

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Martin Koebler, et al.
U.S. Patent No.: 10,850,616 Attorney Docket No.: 49649-0021IP1
Issue Date: December 1, 2020
Appl. Serial No.: 15/693,899
Filing Date: September 1, 2017

Title: USING VEHICLE SYSTEMS TO GENERATE A ROUTE
DATABASE

SUPPLEMENTAL DECLARATION OF VASSILIOS MORELLAS

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

Dated: 03/12/25

By: 
Vassilios Morellas

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I, Vassilios Morellas, declare that:

I. INTRODUCTION

1. I have been retained on behalf of Tesla, Inc. (“Tesla”), as an independent expert consultant in this *inter partes* review (“IPR”) proceeding before the Patent Trial and Appeal Board (“PTAB”) of the United States Patent and Trademark Office (“USPTO”). I understand that the proceeding number of this IPR proceeding is IPR2024-00630.

2. I have been asked by Tesla’s counsel (“Counsel”) to consider whether certain references describe or make obvious features recited in claims of U.S. Patent No. 10,850,616 (“the ’616 patent”) (TESLA-1001). My opinions and the bases for my opinions are set forth below. My opinions are based on my education, my knowledge and experience in the relevant fields of technology, and my review of the materials considered in preparing this document.

3. I previously submitted a declaration in this proceeding that I signed on April 5, 2024 (“Declaration”). I understand that the Declaration was marked as TESLA-1003. The Declaration contained my opinions and the bases for them. Since submitting the Declaration, I have considered the Declaration of Dr. David M. Bevly (“Bevly Declaration”) (EX-2001). My opinions from my previous Declaration have not changed.

II. BACKGROUND AND QUALIFICATIONS

4. My background and qualifications are set forth in the Declaration. I incorporate that section in this declaration (“Supplemental Declaration”) by reference.

III. INFORMATION CONSIDERED

5. In preparing this Supplemental Declaration, I have considered documentary materials referenced in the table below. In addition, my opinions are further based on my education, training, experience, and knowledge in the relevant fields.

Document Identifier	Description
TESLA-1001	U.S. Patent No. 10,850,616 (“the ’616 patent”)
TESLA-1002	Excerpts from the Prosecution History of the ’616 patent (“the Prosecution History”)
TESLA-1004	U.S. Pat. No. 8,712,650 (“Koebler650”)
TESLA-1005	U.S. Pat. No. 11,065,977 (“Koebler977”)
TESLA-1006	U.S. Pat. No. 9,682,624 (“Koebler624”)
TESLA-1007	U.S. Pat. No. 8,972,162 (“Koebler162”)
TESLA-1008	U.S. Pat. No. 7,925,426 (“Koebler426”)

Supplemental Declaration of Vassilios Morellas
TESLA-1054

TESLA-1009	Complaint, iQar Inc. v. Tesla, Inc., 1:23-cv-00694, W.D. Tex., June 20, 2023
TESLA-1010	U.S. Pat. No. 7,516,011 (“Kabel”)
TESLA-1011	U.S. Pat. No. 7,148,648 (“Okano”)
TESLA-1012	U.S. Pat. No. 7,211,019 (“Kirkwood”)
TESLA-1013	U.S. Pat. No. 7,983,836 (“Breed”)
TESLA-1014	U.S. Pat. No. 7,752,188 (“Lagerstedt”)
TESLA-1015	U.S. Pat. No. 7,650,956 (“Hirata”)
TESLA-1016	U.S. Pat. No. 10,746,901 (“O’Brien”)
TESLA-1017	U.S. Pat. No. 10,703,162 (“Kanda”)
TESLA-1018	U.S. Pat. No. 5,848,378 (“Shelton”)
TESLA-1019	E.P. Pat. No. 3,475,729 (“Elkebetz”)
TESLA-1020	Wimmer A. & Schnessl E., “Effects of Humidity and Ambient Temperature on Engine Performance of Lean Burn Natural Gas Engines,” Proceedings of ICEF2006, ASME Combustion Engine Division 2006 Fall Technical Conference, Nov. 5-8, 2006, Sacramento, CA (“Wimmer”)
TESLA-1021	U.S. Pat. No. 6,505,123 (“Root”)
EX-2001	Bevly Declaration

TESLA-1056	Excerpts of Merriam Webster's Collegiate Dictionary, Eleventh Edition (2003)
TESLA-1057	Bayer G. Raymond, <i>Mechanical Wear Fundamentals and Testing</i> , 2 nd Ed., 3 (April 22, 2004)
TESLA-1058	U.S. Pat. App. Pub. No. 2002/0041328 ("LeCompte")
TESLA-1059	U.S. Pat. No. 5,345,606 ("Duckeck")
TESLA-1060	Certified Translation of Japanese Pat. Pub. No. JP 2003-276472 ("Hongo")
TESLA-1061	Translation Certification for TESLA-1060
TESLA-1062	Japanese Pat. Pub. No. JP 2003-276472 ("Hongo2")

IV. LEVEL OF ORDINARY SKILL IN THE ART

6. I set forth a definition of a person of ordinary skill in the art ("POSITA") in the Declaration, and I incorporate that definition here by reference. As explained in the Declaration, a POSITA would have had "a bachelor's degree in electrical engineering, computer engineering, mechanical engineering, civil engineering (transportation systems), physics, or a related field, and at least four years of experience (or the academic equivalent) in the field of transportation systems." TESLA-1003, ¶28.

7. According to Dr. Bevly, a POSITA would have "had a bachelor's degree in mechanical engineering, electrical engineering, computer science or an

equivalent field, along with at least some professional experience working with automotive applications such as powertrains, energy systems, vehicle sensor systems, or vehicle navigation technology or an equivalent level of skill, knowledge, and experience.” Ex-2001, ¶30. While this is a different definition of the level of ordinary skill for a POSITA, either definition is sufficient for the purposes of the prior art analyses discussed in my original Declaration. For example, each of the proposed definitions involve formal education in mechanical engineering and electrical engineering, and further reference related or equivalent fields.

