* vehicle 101 already has sensors 110 to capture weather-related data. *Attard*, 4:42-45. *See*, 1(a). Thus, the modification would have merely required straightforward changes to programming instructions of the vehicle and potentially adding sensors to capture additional weather-related data. *Dec.*, 214-216. Combining sensors with a vehicle according to known methods would have yielded predictable results. *Id.* To the extent *Attard's* server 125 would also need modification, such would have been straightforward. *Id.* Either *Attard's* server functionality would have been modified to include *Schunder's* server functionality or a simple substitution of *Schunder's* server for *Attard's* server 125 would have obtained the predictable results of *Schunder's* functionality. *Attard*, 6:61-7:5, 9:11-39; *Dec.*, 215.

Further underscoring the REOS, *Schunder* teaches a vehicle-based computing system 1 (VCS) for vehicle 31 including a processor and program instructions stored in memory. *Schunder*, 4:23-42. As discussed above, *Attard-Frazer-McNew-An-Kang* also teaches similar vehicle-based computing system with processor and program instructions stored in memory. *See*, 1(d). Thus, modifying *Attard-Frazer-McNew-An-Kang's* functionality per *Schunder* would have required only straightforward changes to programming instructions that would have been well-within the skillset of a POSITA. *Dec.*, 216.

B. Claim 4

1. Claim 4(Pre)

See, 1(Pre).

2. Claim 4(a)

As discussed above, if there is no fault detected, the vehicle does not take any particular corrective action and stays in autonomous mode, controlling engine throttle, steering, braking, and navigation. *See*, Claim 1.

3. Claim 4(b)

Attard teaches *autonomously maintaining a buffer of space from other vehicles around the SDV*. *Attard*, 13:50-14:26; *Dec.*, 219-220. Indeed, *Attard* teaches sensors such as cameras, RADAR, and LIDAR for detecting the presence of other vehicles on the roadway and generating a virtual map indicating the location of other vehicles relative to the first vehicle. *Attard*, 1:62-2:6 (teaching using RADAR or LIDAR to “detect and/or to maintain a distance from other vehicles 101” and adaptive cruise control, which would have maintained a buffer of space from other vehicles around the SDV), 4:1-17, 4:65-5:3, 13:50-14:26.

Attard also teaches *the SDV autonomously controls the steering of the SDV while autonomously controlling driver controls without requiring the human driver to operate the driver controls*. *See* Claim 1; *Dec.*, 221. Specifically, *Attard* teaches autonomous driving module 106 of computing device 105 for driving autonomously including autonomously controlling steering the SDV. *Dec.*, 221.

4. Claim 4(c)

See, 1(c)-(e).

C. Claim 18

1. Claim 18(Pre)

See, 17(Pre).

2. Claim 18(a)

See, 3(a).

3. Claim 18(a)(i)

See, 3(a)(i).

4. Claim 18(b)

See, 3(b).

5. Claim 18(b)(i)

See, 3(b)(i).

6. Claim 18(b)(ii)

See, 3(b)(ii).

D. Claim 19

1. Claim 19(Pre)

See, 17(Pre), 18.

2. Claim 19(a)

See, 4(a).

3. Claim 19(b)

See, 4(b).

4. Claim 19(c)

See, 4(a).

VIII. GROUND 4: CLAIMS 5, 20 ARE OBVIOUS OVER ATTARD, FRAZER, MCNEW, AN, KANG, SCHUNDER, DERUYCK, AND GUNDERSON

A. Claim 5

1. Claim 5(Pre)

See, 1(Pre).

2. Claim 5(a)

Attard-Frazer-McNew-An-Kang-Schunder teaches a *weighted voting system*. *See* Claim 3. As discussed below, *Attard-Frazer-McNew-An-Kang-Schunder-DeRuyck-Gunderson* teaches *determining a competence level of a human driver using a weighted voting system* (e.g., weighted voting system of Claim 3).

DeRuyck teaches *determining a competence level of a human driver* by using a *weighted voting system* to analyze driver behavior including fatigue and distraction (e.g., HDCL). *DeRuyck*, 3:50-53, 13:21-41, 12:2-8, 14:9-31, 17:50-18:21, 18:58-19:2. Specifically, *DeRuyck* teaches an array of weights W1-W6 1020 where each weight is applied to one of the data sources, including driver movement data 1002 and occurrence data 1004. *DeRuyck*, 13:21-41. The data sources are weighted and summed, then passed to driver behavior detector 208:

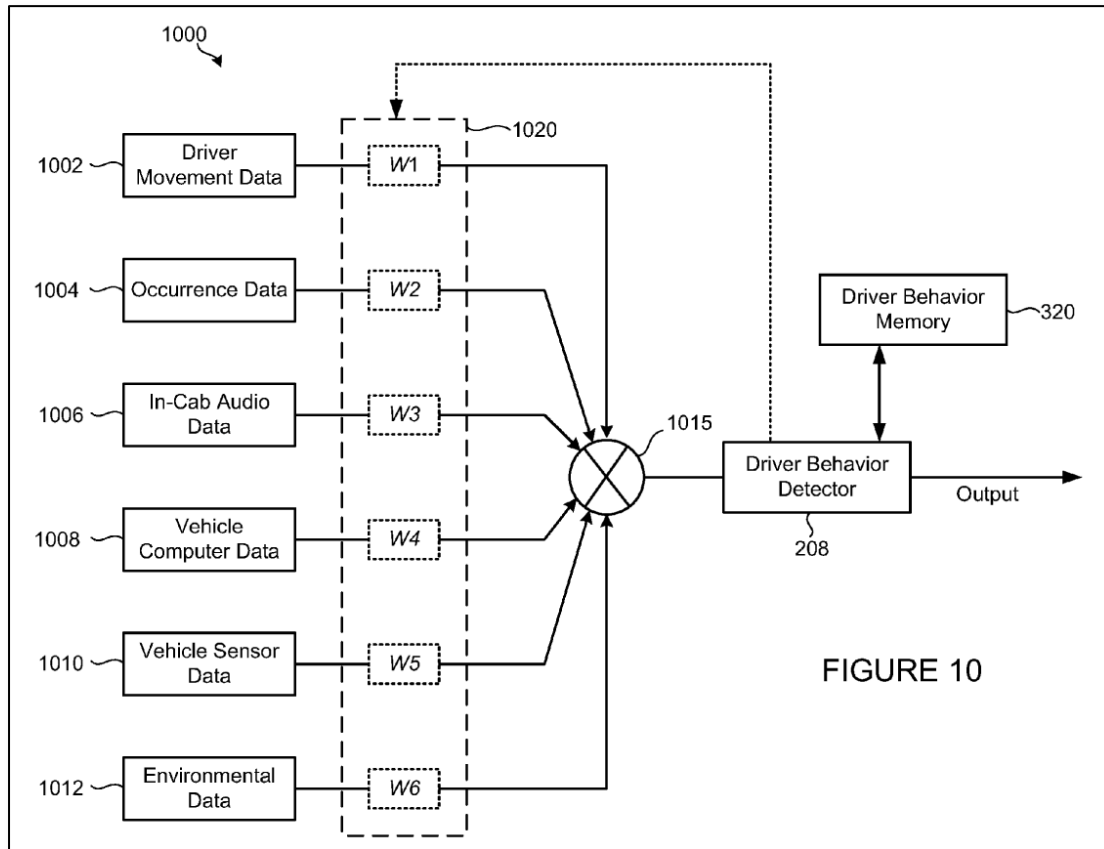


FIGURE 10

DeRuyck, Fig. 10; *Dec.*, 235-237. A motivation to combine *Attard-Frazer-McNew-Kang-Schunder-DeRuyck* is provided below. See, 5(a)(i).

3. Claim 5(a)(i)

a) *DeRuyck's Plurality of Inputs and Weights*

As discussed above, *Attard* teaches a first camera sensor and *first plurality of inputs* from said sensor. See, 1(a), 3(a). Further discussed above, *DeRuyck* teaches a *second plurality of weights* (W1-W6) and a *second plurality of inputs* (e.g., data 1002-1012). See, 5(a).

DeRuyck teaches its *plurality of inputs* comprises *sensor readings from a second camera sensor*. Specifically, *DeRuyck's* driver movement data 1002

comprises *sensor readings from a camera sensor*. For example, cameras 222, 222a are positioned to monitor driver behaviors. *DeRuyck*, 6:19-41; *Dec.*, 239. Thus, driver movement data 1002 captured by a camera is weighted by a weight 1020, summed, and analyzed by driver behavior detector 208. *DeRuyck*, 20:7-34; *Dec.*, 239.

b) *Motivation to Combine Attard-Frazer-McNew-Kang-Schunder-DeRuyck*

A POSITA would have been motivated and found obvious to modify *Attard-Frazer-McNew-An-Kang-Schunder* per *DeRuyck's* teachings of *determining a competence level of a human driver using a weighted voting system* including weights and inputs where the inputs comprise camera sensor. *Dec.*, 241. Modifying *Attard-Frazer-McNew-An-Kang-Schunder* per *DeRuyck's* teachings would have advantageously provided functionality for determining an HDCL beyond *Attard's* native teachings of looking at “static” qualities (e.g., age). *Dec.*, 242. Indeed, modifying the *Attard* combination in this way would have enhanced *Attard's* native driver characteristic to further include driver behaviors such as driver movements, e.g., indicating a driver is distracted. *Dec.*, 243. Such a modification would have been use of a known technique of determining HDCL using weighted voting and camera sensor readings that would have improved *Attard-Frazer-McNew-An-Kang-Schunder's* autonomous vehicle in the same way as *DeRuyck's* vehicle, i.e., by improving driver safety and awareness, as *DeRuyck* teaches. *DeRuyck*, 3:50-63,

8:46-61; *Dec.*, 243. Further, this modification would have combined prior art elements according to known methods to yield predictable. *Dec.*, 243.

A POSITA would have had a REOS when modifying *Attard-Frazer-McNew-An-Kang-Schunder* per *DeRuyck's* teachings. *Attard* already teaches identifying various driver characteristics using sensors 110. *Attard*, 4:18-24. *Attard-An* also already teaches weighted voting and camera sensors, such that modifying the *Attard* combination would have required merely straightforward changes to programming instructions. *DeRuyck*, 27:3-28 (teaching implementing the system as a computer program product); *Dec.*, 244.

4. Claim 5(b)

As discussed, *DeRuyck* teaches *multiplying at least one of the second plurality of inputs* (e.g., driver movement 1002) by a weight W1 *from among the second plurality of weights* (e.g., weights 1020). See, 5(a)(i); *DeRuyck*, 13:21-41; *Dec.*, 245.

5. Claim 5(c)

DeRuyck does not expressly teach how weights 1020 are generated. Specifically, *DeRuyck* does not teach *its weights are based on active learning data that includes information about a cohort of human drivers of other SDVs*. *Gunderson* teaches such.

a) Gunderson's Active Learning Data

Gunderson teaches vehicle 10 and event capture device 20 (e.g., camera) for determining driver behaviors. *Gunderson*, [0030]. Further, *Gunderson* teaches event

detector 30 cooperates with event capture devices 20 and “identifies an event and stores certain audio and video data along with related information about the event.” *Gunderson*, [0032]. *Gunderson* teaches data regarding event 150 is provided to evaluation server 50. *Gunderson*, [0040]-[0045]. In particular, evaluation server 50 includes insight module 270, which “aggregate[s] event data into a database of driving events and correlate[s] information in the database to identify trends in driving behavior that relate to risk factors.” *Gunderson*, [0056], [0059].

Insight module 270 compares correlations and driver safety trends with historical event information to provide a driver rating/score for an individual driver. *Id.* Insight module 270 includes individual module 400 and group module 410. *Gunderson*, [0060], Fig. 10. Individual module 400 analyzes event data for an individual, and scoring module 420 applies scoring regarding various risk factors (e.g., changing lanes without signaling). *Gunderson*, [0061]. Group module 410 similarly analyzes event data for a group of drivers. *Gunderson*, [0062]. Specifically, group module 410 “assign[s] relative weights to the risk factors depending on their prevalence to the group as a whole.” *Id.* These *weights*, based on data from the group’s drivers, are *weights based on active learning data* as recited in 5(c). *Dec.*, 248-250.

A POSITA would have understood or found obvious that weighting driver behaviors in this way (both individually and/or as a group) allows for “a more

granular and accurate group driving score.” *Gunderson*, [0007], [0062], [0079], Abstract; *Dec.*, 251.

b) Motivation to Combine *Attard-Frazer-McNew-An-Kang-Schunder-DeRuyck-Gunderson*

A POSITA would have been motivated and found obvious to modify *Attard-Frazer-McNew-An-Kang-Schunder-DeRuyck* per *Gunderson*’s teachings to base a *second plurality of weights on active learning data* that includes information about *a cohort of human drivers of other SDVs*. *Dec.*, 252-253. This modification would have improved the *Attard* combination by modifying weights according to information about a cohort of drivers of other SDVs to advantageously improve how the weights are determined and applied and improving the HDCL computation. *Id.* For example, *Gunderson* teaches certain negative tendencies may be relatively uncommon among drivers (e.g., one out of ten drivers changes lanes without signaling), and the driver cohort data may be weighted to account for such behaviors. *Id.* Thus, trends in driver behaviors among a *cohort* of drivers can be identified that relate to risk factors, and relationships between those risk factors and driver safety can be determined and applied to an individual driver’s behavior. *Id.* Further, with historical event information for a driver, the driver’s behavior may be analyzed for safety issues and weighted accordingly. *Id.*

Modifying *Attard-Frazer-McNew-An-Kang-Schunder-DeRuyck* per *Gunderson* would have had a REOS. *Attard* already teaches receiving information

from a server and vehicle-to-vehicle. *See*, Claim 1. *Attard* also teaches weighting determinations and employing driver characteristics. *See*, 3(a); *Attard*, 5:33-37. Further, the *Attard* combination includes hardware necessary to perform *Gunderson*'s steps, including *Attard*'s camera sensors 110, in-cab cameras (e.g., *DeRuyck*'s cameras 222a), processor, memory, server 125, and programming instructions. *Dec.*, 254. Thus, modifying *Attard-Frazer-McNew-Kang-Schunder-DeRuyck* per *Gunderson* would have required only straightforward changes to programming instructions and would have been well-within the skillset of POSITA. *Id.* For example, *Attard*'s server would have been modified to perform *Gunderson*'s data processing, and *Attard*'s vehicle would have been modified to include one or more in-cab cameras (e.g., per *DeRuyck*) and utilize weights per *Gunderson*. *Id.*

B. Claim 20

1. Claim 20(Pre)

See, 17(Pre).

2. Claim 20(a)

See, 5(a).

3. Claim 20(a)(i)

See, 5(a).

4. Claim 20(b)

See, 5(b).

5. Claim 20(c)

See, 5(c).

IX. GROUND 5: CLAIM 6 IS OBVIOUS OVER ATTARD, FRAZER, HAMPIHOLI

A. Claim 6

1. Claim 6(Pre)

See, 1(Pre).

2. Claim 6(a)

See, 1(Pre).

3. Claim 6(b)

See, 7(c).

4. Claim 6(c)

See, 1(Pre).

5. Claim 6(d)

See, 1(a).

6. Claim 6(e)

See, 6(b).

7. Claim 6(f)

See, 1(a).