8. Based on my knowledge, skill, and experience in the relevant fields, and my review of the ’616 patent specification, a person with the formal education discussed in the preceding paragraph would have had the sufficient education, training, and professional experience to understand various aspects of the prior art teachings discussed in my original Declaration. *Compare* Ex-2001, ¶¶28-33 and TESLA-1003, ¶¶28-29. As examples, a POSITA as defined by Dr. Bevly would have had sufficient education, training, and professional experience to understand the written description of Koebler as discussed in my original Declaration (*see, e.g.*, TESLA-1003, ¶¶58-91), and how its teachings are applied to the features described in the ’616 patent claims (*see, e.g., id.*, TESLA-1003, ¶¶96-161).

V. RELEVANT LEGAL STANDARDS

9. I set forth the relevant legal standards in the Declaration, and I incorporate those legal standards here by reference.

VI. SUMMARY OF OPINIONS

10. I have been asked to consider whether the claims of the '616 patent are anticipated or obvious over certain prior art references. As explained in the Declaration, and in further detail in this Supplemental Declaration, it is my opinion that:

- Claims 1-16 of the '616 patent are anticipated and made obvious by Koebler650
- Claims 1-16 of the '616 patent are made obvious by Koebler650, Kabel, Lagerstedt, Okano, Kirkwood, and Breed

VII. OVERVIEW OF THE '616 PATENT

A. Specification

11. I summarized the '616 patent specification in the Declaration, and I incorporate that summary here by reference.

B. Claims

12. I summarized the '616 patent claims in the Declaration, and I incorporate that summary here by reference.

C. Prosecution History

13. I summarized the '616 patent claims in the Declaration, and I incorporate that summary here by reference.

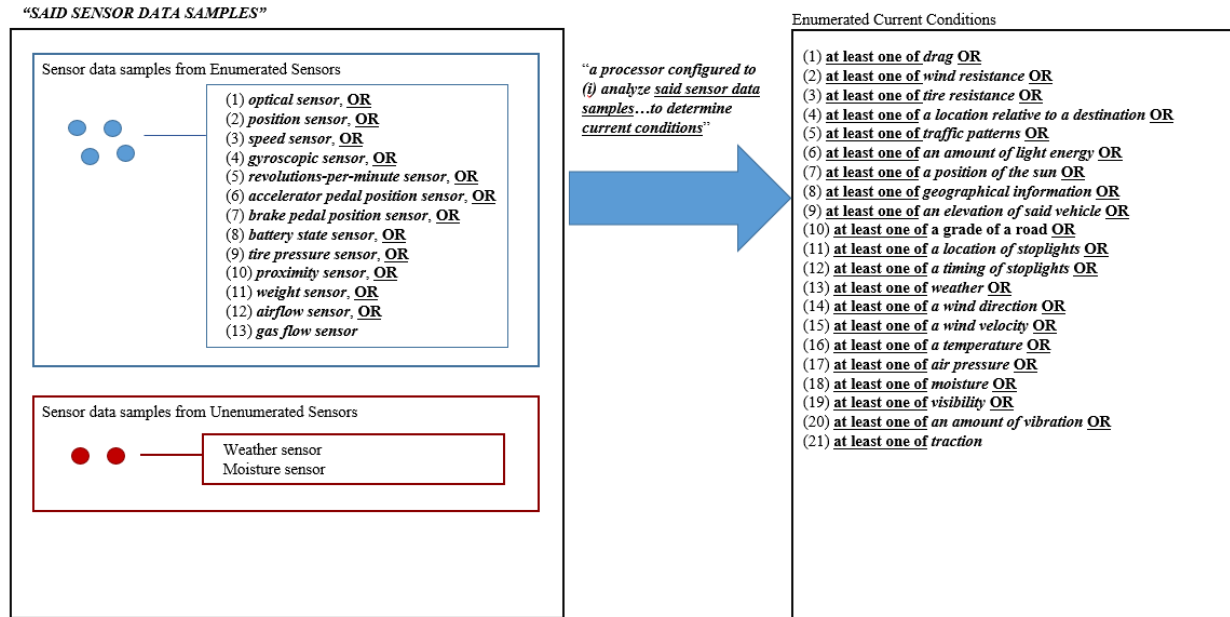
VIII. CLAIM INTERPRETATION

14. The Declaration explained the interpretations of relevant claim terms and limitations. TESLA-1003, ¶¶40-56. I incorporate this analysis here by reference.

15. In this Supplemental Declaration, I address statements in the Bevly Declaration regarding the interpretation of language used in the claims of the '616 patent.

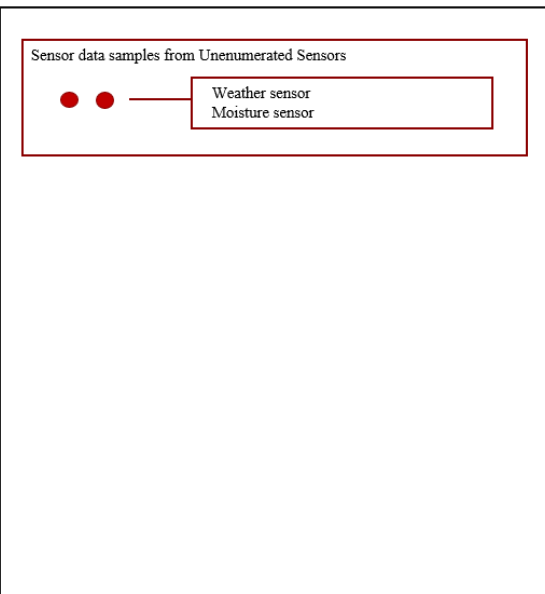
16. Based on my review of the Bevly Declaration, I maintain the opinions discussed in the Declaration. I disagree with the Bevly Declaration that the “invention” is not limited to specific sensors and conditions and “may be applied using various types of sensors and input information.” Ex-2001, ¶66. As explained the Declaration, the scope of the “invention” is limited by the claim language, which expressly states that “[t]he **sensor data samples** are collected from 13 enumerated sensor[s]...(‘Enumerated Sensors’).” TESLA-1003, ¶41. That is, the claim language limits the types of sensors by “requir[ing] that the sensor data samples are received from at least one of the Enumerated Sensors.” TESLA-1003, ¶44.

17. Additionally, interpreting the invention as being open to any sensor is not consistent with the claim language. As shown below, based on the claim language, sensor data samples collected from the Enumerated Sensors is required for determining one of the Enumerated Current Conditions.



18. Additionally, sensor data samples from unenumerated sensors cannot represent the ***said sensor data samples*** recited in [1c-1], [15e-1], and [16e] because their corresponding sensors are not enumerated in [1d], [15f], and [16a].

NOT "SAID SENSOR DATA SAMPLES"



"a processor configured to
(i) analyze said sensor data
samples...to determine
current conditions"



Enumerated Current Conditions

- (1) at least one of drag OR
- (2) at least one of wind resistance OR
- (3) at least one of tire resistance OR
- (4) at least one of a location relative to a destination OR
- (5) at least one of traffic patterns OR
- (6) at least one of an amount of light energy OR
- (7) at least one of a position of the sun OR
- (8) at least one of geographical information OR
- (9) at least one of an elevation of said vehicle OR
- (10) at least one of a grade of a road OR
- (11) at least one of a location of stoplights OR
- (12) at least one of a timing of stoplights OR
- (13) at least one of weather OR
- (14) at least one of a wind direction OR
- (15) at least one of a wind velocity OR
- (16) at least one of a temperature OR
- (17) at least one of air pressure OR
- (18) at least one of moisture OR
- (19) at least one of visibility OR
- (20) at least one of an amount of vibration OR
- (21) at least one of traction

IX. ANALYSIS OF KOEBLER650'S WRITTEN DESCRIPTION

19. The Declaration explained that documents in the priority chain of the '616 patent ("Koebler-Priority-Documents") do not provide a sufficient written description demonstrating that patentee had possession of features recited in the Challenged Claims prior to the 9/1/2017 filing date. TESLA-1003, ¶¶23, 58-91. I incorporate this analysis here by reference.

20. In this Supplemental Declaration, I address statements in the Bevly Declaration regarding a POSITA understanding based on the written description of Koebler650.

21. Based on my review of the Bevly Declaration, I maintain the opinions discussed in the Declaration. I disagree with the Bevly Declaration that a POSITA would have recognized that the patentee had possession over the invention claimed

in the '616 patent based on the written description of Koebler650. As explained in the Declaration, the claimed invention has certain requirements based on language described in claims 1, 15, and 16, including a determination of 22 enumerated current conditions based on analysis of one of 13 enumerated sensors. See TESLA-1003, ¶¶57-64. The limitations that include this requirement are the Current Condition Limitations.¹

22. I understand that the Bevly Declaration cites to portions of Koebler650 that describe certain parameters. As explained below, these parameters are not the same thing as the current conditions described in the claims. As such, the portions of Koebler650 identified in the Bevly Declaration would not have led a POSITA to recognize possession of the Current Condition Limitations.

23. As discussed below, the portions of Koebler650 cited in the Bevly Declaration lack specificity. The written description does not identify parameters representing 10 Unsupported Current Conditions, including **traction**, **amount of vibration**, and **moisture**. TESLA-1003, ¶61 (identifying Unsupported Current Conditions). Even if Koebler650 is interpreted to implicitly suggest these current conditions, the written description does not describe techniques regarding the

¹ Examples of the Current Condition Limitations include limitations [1c-1], [1d], [1e], [15e-1], [15f], [15g], [16a], and [16e].

analysis of sensor data from one of 13 enumerated sensors to determine them. This would have prevented a POSITA from immediately discerning that the Current Condition Limitations are contemplated within Koebler650's written description.

24. Below is a table summarizing the parameters described in Koebler650 that are identified in the Bevly Declaration as apparently corresponding to one of the enumerated current conditions:

Enumerated Current Condition	Parameter(s) Identified in Bevly Declaration
<i>Traction</i>	"operational status" about vehicle tires "tire resistance" "rolling resistance of the vehicle" <i>See Ex-2001, ¶¶87-89</i>
<i>amount of vibration</i>	"terrain" "condition of a road" <i>See Ex-2001, ¶¶102-121</i>
<i>Moisture</i>	"weather around the vehicle," e.g., "rain." <i>See Ex-2001, ¶¶88-101</i>

As explained in the sections below, I disagree with the Bevly Declaration that identification of the above-referenced parameters within Koebler650 is sufficient to have led a POSITA to recognize possession of the Current Condition Limitations.

25. Based on my review of Koebler650, the claim language, and the Bevely Declaration, a POSITA would not have understood the written description of Koebler650 as providing sufficient information to recognize possession of the Current Condition Limitations. Specifically, a POSITA would not have recognized possession of a vehicle system configured to determine the current conditions of ***traction, amount of vibration, and moisture.***

26. Koebler650's written description also would not have provided sufficient guidance to inform a POSITA that the inventors contemplated a vehicle system configured to analyze sensor data samples from one of the Enumerated Sensors to determine the Current Condition Limitations. This includes techniques for analyzing sensor data samples in determining the current conditions of ***traction, amount of vibration, and moisture.*** A POSITA would also not have recognized techniques for analyzing sensor data samples in determining the current conditions of ***weather, temperature, wind velocity, wind direction, air pressure*** (collectively "Weather Current Conditions"). A POSITA would not have recognized techniques for analyzing sensor data samples in determining the current conditions of ***timing of stoplights*** and ***location of stoplights*** (collectively "Stoplight Current Conditions").