8. Claim 6(g)

See, 1(b)-1(c).

9. Claim 6(h)

See, 1(c), 1(h).

10. Claim 6(i)

See, 7(a).

11. Claim 6(j)

The *Attard* combination teaches *the computer system is capable of determining a corrective action using the competence level of the processor. See*, 1(h). The *Attard-Frazer* combination further modified by *Hampiholi* teaches *the computer system is capable of determining a corrective action using the competence level of the processor and the competence level of the human driver*. As further discussed regarding 7(a), *Hampiholi* teaches *determining a competence level of a human driver* as measured by the severity level of distraction the driver is experiencing, such as not looking at the road for upcoming turns, being distracted by music, handling infotainment units, or being sleepy/tired. *See*, 7(a) *citing Hampiholi*, [0001]-[0004], [0050].

As also discussed with respect to Claim 1(h), *Attard* teaches sending a message 116 when Φ is below $\Phi_{\min}$. *See*, 1(h); *Attard*, 7:62-65. *Attard* teaches or renders obvious that $\Phi_{\min}$ is “a threshold provided by the parameter 117.” *Attard*, 5:62-65, 10:53-11:4; *Dec.*, 270. Parameter 117 is “associated with a particular vehicle 101 operator” and “may be determined in a variety of ways, e.g., according

to operator age, level of driving experience, etc.” *Attard*, 5:33-37. Thus, *Attard* itself envisions parameter 117 accounts for the driver’s ability to operate the vehicle. *Dec.*, 270.

A POSITA would have been motivated and found obvious to modify *Attard*’s computer system such that $\Phi_{\min}$ is supplemented with *Hampiholi*’s severity rank R or is based on severity rank R, which indicates the driver’s distraction level such that it is a *human driver competence level* (HDCL). See 7(j); *Dec.*, 273-275. Thus, in the *Attard-Frazer-Hampiholi* combination, *Attard*’s Φ (CPCL) is either compared directly to *Hampiholi*’s severity rank R (HDCL), i.e., the modification is a simple substitution such that Φ (CPCL) is compared to R (HDCL). Alternatively, *Attard*’s parameter 117, which is used to determine $\Phi_{\min}$, is modified to be based on severity rank R, where the modification is use of a known technique. *Dec.*, 276. Because *Attard* teaches determining to send message 116 when Φ is below $\Phi_{\min}$, and in the combination, $\Phi_{\min}$ is substituted or modified using *Hampiholi*’s severity rank R, the *Attard-Frazer-Hampiholi* combination teaches or renders obvious *determining a corrective action using the competence level of the processor and the competence level of the human driver*.

While not required by Claim 6(j), a POSITA would have found obvious to modify Frazer’s event table 112 (*fault-remediation table*) to further store the appropriate $\Phi_{\min}$ at which corrective action(s) should be taken. *Dec.*, 272.

a) Motivation to Combine *Attard-Frazer-Hampiholi*

A POSITA would have been motivated and found obvious to modify *Attard's* $\Phi_{\min}$ based on *Hampiholi's* HDCL (severity rank R) teachings such that *Attard's* determination of sending a message 116, which *determin[es] a corrective action* (Claim 1(h)), *us[es] the competence level of the processor and the competence level of the human driver. Dec., 273. Attard* provides a teaching, suggestion, or motivation to do so by teaching that parameter 117 (used to determine $\Phi_{\min}$) is “associated with a particular vehicle 101 operator.” *Attard*, 5:33-37, 10:53-11:4; *Dec.*, 274-275. However, *Attard* does not expressly teach using a parameter such as *Hampiholi's* severity rank R. Thus, a POSITA would have found obvious to use or substitute other driver-related information, i.e., *Hampiholi's* severity rank R, into $\Phi_{\min}$ to provide a safer and/or more accurate method by which to determine the recommendation resulting from *Attard's* message 116. *Dec.*, 274-275. Thus, based on these teachings, a POSITA would have found obvious to include *Hampiholi's* driver-related parameter (severity rank R) to increase the safety of *Attard's* vehicle 101 by ensuring the driver is prepared for the handover. *Id.* Accounting for the driver's state was well-known in handover processes for improving safety. *Dec.*, 275.

This modification would have required only straightforward programming changes to *Attard's* computer 105 to determine $\Phi_{\min}$ based on the determined HDCL

(per *Hampiholi*), thus combining known techniques according to known programming methods, yielding the predictable result of an SDV using both an HDCL and CPCL in *determining a corrective action*. *Dec.*, 276. *Hampiholi*'s severity rank R, like *Attard*'s Φ , is taught as being a scalar value. *Hampiholi*, [0066], FIG. 7; *Attard*, 5:66-6:3. Adding (or substituting) an additional scalar for comparison against *Attard*'s Φ would have been within the skill of a POSITA and would have used hardware already present in the combination, leading to a REOS. *Dec.*, 273-275. A POSITA would have appreciated that there would have been an increase in the accuracy and appropriateness of the corrective action determined when additional information (the driver's distraction level) is accounted for in the process of *determining a corrective action*. *Id.* Particularly, the diversity of the type of information being considered (driver's distraction level as opposed to more abstract data, e.g., driver's age) would have led a POSITA to appreciate the desirability of combining *Hampiholi*'s HDCL. *Id.*

Thus, the combined *Attard-Frazer-Hampiholi* vehicle would have a *computer system capable of using Attard's CPCL and Hampiholi's HDCL to determine a corrective action*, as claimed.

12. Claim 6(k)

See, 1(d).

13. Claim 6(l)

See, 1(e), 1(i).

14. Claim 6(m)

See, 1(f).

15. Claim 6(n)

See, 1(g).

16. Claim 6(o)

Attard teaches faults regarding sensors not detecting lane markings. *See* Claim 1(b)-1(c); *Attard*, 8:10-13, 8:33-35.

17. Claim 6(p)

Frazer teaches a fault-remediation table, which is stored in memory. A POSITA would have understood or found obvious that a fault-remediation table is a type of database that is queried for a “proper action to take.” *See*, 1(d), 6(o).

X. GROUND 6: CLAIM 8 IS OBVIOUS OVER HAMPIHOLI, ATTARD, FRAZER, DERUYCK, SCHUNDER

A. Claim 8

1. Claim 8(Pre)

See, 7(Pre).

2. Claim 8(a)

Attard teaches a GPS sensor. *See*, 2(a). *Hampiholi* teaches a sensor for vehicle speed. *Hampiholi*, [0034], [0046].

3. Claim 8(b)

See, 3(a).

4. Claim 8(c)

Hampiholi-Attard-DeRuyck teaches determining the competence level of the human driver comprises weighted voting. *See*, 5(a).

5. Claim 8(d)

Hampiholi-Attard-DeRuyck-Schunder teaches using active learning data including information from other SDVs. *See* Claim 3. A POSITA would have understood or found obvious that such active learning data would also have been used to determine a corrective action (e.g., issuing a warning, slowing the vehicle). *Dec.*, 290.

6. Claim 8(e)

See, 6(p).

XI. GROUND 7: CLAIMS 10-11 ARE OBVIOUS OVER HAMPIHOLI, ATTARD, DERUYCK, GUNDERSON

A. Claim 10

1. Claim 10(Pre)

See, 7(Pre).

2. Claim 10(a)

See, 5(a)-5(a)(i).

3. Claim 10(b)

See, 5(a)-5(a)(i).

4. Claim 10(c)

See, 5(b).

5. Claim 10(d)

See, 5(c).