A. A POSTA Would Not Have Recognized That The Vehicle System Described in Koebler650 Is Configured To Determine Traction

1. Operational Status, Tire Resistance And Rolling Resistance Are Not The Same Thing As Traction

27. According to the Bevly Declaration, Koebler650's description of three parameters ("operational status," "tire resistance," "rolling resistance") represents determining traction. Ex-2001, ¶130. I disagree because these parameters do not necessarily represent traction information.

28. The Bevly Declaration defines "traction" as "a measure of the amount of power that is transferred from the engine to the road, which is a function of the friction between the vehicle's drive wheels and the road surface." Ex-2001, ¶129. I disagree with this statement because this not how a POSITA would have understood the term "traction" in the context of the '616 patent. The definition proposed in the Bevly Declaration is exclusively focused on power transfer, which is different from the plain meaning understanding of the term "traction."

29. A POSITA would have recognized that under plain meaning, the term "traction" is "a physical process in which a tangential force is transmitted across the interface between two bodies through dry friction or an intervening fluid film." TESLA-1057, 5. This definition is from a textbook that was publicly available in 2004 (i.e., before the earliest filing date of Koebler650) and authored by Raymond G. Bayer. *Id.* As noted in TESLA-1057, traction results in "motion, stoppage, or

the transmission of power.” *Id.* (emphasis added). This description demonstrates a POSITA would have recognized that traction may result in either motion, stoppage, or transmission of power. However, as noted above, the definition of “traction” in the Bevly Declaration is only limited to “transmission of power.” A POSITA would not have understood “traction” to only be limited to the “transmission of power” (e.g., “measure of the amount of power”).

30. Traction is a frictional force exerted by a tire on the road surface that enables motion, such as acceleration, braking, or cornering, and is influenced by the normal force, the coefficient of friction, and the interaction between the tire and the road surface. It is not only a measure of power transfer, which involves both force and velocity. Power transfer is a function of the traction force and the speed of the wheels, but they are distinct concepts.

31. The definition of “traction” in the Bevly Declaration also focuses on “vehicle’s drive wheels,” but traction is relevant for all wheels, not just those powered by the engine. For example, braking traction affects all wheels during deceleration and cornering traction involves lateral forces and affects all wheels during turning.

32. As to “operational status,” Koebler⁶⁵⁰ uses this term to represent a generic category of status information. For example, column 4, lines 1-18 references examples of operational status information that are unrelated to

frictional forces. These examples include battery information (e.g., “battery state, the voltage of the battery, the amp hours from the battery, the state of the battery...”) and other information (e.g., “the amount of air going to the engine, the amount of gas going to engine, and the weight of the driver”). TESLA-1004, 4:1-18. These examples do not relate to traction. They also do not specifically identify frictional forces between a vehicle’s tire and the road.

33. As to “tire resistance,” this parameter represents a measure of how much energy is lost due to deformation and road interaction while a tire rolls. In contrast, traction measures the force that allows a tire to grip the road to facilitate motion. Tire rotation also generally refers to factors impeding tire rotation, which does not necessarily reflect the dynamic grip or frictional interaction associated with traction. For example, rolling resistance due to tire stiffness or inflation pressure represents tire resistance without providing meaningful information about traction on a specific road surface.

34. Tire resistance is also primarily a steady-state phenomenon that applies when the tire is rolling at a constant speed. In contrast, traction is a dynamic phenomenon that applies when forces are actively being applied to accelerate, brake, or turn the vehicle.

35. There are also scenarios in which tire resistance measurements have no relationship to traction since they each assess different aspects of tire

performance. For example, in the context of improving fuel efficiency, a vehicle system may measure rolling resistance in real time during highway driving. During steady cruising, where acceleration, braking, and cornering are negligible, rolling resistance is one of the primary forces opposing motion, alongside aerodynamic drag. In this example, fuel consumption largely correlates with the energy needed to overcome rolling resistance and maintain constant speed. However, in this scenario, traction is minimal because the vehicle is not accelerating, braking, or cornering significantly. In this scenario, tires maintain a steady grip on the road, and the forces measured by monitoring tire resistance are not about maximizing grip, only about maintaining rolling efficiency.

36. As to “rolling resistance,” this parameter is the resistive force that opposes the rotation of a tire as it moves along a surface. Rolling resistance arises from internal tire deformation and friction unrelated to surface grip, which does not necessarily represent traction information. For example, a highly inflated tire on a smooth, dry road exhibits low rolling resistance but provides no direct indication of available traction.

2. *Processing Of Operational Status, Tire Resistance And Rolling Resistance Does Not Necessarily Involve Determining Traction Information*

37. According to the Bevly Declaration, Koeble650’s description of an RPM sensor represents determining traction based on analyzing sensor data

samples collected by an RPM sensor. Ex-2001, ¶¶68, 131-133 (citing TESLA-1004, 4:1-18, 8:41-51, 21:29-62). I disagree because Koebler650 does not describe how or why traction information is determined from sensor data collected by the RPM sensor. The Bevly Declaration also does not explain how such processing is present within Koebler650. This description is required to have informed a POSITA that Koebler650 teaches a vehicle system that performs such processing because not all measurements by an RPM sensor specify traction information.

38. The examples of RPM sensor measurements described in Koebler650 do not necessarily relate to traction information. For example, “wheel rotations per minute (RPM)” determined by an RPM sensor does not directly indicate traction information without further processing. Wheel RPM only provides information about the rotational speed of the wheel. It does not directly indicate whether the tire is maintaining effective grip with the road. Wheel RPM also measures how fast a wheel is spinning, which similarly does not indicate traction information without further processing. Wheel RPM may indicate the rotational speed, but it does not directly indicate the frictional force between the tire and the road. A high RPM could mean the wheel is spinning freely (loss of traction), or it could mean the vehicle is moving normally under high speed.