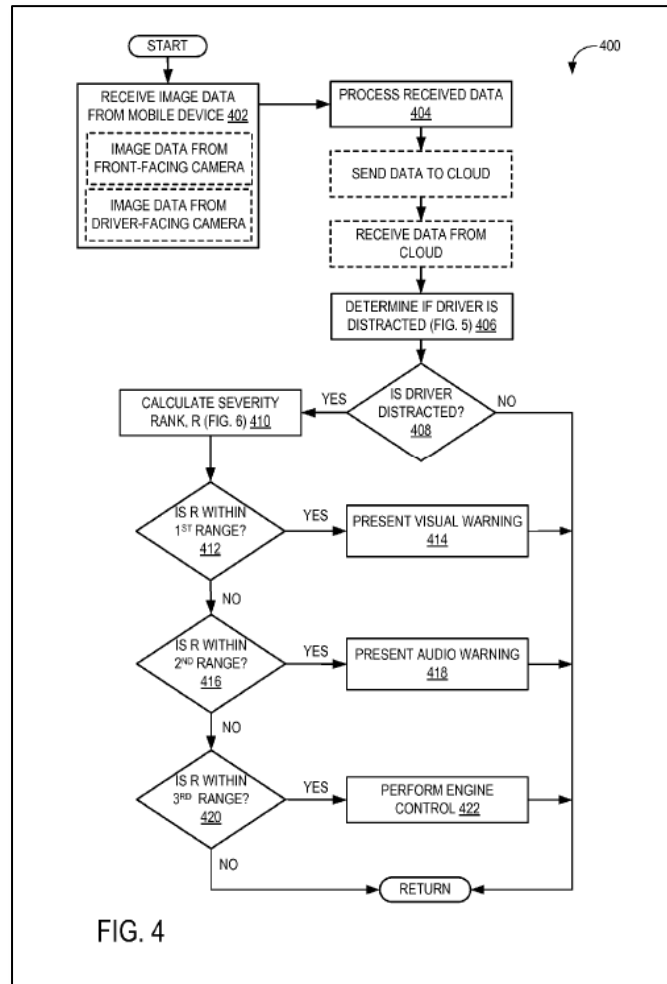
B. Claim 11

1. Claim 11(Pre)

See, 10(Pre).

2. Claim 11(a)

See, 1, 4(a), 7(b)-7(c). A POSITA would have understood or found obvious that when the *HDCL* is above a first threshold, the *Hampiholi-Attard* SDV would have continued operating in autonomous mode where the human driver is not required to operate the driver controls. *Hampiholi*, [0056]-[0057]; *Dec.*, 298-300. Specifically, *Hampiholi* teaches (with regard to Fig. 4) a severity rank R (*human driver competence level*) is calculated when it is determined the driver is distracted, which is then compared to various ranges to determine a corrective action.



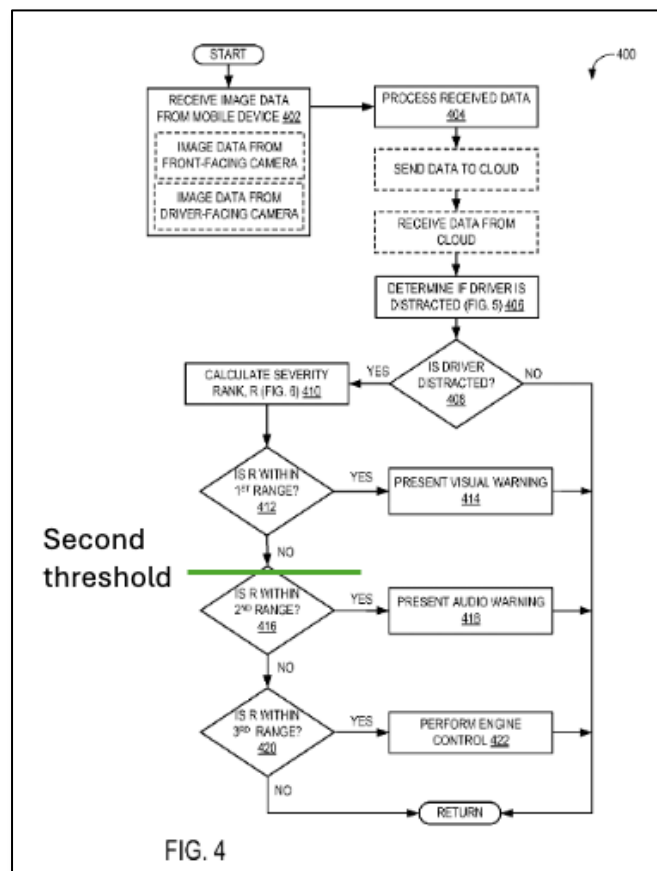
Hampiholi, Fig. 4, [0057]. *Hampiholi* further envisions that if R is outside of these ranges, the vehicle may forego any corrective actions (e.g., warnings). *Id.* Thus, in the modified *Hampiholi-Attard* SDV, when the *competence level of the human driver* (R) is *above a first threshold* (low enough distraction to not even reach the first range of Fig. 4) the *SDV autonomously controls the driver controls without requiring the human driver to operate the driver controls* (autonomous driving continues). *Dec.*, 298-300.

3. **Claim 11(b)**

See, 4(b), 11(a).

4. **Claim 11(c)**

See, 11(a). In *Hampiholi*, if severity rank R is below a second threshold (e.g., block 412 – “Is R within 2nd range? – YES”), then it is determined that a first fault has occurred and a corrective action is taken (e.g., presenting warning). *Dec.*, 302.



Hampiholi, Fig. 4, [0056]-[0057].

5. **Claim 11(d)**

A first corrective action corresponding to the first fault includes issuing a warning. See, 11(c).

6. Claim 11(e)

A POSITA would have understood or found obvious that the *Hampiholi-Attard* SDV would have issued the alert while providing autonomous control of the driver controls without requiring the human driver to operate the driver controls because *Hampiholi* does not teach performing engine control (e.g., transitioning out of autonomous mode) in response to a first fault. *Dec.*, 304. *See*, 11(c).

XII. GROUND 8: CLAIM 12 IS OBVIOUS OVER HAMPIHOLI, ATTARD, DERUYCK, GUNDERSON, MCNEW

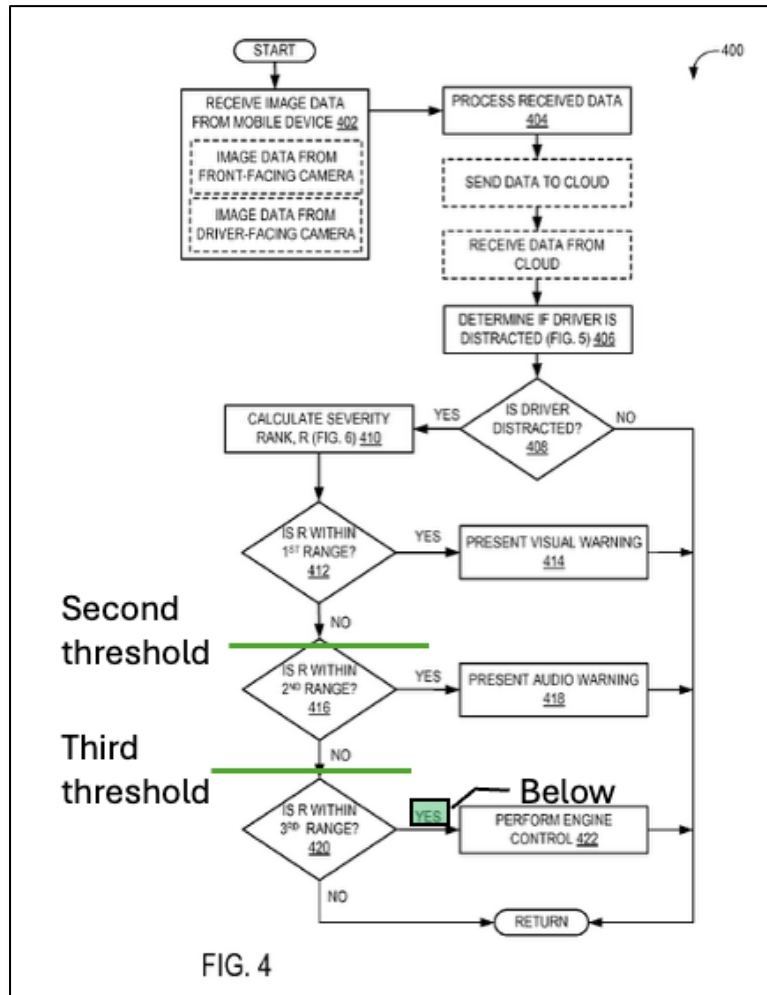
A. Claim 12

1. Claim 12(Pre)

See, 11(Pre).