39. Determining traction information from wheel RPM measurements requires further analysis that is not described in Koebler650. This may include

determining the wheel slip ratio, longitudinal and lateral forces, and road surface monitoring.

40. There may also be scenarios where wheel RPM and traction are decoupled such that measurement of wheel RPM alone provides no information about loss of traction. For example, during hard braking without ABS, wheel RPM may drop to zero while the vehicle continues moving, showing traction is lost even though the RPM is low. On a wet or slippery road, a wheel can maintain steady RPM while still losing grip if lateral forces (e.g., during cornering) exceed the available friction.

41. Additionally, measuring “motor rotations per minute” and “engine RPM” does not necessarily involve determining traction. These measurements pertain to rotational speeds of a vehicle power source. In contrast, traction is fundamentally about the interaction between the tires and the road surface. Engine RPM measures the speed of the engine’s crankshaft in an internal combustion engine. Motor RPM measures the speed of the rotor in an electric motor. Each of these measurements provide no direction information about whether the tires are effectively gripping the road as they only show how fast the power source is spinning. As previously explained, traction analysis relies on sensor data that measures tire behavior, vehicle dynamics, and external conditions (each of which are unrelated to engine RPM and motor RPM).

42. Similarly, measuring “tire pressure” does not necessarily involve determining traction. Tire pressure is a static property of the tire that influences its overall performance characteristics. In contrast, traction is determined dynamically and involves real-time interaction between the tires and the road surface. Tire pressure measures the amount of air pressure inside the tire, which is typically expressed in pounds per square inch (PSI) or kilopascals (kPa). Tire pressure affects the tire’s contact patch (area of the tire in contact with the road). However, tire pressure does not directly measure or reflect the real-time interaction between the tire and the road that determines traction.

43. Further, there are scenarios where “tire pressure” and “traction” are decoupled such that measurement of tire pressure alone provides no information about loss of traction. For example, even with correct tire pressure, traction can be lost due to a low friction coefficient between the tire and the road. As another example, a correctly inflated tire may skid under hard braking, losing traction, but tire pressure measurements remain unchanged. Additionally, in situations where the tire spins (e.g., on mud or gravel), traction loss occurs, but tire pressure measurements remain irrelevant.

B. A POSITA Would Not Have Recognized That The Vehicle System Described in Koebler650 Is Configured to Determine An Amount of Vibration

1. Terrain and Road Conditions Are Not The Same Thing As An Amount of Vibration

44. According to the Bevly Declaration, Koebler650's description of two parameters ("terrain," "condition of a road") represents determining an amount of vibration. Ex-2001, ¶106. I disagree because these parameters do not necessarily represent vibration information.

45. In the context of vehicle systems, a POSITA would have understood the term "vibration" to mean "oscillatory motion or mechanical movement of the vehicle or its components." See TESLA-1056, 9 ("the act of vibration: the state of being vibrated or in vibratory motion: such as (1) OSCILLATION"). Under plain meaning, the phrase "amount of vibration" means a "quantifiable measure of the oscillatory motion or mechanical movement of the vehicle or its components." The parameters of "terrain" and "condition of a road" do not necessarily represent a quantifiable measure of the oscillatory motion or mechanical movement of the vehicle or its components.

46. As to "terrain," Koebler650 uses this term to represent a generic category of road information. For example, column 13, lines 52-58 reference "the gradient or condition of a road" as examples of "terrain" information. TESLA-1004, 13:52-58. Gradient of a road does not necessarily identify vibration

information. This encompasses static slope characteristics, does not convey dynamic aspects such as vibration experienced by vehicles. For example, a smoothly paved incline with a constant gradient does not provide any information about vibration. As discussed below, the condition of a road similarly does not necessarily represent vibration information.

47. The plain meaning of the term “terrain” is “the physical features of a tract of land.” TESLA-1056, 7. Physical features of a tract of land does not necessarily represent vibration information. This encompasses static terrain characteristics, which do not reflect dynamic conditions such as vibration. For example, the slope or elevation profile of land represents a physical feature that conveys no information about vibration.

48. As to “condition of a road,” this phrase reflects a generic category of condition information associated with a road. A condition of a road broadly refers to various static or structural states of the roadway surface, which do not imply dynamic parameters such as vibration. For example, describing a road as “wet” or “icy” indicates road condition without conveying any vibration-related information. Koebler⁶⁵⁰’s usage of the phrase “road condition” also conveys a road category of condition information since it identifies “traffic” and “weather” as examples of road conditions. See TESLA-1004, 13:59-14:4. Traffic and weather are each unrelated to vibration information.

49. The plain meaning of the term “condition” is “a state of being.”

TESLA-1056, 3. Additionally, the plain meaning of the term “road” is an “open way for vehicles, persons, and animals.” *Id.*, 5. The plain meaning of the phrase “condition of a road” is “a state of being for an open way for vehicles, persons, and animals.” This encompasses, for instance, general accessibility or usability characteristics that do not convey dynamic phenomena such as vibration. For example, stating that a roadway is “closed for construction” represents a state of being without indicating vibration information.

50. Additionally, the condition of a road can be assessed through various factors such as surface type (e.g., asphalt, gravel, dirt), presence of obstacles (e.g., potholes, debris), wetness or dryness, and traffic congestion, none of which specifically involve measuring vibration. Other road condition indicators, such as lane markings, speed limits, construction zones, and road curvature, are visually identifiable and can be determined through mapping data, cameras, or external reports without analyzing vibration data.