2. Claim 12(a)

Similar to determining a first fault has occurred when the HDCL is below a second threshold, it is determined a second fault has occurred when the HDCL is below a third threshold after taking the first corrective action. *See*, 11(c). *Hampiholi's* Fig. 4 below depicts first, second, and third thresholds, where the corrective action for falling below the third threshold (i.e., second fault) is performing engine control. *Hampiholi*, [0057] (controlling speed/braking), [0067].



Hampiholi, Fig. 4.

3. Claim 12(b)

See, 12(a). A second corrective action corresponding to the second fault includes performing engine control. Dec., 307.

4. Claim 12(c)

Hampiholi-Attard-McNew teaches transferring driver controls to manual and alerting the human driver to take over. See, 11, 12, 1(i). As discussed above, Hampiholi teaches combining corrective actions for a particular range of severity

rank R, such that an alert would also be issued with performing engine control (e.g., transition to manual control) in the *Hampiholi-Attard-McNew* combination. Indeed, *Hampiholi-Attard-McNew* teaches alerting a human driver to take over and transfer driver controls to manual and a POSITA would have been motivated to modify *Hampiholi-Attard-McNew* for reasons discussed above. *See*, 1(i); *Dec.*, 308-310.

XIII. GROUND 9: CLAIM 13 IS OBVIOUS OVER HAMPIHOLI, ATTARD, MCNEW, AN, KANG, AND SCHUNDER

A. Claim 13

1. Claim 13(Pre)

See, 7(Pre).

2. Claim 13(a)

See, 3(a).

3. Claim 13(a)(i)

See, 3(a)(i).

4. Claim 13(b)

See, 3(b).

5. Claim 13(b)(i)

See, 3(b)(i).

6. Claim 13(b)(ii)

See, 3(b)(ii).

**XIV. GROUND 10: CLAIMS 14-15 ARE OBVIOUS OVER HAMPIHOLI,
ATTARD, MCNEW, DERUYCK, GUNDERSON, AN, KANG,
SCHUNDER**

A. Claim 14

1. Claim 14(Pre)

See, 7(Pre).

2. Claim 14(a)(i)

See, 5(a).

3. Claim 14(a)(ii)

See, 5(a)(i).

4. Claim 14(a)(iii)

See, 5(b).

5. Claim 14(a)(iv)

See, 5(c).

6. Claim 14(b)

See, 3(a), 13(a).

7. Claim 14(b)(i)

See, 3(a)(i), 13(a)(i).

8. Claim 14(b)(ii)

See, 3(b), 13(b).

9. Claim 14(b)(iii)

See, 3(b)(i), 13(b)(i).

10. Claim 14(b)(iv)

See, 3(b)(ii), 13(b)(ii).

11. Claim 14(c)

In the *Hampiholi-Attard-McNew-DeRuyck-Gunderson-An-Kang-Schunder* combination, the *first camera sensor* is a driver-monitoring camera (e.g., *Hampiholi's* and/or *DeRuyck's* driver-monitoring camera), and *the second camera sensor* is *Attard's* vehicle camera. See, 5(a)(i), 3(a)(i), 7(b). Thus, *the first camera sensor is different from the second camera sensor*. Likewise, *the first plurality of inputs is different from the second plurality of inputs* because these inputs come from distinct cameras capturing different images. Dec., 327. *DeRuyck's* driver weights and *Kang's* weather weights are the *first/second plurality of weights*, respectively, and are, therefore, *different*. See, 3(b), 5(a)(i). Therefore, *Hampiholi-Attard-McNew-DeRuyck-Gunderson-An-Kang-Schunder* teaches 14(c).

12. Claim 14(d)

See, 11(a).

13. Claim 14(e)

See, 11(b).

14. Claim 14(f)

See, 11(c).

15. Claim 14(g)

See, 11(d).

16. Claim 14(h)

See, 11(e).

B. Claim 15

1. Claim 15(Pre)

See, 7(Pre).

2. Claim 15(a)

See, 12(a).

3. Claim 15(b)

See, 12(b).

4. Claim 15(c)

See, 12(c).

XV. GROUND 11: CLAIM 16 IS OBVIOUS OVER HAMPIHOLI, ATTARD, MCNEW, DERUYCK, GUNDERSON, AN, KANG, SCHUNDER, FRAZER

A. Claim 16

1. Claim 16(Pre)

See, 7(Pre).

2. Claim 16(a)

Petitioner notes Claim 16 recites no relationship between the fourth threshold relative to the first, second, or third thresholds and that the CPCL, not the HDCL, is compared to the fourth threshold.

Attard teaches comparing *the competence level of the processor*, Φ , to a threshold, $\Phi_{\min}$. *See* 1(h). $\Phi_{\min}$, therefore, is *a fourth threshold. Dec.*, 338-339. Per *Attard*, when Φ is below $\Phi_{\min}$, “components of each of the vectors φ^{PL} and φ^{AL} may be evaluated to determine whether a value of the vector component falls below a predetermined threshold for the vector component.” *Attard*, 7:65-8:1. When φ_i is below $\varphi_{\min}$, it is *determin[ed] that a third fault has occurred. See*, 1(b).

3. *Claim 16(b)*

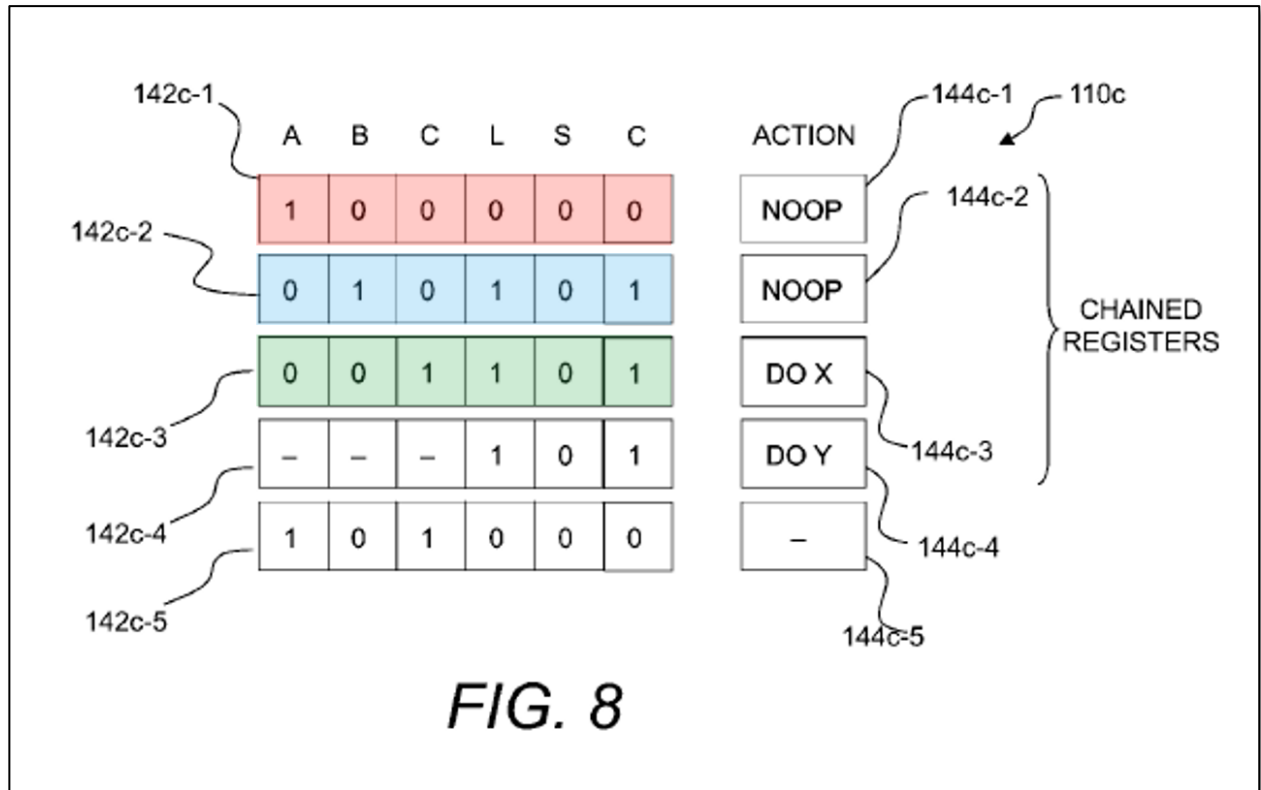
Attard teaches determining a corrective action corresponding to the fault. *See* 1(d).

4. *Claim 16(c)*

Frazer teaches determining a corrective action *using a fault-remediation table. See* 1(d).

5. *Claim 16(d)*

Frazer's table 112 includes rows/conditions 142c that, when met, cause an action/instruction 144c to be taken. *See*, 1(d); *Frazer*, 21:33-43. Thus, conditions 142c-1, 142c-2, and 142c-3 are *the first fault*, *the second fault*, and *the third fault*, respectively.



Frazer, FIG. 8.

XVI. DISCRETIONARY DENIAL

Pursuant to the Board’s Interim Process Concerning Institution of AIA Proceedings dated March 26, 2025, Petitioner reserves all rights to respond to any discretionary denial issues raised by Patent Owner.

XVII. CONCLUSION

For the foregoing reasons, Petitioner respectfully requests *inter partes* review of the Challenged Claims.

Respectfully submitted,

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

A. Real Party-In-Interest

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

B. Related Matters

The '765 Patent is presently the subject of the following patent infringement lawsuit: *Granite Vehicle Ventures LLC v. Tesla, Inc.*, 2:24-cv-01007, No. 1 (E.D. Tex. Dec. 6, 2024).

C. Lead and Back-Up Counsel

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

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

Please address all correspondence to the lead and back-up counsel as shown above. Petitioner consents to electronic service by e-mail at the e-mail addresses provided above.

CLAIM LISTING APPENDIX
U.S. Patent No. 11,738,765 for Claims 1-8 and 10-20

Claim Designation	Claim Language
Claim 1(Pre)	A computer program product for controlling a driving mode of a self-driving vehicle (SDV), the computer program product comprising a non-transitory computer readable storage medium having program code embodied therewith, the program code readable and executable by a processor to perform a method comprising:
Claim 1(a)	receiving sensor readings from a system of sensors, wherein the sensor readings describe a current operational state of a SDV;
Claim 1(b)	determining based on the sensor readings, by one or more processors, whether a fault has occurred;
Claim 1(c)	determining, by the one or more processors, whether the fault exceeds a threshold for danger;
Claim 1(d)	determining a corrective action associated with the fault using a fault-remediation table;
Claim 1(e)	the SDV implementing the corrective action;
Claim 1(f)	wherein, the sensor readings comprise a reading from a GPS sensor;
Claim 1(g)	the fault comprises a current weather condition of the roadway on which the SDV is currently traveling;
Claim 1(h)	determining whether the fault exceeds a threshold for danger comprises determining a control processor competence level;
Claim 1(i)	the corrective action comprises transferring driver controls to manual control and alerting a human driver to take over immediately.
Claim 2(Pre)	The computer program product of claim 1,
Claim 2(a)	wherein: the sensor readings comprise a reading from a GPS sensor;
Claim 2(b)	the fault comprises a road condition, wherein the road condition comprises an absence of lane markings;
Claim 2(c)	determining whether the fault exceeds a threshold for danger comprises determining a control processor competence level;
Claim 2(d)	the corrective action comprises transferring driver controls to manual control and alerting a human driver to take over immediately.

Claim Designation	Claim Language
Claim 3(Pre)	The computer program product of claim 1, further comprising:
Claim 3(a)	determining the control processor competence level comprises using a weighted voting system, the weighted voting system comprising:
Claim 3(a)(i)	a first plurality of inputs and a first plurality of weights, wherein the first plurality of inputs comprise sensor readings from a first camera sensor; and
Claim 3(b)	multiplying at least one of the first plurality of inputs by a weight from among the first plurality of weights;
Claim 3(b)(i)	wherein the first plurality of weights are based on active learning data; and wherein the active learning data includes weather condition data
Claim 3(b)(ii)	from a cohort of other SDVs, wherein the weather condition data shares one or more traits with the current weather condition of the roadway on which the SDV is currently traveling.
Claim 4(Pre)	The computer program product of claim 3, further comprising:
Claim 4(a)	when the fault does not exceed the threshold for danger, the SDV autonomously controls the driver controls, wherein said driver controls comprise: engine throttle, steering mechanism, braking system, and navigation;
Claim 4(b)	the SDV autonomously maintains a buffer of space from other vehicles around the SDV and the SDV autonomously controls the steering of the SDV while autonomously controlling the driver controls, without requiring the human driver to operate the driver controls; and
Claim 4(c)	when the fault exceeds the threshold for danger, the SDV takes the corrective action.
Claim 5(Pre)	The computer program product of claim 4, further comprising:
Claim 5(a)	determining a competence level of a human driver, comprising using the weighted voting system, the weighted voting system further comprising:
Claim 5(a)(i)	a second plurality of inputs and a second plurality of weights, wherein the second plurality of inputs comprise sensor readings from a second camera sensor; and
Claim 5(b)	multiplying at least one of the second plurality of inputs by a weight from among the second plurality of weights;

Claim Designation	Claim Language
Claim 5(c)	wherein the second plurality of weights are based on active learning data that includes information about a cohort of human drivers of other SDVs.
Claim 6(Pre)	A self-driving vehicle (SDV) comprising:
Claim 6(a)	a sensor system comprising a plurality of sensors;
Claim 6(b)	vehicle controls comprising: engine throttle, steering mechanism, and braking system;
Claim 6(c)	a computer system comprising a processor coupled to a non-transitory computer readable storage medium containing program code, the program code readable and executable by a processor;
Claim 6(d)	the computer system is capable of receiving a sensor reading from the system of sensors;
Claim 6(e)	the computer system is capable of operating the vehicle controls;
Claim 6(f)	the computer system is capable of determining the operational state of the self-driving vehicle (SDV);
Claim 6(g)	the computer system is capable of determining a vehicle fault;
Claim 6(h)	the computer system is capable of determining a competence level of the processor;
Claim 6(i)	the computer system is capable of determining competence level of a human driver;
Claim 6(j)	the computer system is capable of determining a corrective action using the competence level of the processor and the competence level of the human driver;
Claim 6(k)	the computer system is capable of implementing the corrective action; and
Claim 6(l)	the computer system is capable of issuing an alert indicating the corrective action;
Claim 6(m)	the system of sensors comprises a GPS sensor;
Claim 6(n)	the operational state of the self-driving vehicle comprises a first road condition;
Claim 6(o)	the vehicle fault comprises an absence of a sensor reading;
Claim 6(p)	the corrective action comprises querying a database for the proper action to take.