51. A road can also be in poor condition due to cracks, potholes, or uneven surfaces, but if a vehicle’s suspension system absorbs these irregularities effectively, the driver may not experience significant vibration, meaning vibration is not a necessary indicator of road conditions. Conversely, a smooth road with high-speed travel, engine idling, or certain aerodynamic factors can still produce

noticeable vibrations inside a vehicle, demonstrating that vibration is not an exclusive or required factor in assessing road conditions. Road conditions can be evaluated based on factors like material composition, weather impact, and visual markers without requiring vibration analysis.

2. *Processing Of Terrain And Road Conditions Does Not Necessarily Involve Determining Traction Information*

52. According to the Bevly Declaration, Koebler650's description of a gyroscopic sensor, a tire pressure sensor, and a position sensor represents determining an amount of vibration based on analyzing sensor data samples collected by these sensors. Ex-2001, ¶¶116-24 (citing TESLA-1004, 4:3-11, 8:48-49, 21:49-51). I disagree because Koebler650 does not describe how or why vibration information is determined from sensor data collected by the gyroscopic sensor, the tire pressure sensor, or the position sensor. The Bevly Declaration also does not explain how such processing is present within Koebler650. This description is required to have informed a POSITA that Koebler650 teaches a vehicle system that performs such processing because not all measurements by a gyroscopic sensor, a tire pressure sensor, or a position sensor specify vibration information.

53. As to the gyroscope sensor, the examples of "gyroscope information" in the cited portion of Koebler650 are "vehicle's status information" and "current

slope/grade of road.” TESLA-1004, 21:29-62. However, these examples of information do not necessarily represent vibration information. Koebler650 does not describe how “vehicle’s status information” and “current slope/grade of road” are further processed to identify vibration information.

54. A “vehicle’s status information” represents a generic category of status information relating to the vehicle. This is consistent with use of the phrase “operational status information” within Koebler650 as generically representing various types of information. TESLA-1004, 4:1-18; *see id.*, 8:32-40, 8:65-9:4. The types of operational status information described in Koebler650 does not necessarily involve determining an amount of vibration because their determination is used for power management, not mechanical oscillations. Additionally, while certain parameters described in Koebler650, such as RPM fluctuations, rolling resistance, and weight distribution changes may correlate with vibration, Koebler650 fails to describe processing these parameters to determine vibration information.

55. Similarly, the “current slope/grade of road” refers to the inclination of the road surface. In contrast, vibration refers to the rapid oscillatory motion of the vehicle due to road irregularities, engine function, or mechanical forces. Since slope/grade and vibration describe distinct physical characteristics of the driving

environment, determining slope/grade of a road does not necessarily require analyzing vibration information.

56. As to the tire pressure sensor, measuring “tire pressure” does not necessarily involve determining vibration information. Tire pressure measurement involves detecting the internal air pressure of a tire. In contrast, vibration measurement involves detecting oscillatory motion, typically using an accelerometer or specialized vibration sensor. A vehicle can experience vibration even when tire pressure remains constant. Conversely, tire pressure can change without inducing measurable vibration. As such, the process of determining tire pressure does not necessarily require or involve determining an amount of vibration.

57. Koebler650’s discussion of “tire pressure” measurements also confirm that they do not necessarily include traction information. Koebler650 describes one example where a tire pressure measurement is “used to calculate the drag force due to rolling resistance.” TESLA-1004, 21:49-50. However, a drag force due to rolling resistance does not necessarily represent vibration information. Koebler650 also does not describe a calculated drag force due to rolling resistance being further processed to identify vibration information. Calculating drag force due to rolling resistance involves static or steady-state variables such as tire deformation,

inflation pressure, and surface interaction, none of which necessarily include dynamic vibration information.

58. Other examples of drag force due to rolling resistance may be calculated using parameters, such as tire pressure, vehicle weight, speed, and rolling resistance coefficients. These parameters do not require measuring oscillatory motion or vibration. Rolling resistance is a steady-state force that opposes motion and can be determined without analyzing transient oscillations, and a vehicle can experience high rolling resistance on a smooth road with no vibration or low vibration.

59. As to the position sensor, while paragraph 124 of the Bevely Declaration speculates that position sensors “could be used to determine certain types of vibration[,]” there is no corresponding citation to a description within Koebler650. Ex-2001, ¶124. Koebler650 suggests data collected by a position sensor may be used for determining (a) position and elevation information (TESLA-1004, 3:41-67) and (b) destination and route tracking information (*id.*, 4:19-30).

60. For position and elevation information, this type of information is calculated by receiving satellite signals and calculating latitude, longitude, and altitude, which are static or slowly changing data points. In contrast, vibration measurement requires detecting rapid oscillatory motion, typically using an

accelerometer or vibration sensor. A vehicle can experience vibration without any meaningful change in position or elevation (e.g., shaking while idling at a stoplight) and can change position or elevation without experiencing vibration (e.g., driving smoothly uphill). The process of determining position and elevation information using a position sensor does not necessarily involve determining an amount of vibration.

61. For destination and route tracking information, this type of information is determined by mapping the vehicle's location over time, identifying waypoints, and correlating position data with stored maps. These types of information do not require detecting or analyzing oscillatory motion characteristic of vibration. A vehicle can experience vibration without changing its route or destination (e.g., sitting at a vibrating stoplight) and can change its route or destination without experiencing vibration (e.g., smoothly rerouting due to GPS guidance). The process of determining destination and route tracking information using a position sensor does not necessarily involve determining an amount of vibration.

C. A POSITA Would Not Have Recognized That The Vehicle System Described in Koebler650 Is Configured to Determine *Moisture*

1. Rain Is Not The Same Thing As Moisture

62. According to the Bevly Declaration, Koebler650's description of "rain" represents determining moisture. Ex-2001, ¶90. I disagree because rain is

not the same thing as moisture. Rain and moisture are correlated, but Koebler⁶⁵⁰ does not describe how moisture information is determined from detecting rain. Koebler⁶⁵⁰ also provides no detail regarding examples of rain information that are determined by its vehicle system.

63. In the context of vehicle systems, a POSITA would have understood the term “moisture” to mean “liquid diffused or condensed in relatively small quantity.” See TESLA-1056, 4. Rain specifically refers to precipitation actively falling from the atmosphere, while moisture is a broader term that includes any presence of water (e.g., humidity, condensation, wet road surfaces, or residual water from previous rainfall). A vehicle system detecting rain typically relies on rain sensors (e.g., optical or acoustic sensors on the windshield) to determine active precipitation, which may be used for automatic wipers or weather-adaptive driving systems. In contrast, detecting moisture could involve other types of sensors, including one or more of humidity sensors, road condition sensors, and tire slip detection to assess surface wetness, which impacts traction control, braking performance, and adaptive cruise control, regardless of whether rain is currently falling.

2. *Processing Of Rain Does Not Necessarily Involve Determining Moisture Information*

64. According to the Bevly Declaration, Koebler650's description of a position sensor and an optical sensor represents determining moisture based on analyzing sensor data samples collected by these sensors. Ex-2001, ¶¶93-100 (citing TESLA-1004, 8:19-24, 21:29-37). I disagree because Koebler650 does not describe how or why moisture information is determined from sensor data collected by the position sensor or the optical sensor. The Bevly Declaration also does not explain how such processing is present within Koebler650. This description is required to have informed a POSITA that Koebler650 teaches a vehicle system that performs such processing because not all measurements by a position sensor or an optical sensor specifies moisture information.

65. As to the position sensor, the Bevly Declaration references communications with a "weather service" and analyzing such communications in relation to position information. Ex-2001, 2001, ¶93. However, in column 8, lines 19-24, Koebler650 does not describe or suggest any processing of information obtained from a weather service to determine moisture information. The phrase "weather information" broadly includes various types of parameters, including some that are not related to moisture information. For example, a weather service may only provide information related to temperature, wind, visibility, and

barometric pressure. In this example, the weather information includes various types of weather-related parameters but no moisture information.

66. As to the optical sensor, the Bevly Declaration references generic descriptions relating information input. Ex-2001, ¶98 (citing TESLA-1004, 2:27-29, 3:63-67, 4:14-18, 4:25-30, 7:26-31, 19:59-65). These descriptions do not provide specific examples of processing techniques to determine moisture information. Additionally, in column 21, 31-33, Koebler650 provides examples of sensor functionality but does not describe or suggest processing of “external environmental information” received from an optical sensor to determine a current condition of moisture. TESLA-1004, 21:29-62.

67. Paragraph 100 of the Bevly Declaration further states that “optical sensors (e.g., infrared sensors) were not only well-known in the automotive field, but were routinely used to detect whether or not it is raining at the vehicle’s location.” Ex-2001, ¶100. Even if true, this fails to identify the description in Koebler650 regarding processing of optical sensor data to determine whether or not it is raining, and further processing to identify moisture information.

Koebler650 focuses generally on processing relating to “external environmental information,” but this is a broad phrase that does not necessarily include moisture information. As explained in Koebler650, information about the external environment of the vehicle includes a variety of parameters, including those

unrelated to moisture, such as “current location,” “elevation” and “predicted slope/grade.” TESLA-1004, 3:41-67. Similarly, column 3, lines 41-67 lists various types of external environmental information, but does not reference “moisture” or any other information that necessarily represents moisture information. *Id.*, 3:41-67.

D. A POSITA Would Not Have Recognized That The Vehicle System Described in Koebler650 Is Configured to Determine Weather Current Conditions

68. According to the Bevly Declaration, Koebler650’s description of a position sensor and an optical sensor represents determining Weather Current Conditions. Ex-2001, ¶¶76-87 (citing TESLA-1004, 3:50-61, 7:32-61, 8:12-24, 11:20-23, 13:41-45, 13:59-63, 14:1-23, 17:52-56, 21:29-62, FIG. 9). I disagree because Koebler650 does not describe how or why weather information is determined from sensor data collected by the position sensor or the optical sensor. The Bevly Declaration also does not explain how such processing is present within Koebler650. This description is required to have informed a POSITA that Koebler650 teaches a vehicle system that performs such processing because not all measurements by a position sensor or an optical sensor specifies weather information.

69. As to the position sensor, the Bevly Declaration does not identify a description within Koebler650 indicating that a current vehicle position is used to

process Weather Current Conditions (whether sensed or received via telemetry).

See Ex-2001, ¶¶83-85. While column 8, lines 19-24 identifies receipt of “information by telemetry,” via communications with “a weather service, a map service, a traffic service, etc.,” there is no reference to a position sensor in this paragraph. TESLA-1004, 8:19-24.

70. By Koebler650’s filing date, a POSITA would have known of vehicle systems that were configured to receive location-specific weather information from an external weather service without necessarily processing sensor data samples collected by a position sensor. A POSITA would have known of various methods of distributing weather information to vehicles, including broadcast-based satellite transmission. *See, e.g.*, TESLA-1058, [0164], [0177], [0235]. As one example, U.S. Pat. App. Pub. No. 2002/0041328 (“LeCompte”)(TESLA-1058) describes an example of a system where “ground terminals 308 having a computer with an associated wireless communication link connected” can “provide a weather pattern information signal that is broadcast to subscribers.” *Id.*, [0164]. In this configuration, “the broadcast message includes only weather data for regions affecting that particular subscriber.” *Id.* This indicates that location-specific filtering occurs at the transmission source rather than requiring vehicle-side processing. *Id.* Additionally, “personnel who view the weather data on a display screen at the ground terminal 308 may manually detect selected weather events and

generate warning messages, followed by electronic Internet messages that warn subscribers of danger, for those subscribers who are located in the affected area,” further emphasizing that location-specific weather information is prepared externally before transmission to the vehicle. *Id.*, [0165]. When column 8, lines 19-24 of Koebler650 identifies receipt of “information by telemetry,” via communications with “a weather service, a map service, a traffic service, etc.,” a POSITA would have understood that this configuration does not necessarily require analysis of position sensor data in obtaining location-specific weather information from the “weather service.” TESLA-1004, 8:19-24.