Claim Designation	Claim Language
Claim 7(Pre)	A computer program product for controlling a driving mode of a self-driving vehicle (SDV), the computer program product comprising a non-transitory computer readable storage medium having program code embodied therewith, the program code readable and executable by a processor to perform a method comprising:
Claim 7(a)	determining a competence level of a human driver, wherein the competence level describes a competence level of the human driver in controlling the SDV;
Claim 7(b)	receiving sensor readings from a system of sensors about the competence level of the human driver,
Claim 7(c)	wherein the SDV is operable to provide autonomous control of driver controls comprising: engine throttle, steering mechanism, braking system, and navigation; determining a competence level of a processor;
Claim 7(d)	determining a competence level of a processor;
Claim 7(e)	determining a corrective action; the SDV implementing the corrective action.
Claim 8(Pre)	The computer program product of claim 7, wherein:
Claim 8(a)	the sensor readings comprise a reading from a GPS sensor and a reading from a speedometer;
Claim 8(b)	determining the competence level of the processor comprises weighted voting;
Claim 8(c)	determining the competence level of the human driver comprises weighted voting;
Claim 8(d)	determining the corrective action comprises using active learning data, said active learning data including information from other SDVs;
Claim 8(e)	the corrective action comprises querying a database for the proper action to take.
Claim 10(Pre)	The computer program product of claim 7, further comprising:
Claim 10(a)	determining the competence level of the human driver comprises using a weighted voting system, the weighted voting system comprising: a plurality of inputs and a plurality of weights,
Claim 10(b)	the plurality of inputs comprising sensor readings from a camera sensor; and

Claim Designation	Claim Language
Claim 10(c)	multiplying at least one of the plurality of inputs by a weight from among the plurality of weights;
Claim 10(d)	wherein the plurality of weights are based on active learning data that includes information about a cohort of human drivers of other SDVs.
Claim 11(Pre)	The computer program product of claim 10, further comprising:
Claim 11(a)	when the competence level of the human driver is above a first threshold, the SDV autonomously controls the driver controls without requiring the human driver to operate the driver controls;
Claim 11(b)	the SDV autonomously maintains a buffer of space from other vehicles around the SDV and the SDV autonomously controls the steering of the SDV while the SDV autonomously controls the driver controls, without requiring the human driver to operate the driver controls;
Claim 11(c)	when the competence level of the human driver is below a second threshold, determining that a first fault has occurred;
Claim 11(d)	determining the corrective action comprises determining a first corrective action corresponding to the first fault; and
Claim 11(e)	the first corrective action comprises issuing an alert while the SDV provides autonomous control of the driver controls without requiring the human driver to operate the driver controls.
Claim 12(Pre)	The computer program product of claim 11, further comprising:
Claim 12(a)	when the competence level of the human driver is below a third threshold after taking the first corrective action, determining that a second fault has occurred;
Claim 12(b)	determining the corrective action further comprises determining a second corrective action corresponding to the second fault; and
Claim 12(c)	the second corrective action comprises transferring driver controls to manual control and alerting the human driver to take over.
Claim 13(Pre)	The computer program product of claim 7, further comprising:
Claim 13(a)	determining the competence level of the processor comprises using a weighted voting system, the weighted voting system comprising:

Claim Designation	Claim Language
Claim 13(a)(i)	a plurality of inputs and a plurality of weights, wherein the plurality of inputs comprise sensor readings from a camera sensor; and
Claim 13(b)	multiplying at least one of the plurality of inputs by a weight from among the plurality of weights;
Claim 13(b)(i)	wherein the plurality of weights are based on active learning data; and wherein the active learning data includes condition data
Claim 13(b)(ii)	from a cohort of other SDVs, wherein the condition data shares one or more traits with a current condition of a roadway on which the SDV is currently traveling.
Claim 14(Pre)	The computer program product of claim 7, further comprising:
Claim 14(a)(i)	determining the competence level of the human driver comprises using a weighted voting system
Claim 14(a)(ii)	with a first plurality of inputs and a first plurality of weights, wherein: the first plurality of inputs comprises sensor readings from a first camera sensor; and
Claim 14(a)(iii)	at least one of the first plurality of inputs is multiplied by a weight from among the first plurality of weights,
Claim 14(a)(iv)	wherein the first plurality of weights are based on first active learning data, the first active learning data comprising information about a cohort of human drivers of other SDVs;
Claim 14(b)	determining the competence level of the processor comprises using the weighted voting system
Claim 14(b)(i)	with a second plurality of inputs and a second plurality of weights, wherein: the second plurality of inputs comprises sensor readings from a second camera sensor; and
Claim 14(b)(ii)	at least one of the second plurality of inputs is multiplied by a weight from among the second plurality of weights,
Claim 14(b)(iii)	wherein the second plurality of weights are based on second active learning data, the second active learning data comprising condition data
Claim 14(b)(iv)	from a cohort of other SDVs, wherein the condition data shares one or more traits with a current condition of a roadway on which the SDV is currently traveling;

Claim Designation	Claim Language
Claim 14(c)	the first camera sensor is different from the second camera sensor, the first plurality of inputs is different from the second plurality of inputs, and the first plurality of weights is different from the second plurality of weights;
Claim 14(d)	when the competence level of the human driver is above a first threshold, the SDV autonomously controls the driver controls without requiring the human driver to operate the driver controls;
Claim 14(e)	the SDV autonomously maintains a buffer of space from other vehicles around the SDV and the SDV autonomously controls the steering of the SDV while the SDV autonomously controls the driver controls, without requiring the human driver to operate the driver controls;
Claim 14(f)	when the competence level of the human driver is below a second threshold, determining that a first fault has occurred;
Claim 14(g)	determining the corrective action comprises determining a first corrective action corresponding to the first fault; and
Claim 14(h)	the first corrective action comprises issuing an alert while the SDV autonomously controls the driver controls without requiring the human driver to operate the driver controls.
Claim 15(Pre)	The computer program product of claim 14, further comprising:
Claim 15(a)	when the competence level of the human driver is below a third threshold, after taking the first corrective action, determining that a second fault has occurred;
Claim 15(b)	determining the corrective action further comprises determining a second corrective action corresponding to the second fault; and
Claim 15(c)	the second corrective action comprises transferring driver controls to manual control and alerting the human driver to take over.
Claim 16(Pre)	The computer program product of claim 15, further comprising:
Claim 16(a)	when the competence level of the processor is below a fourth threshold, determining that a third fault has occurred;
Claim 16(b)	determining the corrective action further comprises determining a third corrective action corresponding to the third fault;
Claim 16(c)	determining the corrective action further comprises using a fault remediation table; and

Claim Designation	Claim Language
Claim 16(d)	the fault remediation table comprises the first fault, the second fault, and the third fault.
Claim 17(Pre)	A computer program product for controlling a driving mode of a self-driving vehicle (SDV), the computer program product comprising a non-transitory computer readable storage medium having program code embodied therewith, the program code readable and executable by a processor to perform a method comprising:
Claim 17(a)	receiving sensor readings from a system of sensors, wherein the sensor readings describe a current operational state of a SDV;
Claim 17(b)	determining based on the sensor readings, by one or more processors, whether a fault has occurred;
Claim 17(c)	determining, by the one or more processors, whether the fault exceeds a threshold for danger;
Claim 17(d)	determining a corrective action associated with the fault using a fault-remediation table; and
Claim 17(e)	the SDV implementing the corrective action;
Claim 17(f)	wherein: the sensor readings comprise a reading from a GPS sensor;
Claim 17(g)	the fault comprises a current weather condition of a roadway on which the SDV is currently traveling;
Claim 17(h)	determining whether the fault exceeds the threshold for danger comprises determining a control processor competence level; and
Claim 17(i)	the corrective action comprises transferring driver controls to manual control and alerting a human driver to take over.
Claim 18(Pre)	The computer program product of claim 17, further comprising:
Claim 18(a)	determining the control processor competence level comprises using a weighted voting system, the weighted voting system comprising:
Claim 18(a)(i)	a first plurality of inputs and a first plurality of weights, wherein the first plurality of inputs comprise sensor readings from a first camera sensor; and
Claim 18(b)	multiplying at least one of the first plurality of inputs by a weight from among the first plurality of weights;