71. As to the optical sensor, the Bevly Declaration does not cite to any description from Koebler650 in analyzing sensor data collected by the optical sensor for determining the Weather Current Conditions. *See* Ex-2001, ¶¶86-87. There is also no language in Koebler650 to have informed a POSITA that the system analyzes a series of optical sensor data samples over time to generate or infer Weather Current Conditions. Even though optical sensors may theoretically detect some weather-related features (e.g., fog), Koebler650 does not describe any logic or algorithm for using these features to classify or determine weather information comprehensively.

E. A POSITA Would Not Have Recognized That The Vehicle System Described in Koebler650 Is Configured To Determine Stoplight Current Conditions

72. According to the Bevly Declaration, Koebler650's description of a position sensor and an optical sensor represents determining Stoplight Current Conditions. Ex-2001, ¶¶76-87 (citing TESLA-1004, 3:50-61, 7:32-61, 8:12-24, 11:20-23, 13:41-45, 13:59-63, 14:1-23, 17:52-56, 21:29-62, FIG. 9). I disagree because Koebler650 does not describe how or why stoplight information is determined from sensor data collected by the position sensor or the optical sensor. The Bevly Declaration also does not explain how such processing is present within Koebler650. This description is required to have informed a POSITA that Koebler650 teaches a vehicle system that performs such processing because not all measurements by a position sensor or an optical sensor specifies stoplight information.

73. As to the position sensor, the Bevly Declaration does not identify a description within Koebler650 indicating that a current vehicle position is used to process Stoplight Current Conditions (whether sensed or received via telemetry). See Ex-2001, ¶¶83-85. While column 8, lines 19-24 identifies receipt of "information by telemetry," via communications with "a weather service, a map service, a traffic service, etc.," there is no reference to a position sensor in this paragraph. TESLA-1004, 8:19-24.

74. By Koebler650's filing date, a POSITA would have known that traffic information received from an external traffic service does not necessarily include stoplight information (e.g., location of stoplights, timing of stoplights). As one example, U.S. Pat. No. 5,345,606 ("Duckeck")(issued 9/6/1994)(TESLA-1059) describes an example of a vehicle traffic information system that receives traffic information that does not specify any stoplight information. In Duckeck, a driver "receives only traffic information from the region of interest to him..." See TESLA-1059, Abstract. The received traffic information instead includes "traffic news relating to the desired region." *Id.* A POSITA would have recognized that examples of traffic news includes regional traffic events that affect border or transitional areas between different regional broadcasting zones. *Id.*, 1:64-68.

75. As another example, a certified translation of Japanese Pat. App. Pub. No. 2003-276472 ("Hongo")(published 9/30/2003)(TESLA-1060) describes a vehicle configured to receive traffic information via radio broadcast without the received information representing any stoplight information. In Hongo, the "received information relates to road conditions, traffic jams, traffic regulations, etc. during driving." TESLA-1060, [0064]. Examples of traffic information include "traffic congestion and traffic regulations," as well as "natural traffic jams, traffic accidents, road construction, construction around roads, large events, long holidays, etc.," which are "factors that cause these changes." *Id.* A POSITA would

have recognized that these examples of traffic information that are received from an external traffic service do not necessarily relate to stoplight information.

76. Additionally, a POSITA would have been familiar with external traffic services, such as the Traffic Message Channel (TMC), which broadcasts real-time traffic information to vehicles without providing any stoplight-related data. TMC primarily transmitted information such as traffic congestion, accident locations, road construction, road closures, and average traffic speed conditions. This information does not include details about individual stoplights or intersection signals.

77. Additionally, by Koebler⁶⁵⁰'s filing date, a POSITA would have known of vehicle systems that were configured to receive location-specific traffic information from an external traffic service without necessarily processing sensor data samples collected by a position sensor. For example, as explained above, in Duckeck, "a driver receives only traffic information from the region of interest to him, route-specific features are provided with an identifier." TESLA-1059, Abstract.

78. As another example, a POSITA would have known of Traffic Message Control (TMC) systems that allow vehicles to receive broadcasted traffic information without relying on position sensor data. In such systems, a receiver located in a vehicle (e.g., Radio Data System receiver configured to receive TMS

messages (RDS-TMS receiver)) tunes into a FM radio station transmitting traffic data. The receiver extracts encoded messages containing traffic event codes and location references. The receiver then matches the received location codes to a predefined and locally-stored location table. This table contains an indexed list of roads and intersections within the broadcast region, ensuring that only relevant messages corresponding to the local area are decoded and displayed. This approach provides an example of a known configuration for vehicles to receive pertinent traffic alerts without necessarily analyzing sensor data collected by a position sensor.

79. As to the optical sensor, the Bevly Declaration does not cite to any description from Koebler650 in analyzing sensor data collected by the optical sensor for determining the Stoplight Current Conditions. *See* Ex-2001, ¶¶86-87. There is also no language in Koebler650 to have informed a POSITA that the system analyzes a series of optical sensor data samples over time to generate or infer Stoplight Current Conditions. Even though optical sensors may theoretically detect some features (e.g., distance from nearby vehicles), Koebler650 does not describe any logic or algorithm for using these features to classify or determine stoplight information comprehensively. Koebler650 also does not establish that any stoplight information is inferred from sensor data collected by an optical sensor.