Claim Designation	Claim Language
Claim 18(b)(i)	wherein the first plurality of weights are based on active learning data; and wherein the active learning data includes weather condition data
Claim 18(b)(ii)	from a cohort of other SDVs, wherein the weather condition data shares one or more traits with the current weather condition of the roadway on which the SDV is currently traveling.
Claim 19(Pre)	The computer program product of claim 18, further comprising:
Claim 19(a)	when the fault does not exceed the threshold for danger, the SDV autonomously controls the driver controls, wherein said driver controls comprise: engine throttle, steering mechanism, braking system, and navigation;
Claim 19(b)	the SDV autonomously maintains a buffer of space from other vehicles around the SDV and the SDV autonomously controls the steering of the SDV while the SDV autonomously controls the driver controls, without requiring the human driver to operate the driver controls; and
Claim 19(c)	when the fault exceeds the threshold for danger, the SDV takes the corrective action.
Claim 20(Pre)	The computer program product of claim 19, further comprising:
Claim 20(a)	determining a competence level of a human driver, comprising using the weighted voting system, the weighted voting system further comprising:
Claim 20(a)(i)	a second plurality of inputs and a second plurality of weights, wherein the second plurality of inputs comprise sensor readings from a second camera sensor; and
Claim 20(b)	multiplying at least one of the second plurality of inputs by a weight from among the second plurality of weights;
Claim 20(c)	wherein the second plurality of weights are based on active learning data that includes information about a cohort of human drivers of other SDVs.

APPENDIX OF EXHIBITS

Exhibit 1001	U.S. Patent No. 11,738,765 (“ <i>the ’765 Patent</i> ”)
Exhibit 1002	File History for U.S. Patent No. 11,738,765
Exhibit 1003	Declaration of Christopher Wilson
Exhibit 1004	U.S. Patent No. 9,406,177 to Attard et al. (“ <i>Attard</i> ”)
Exhibit 1005	U.S. Patent No. 9,494,926 to Frazer et al. (“ <i>Frazer</i> ”)
Exhibit 1006	U.S. Patent No. 10,377,303 to McNew et al. (“ <i>McNew</i> ”)
Exhibit 1007	U.S. Patent Application Publication No. 2016/0267335 to Hampiholi (“ <i>Hampiholi</i> ”)
Exhibit 1008	U.S. Patent No. 9,063,543 to An et al. (“ <i>An</i> ”)
Exhibit 1009	U.S. Patent No. 9,688,145 to Kang (“ <i>Kang</i> ”)
Exhibit 1010	U.S. Patent No. 9,451,030 to Schunder et al. (“ <i>Schunder</i> ”)
Exhibit 1011	U.S. Patent No. 9,714,037 to DeRuyck et al. (“ <i>DeRuyck</i> ”)
Exhibit 1012	U.S. Patent Application Publication No. 2007/0268158 to Gunderson et al. (“ <i>Gunderson</i> ”)
Exhibit 1013	U.S. Patent Application Publication No. 2007/0219720 (“ <i>Trepagnier</i> ”)
Exhibit 1014	Gereon Meyer and Sven Beiker. <i>Road Vehicle Automation</i> . Springer. 2014. (“ <i>Meyer</i> ”)
Exhibit 1015	Jeff Wit et al. “Autonomous Ground Vehicle Path Tracking.” <i>Journal of Robotic Systems</i> 21(8), 439-449 (2004). (“ <i>Wit</i> ”)
Exhibit 1016	Keshav Bimbraw. “Autonomous Cars: Past, Present and Future.” <i>Proceedings of the 12th International Conference on Informatics in Control, Automation and Robotics (ICINCO-2015)</i> , pages 191-198, July 21-23, 2015. (“ <i>Bimbraw</i> ”)
Exhibit 1017	Xavier Mosquet et al. <i>Revolution in the Driver’s Seat</i> . The Boston Consulting Group. April 2015. (“ <i>Mosquet</i> ”)
Exhibit 1018	Steven E. Muldoon et al. “10.3: Vehicle Fault Diagnostics Using a Sensor Fusion Approach.” IEEE 2002.
Exhibit 1019	U.S. Patent No. 8,825,258 (“ <i>Cullinane</i> ”)
Exhibit 1020	U.S. Patent No. 9,798,323 (“ <i>Tsimhoni-323</i> ”)
Exhibit 1021	U.S. Patent No. 9,884,631 (“ <i>James</i> ”)
Exhibit 1022	U.S. Patent No. 11,040,725 (“ <i>Scofield</i> ”)
Exhibit 1023	U.S. Patent No. 9,483,059 (“ <i>Caveney</i> ”)
Exhibit 1024	U.S. Patent No. 9,365,213 (“ <i>Stenneth</i> ”)
Exhibit 1025	International Publication No. WO 2006/047297 (“ <i>Allard</i> ”)
Exhibit 1026	Rajesh Rajamani et al. “A Complete Fault Diagnostic System for Automated Vehicles Operating in a Platoon.” <i>IEEE Transactions</i>

	on Control Systems Technology, Vol 9, No. 4, July 2001. (“ <i>Rajamani</i> ”)
Exhibit 1027	U.S. Patent Application Publication No. 2013/0063336 (“ <i>Sugimoto</i> ”)
Exhibit 1028	Matthew McNaughton et al. “Motion Planning for Autonomous Driving with a Conformal Spatiotemporal Lattice.” 2011 IEEE International Conference on Robotics and Automation. May 9-13, 2011, Shanghai, China. (“ <i>McNaughton</i> ”)
Exhibit 1029	A. de la Escalera. “Traffic sign recognition and analysis for intelligent vehicles.” Image and Vision Computing 21 (2003) 247-258. (“ <i>Escalera</i> ”)
Exhibit 1030	“Surface Vehicle Information Report J3016.” SAE International. January 2014. (“ <i>J3016</i> ”)
Exhibit 1031	Intentionally Left Blank
Exhibit 1032	Intentionally Left Blank
Exhibit 1033	Intentionally Left Blank
Exhibit 1034	U.S. Patent No. 8,378,849 (“ <i>Chandra</i> ”)
Exhibit 1035	U.S. Patent No. 5,779,593 (“ <i>Takada</i> ”)
Exhibit 1036	U.S. Patent Application Publication No. 2013/0131907 (“ <i>Green</i> ”)
Exhibit 1037	Harding, J., Powell, G., R., Yoon, R., Fikentscher, J., Doyle, C., Sade, D., Lukuc, M., Simons, J., & Wang, J. (2014, August). “Vehicle-to-vehicle communications: Readiness of V2V technology for application.” (Report No. DOT HS 812 014). Washington, DC: National Highway Traffic Safety Administration. (“ <i>Harding</i> ”).

CERTIFICATION OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. §42.24 that the foregoing Petition for *Inter Partes* Review, excluding any table of contents, mandatory notices under 37 C.F.R. §42.8, certificates of service or word count, or appendix of exhibits, contains 13,904 words according to the word-processing program used to prepare this document (Microsoft Word).

Dated: May 2, 2025

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

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(b), the undersigned certifies that on May 2, 2025, a complete and entire copy of this Petition for *Inter Partes* Review and Exhibits were provided via Federal Express to the Patent Owner by serving the correspondence address of record for the '765 Patent:

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

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