

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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TOYOTA MOTOR CORP.,  
Petitioner,

v.

LEROY G. HAGENBUCH,  
Patent Owner.

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Case IPR2013-00638  
Patent 8,014,917 B2

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Before JAMESON LEE, MICHAEL W. KIM, and  
JEREMY M. PLENZLER, *Administrative Patent Judges*.

PLENZLER, *Administrative Patent Judge*.

FINAL WRITTEN DECISION  
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

## I. INTRODUCTION

### A. Background

Toyota Motor Corp. (“Petitioner”) filed a corrected Petition to institute an *inter partes* review of claims 4, 9–17, 21, and 26–38 of U.S. Patent No. 8,014,917 B2 (Ex. 1101, “the ’917 patent”). Paper 5 (“Pet.”). The Petition was accompanied by an expert declaration from David McNamara. Ex. 1111. Leroy G. Hagenbuch (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). We instituted trial on the following grounds: (1) obviousness of claims 4, 9–17, 21, and 26–34 over Aoyanagi<sup>1</sup>, Steiner<sup>2</sup>, and Oishi<sup>3</sup>; (2) obviousness of claims 4, 9–17, 21, and 26–34 over Aoyanagi, Steiner, and Vollmer<sup>4</sup>; (3) obviousness of claim 35 over Aoyanagi and Hagenbuch ’835<sup>5</sup>; and (4) obviousness of claims 36–38 over Aoyanagi, Hagenbuch ’835, and Steiner. Paper 10 (“Dec. on Inst.”).

During trial, Patent Owner filed a corrected Patent Owner Response (Paper 24, “PO Resp.”), which was accompanied by an expert declaration from Michael Nranian (Ex. 2060). Petitioner filed a Reply to the Patent Owner Response. Paper 29 (“Pet. Reply”). An oral hearing was held on

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<sup>1</sup> Japanese Patent Publication No. H03-085412, published April 10, 1991 (Ex. 1102, “Aoyanagi”). Citations to this reference refer to its English translation (Ex. 1103), and are in the format page:column:lines.

<sup>2</sup> U.S. Patent No. 4,939,652, issued July 3, 1990 (Ex. 1110) (“Steiner”).

<sup>3</sup> Japanese Patent Publication No. S58-16399, published January 31, 1983 (Ex. 1104, “Oishi”). Citations to this reference refer to its English translation (Ex. 1105), and are in the format page:column:lines.

<sup>4</sup> International Patent Publication No. WO 90/03899, published April 19, 1990 (Ex. 1106, “Vollmer”). Citations to this reference refer to its English translation (Ex. 1107).

<sup>5</sup> U.S. Patent No. 4,839,835, issued June 13, 1989 (Ex. 1108) (“Hagenbuch ’835”).

November 20, 2014. A transcript of the hearing has been entered into the record. Paper 41 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c). This final written decision is issued pursuant to 35 U.S.C. § 318(a).

We determine that Petitioner has shown by a preponderance of the evidence that claims 4, 9–17, 21, and 26–38 of the ’917 patent are *unpatentable*.

#### *B. Related Proceedings*

The ’917 patent is involved in a district court proceeding, *Hagenbuch v. Toyota Motor Sales, U.S.A., Inc.*, No.1:13-cv-6713 (N.D. Ill., filed Sept. 18, 2013). Pet. 1; Prelim. Resp. 4. A final decision in another *inter partes* review of the ’917 patent between the same parties has issued (*Toyota Motor Corp. v. Leroy G. Hagenbuch*, Case IPR2013-00483 (PTAB Dec. 5, 2014) (Paper 37)), determining claims 1–3, 5–8, 18–20, and 22–25 are *unpatentable*.

#### *C. The ’917 Patent*

The ’917 patent relates generally to a vehicle including various sensors that monitor vital signs and production-related parameters of the vehicle. Ex. 1101, 6:23–27. The ’917 patent provides a list of vital sign sensors that detect engine oil temperature, engine oil pressure, engine coolant level, engine crankcase pressure, engine fuel pressure, transmission oil temperature, transmission oil level, differential oil temperature, differential oil level, current amperes to the drive motor, drive motor temperature, a crash, and tire air pressure, and a list of production-related sensors that determine engine revolutions per minute (RPM), throttle position, engine fuel consumption, distance traveled, ground speed, incline,

angle of turn, steering wheel position, brake status, vehicle direction, load, and dump status. *Id.* at 6:30–58. The '917 patent notes that each of the sensors listed above was known and commercially available at the time of the '917 patent's filing. *Id.* at 6:59–61. The '917 patent provides additional detail on a number of the sensors, including the sensors related to vehicle braking, for example. *Id.* at 10:6–11:10.

The '917 patent describes two types of sensors related to vehicle braking: “a simple on/off status sensor” and a sensor “which senses the degree of braking.” *Id.* at 10:43–49. The '917 patent explains that the illustrated embodiment includes a “degree of braking” sensor and provides various examples employing the data obtained from the “degree of braking” sensor to determine various vehicle conditions based on the timing of when the brakes were applied to diagnose a crash condition, for example. *Id.* at 10:49–62.

The '917 patent explains that inputs from the production-related sensors are recorded in RAM 47, which is continually updated, and stored in memory 83. *Id.* at 11:15–23. The '917 patent further explains that a crash event can trigger downloading data saved from the various sensors, and that data can continue to be gathered and stored after the crash event. *Id.* at 7:36–38, 7:57–60, 11:59–62, 25:10–14. Specifically, in the event of a crash, data from memory 83 is recorded to memory 85. *Id.* at 11:59–62. A distress signal is automatically sent after the crash event to alert other personnel that aid may be required. *Id.* at 7:35–41. The crash event is described as being detected when the value of data sampled from an accelerometer exceeds a pre-programmed critical value. *Id.* at 25:8–10.

*D. Illustrative Claims*

Of challenged claims 4, 9–17, 21, and 26–38, claims 9, 26, and 35 are the only independent claims, with claims 10–17 depending from claim 9, claims 27–34 depending from claim 26, and claims 36–38 depending from claim 35. Claim 4 depends from claim 1 and claim 21 depends from claim 18.<sup>6</sup> Claim 9 illustrates the claimed subject matter and is reproduced below:

9. An apparatus for recording operation of a vehicle, the apparatus comprising:

- sensors for monitoring production-related parameters of the vehicle, where the parameters include ground speed of the vehicle, a position of a throttle for an engine of the vehicle and a degree of braking by a braking system of the vehicle;
- a first memory for capturing information from one or more of the sensors for monitoring production-related parameters;
- a second memory for receiving the information from the first memory;
- sensors for monitoring vital signs of the vehicle, where the vital signs include a collision of the vehicle;
- a processor in communication with the production-related and vital sign sensors and the first and second memories for transferring into the second memory the information captured by the first memory in response to detection of the collision of the vehicle, where the information includes data from one or more of the production-related parameters before detection of the collision and data from one or more of the vital signs sensors after detection of the collision; and

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<sup>6</sup> Independent claims 1 and 18 were found unpatentable in IPR2013-00483.

a transmitter for automatically transmitting a distress signal in response to detection of the collision of the vehicle.

Ex. 1101, 26:9–34.

## II. ANALYSIS

For the challenged claims, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). We begin with a claim construction analysis, and then follow with specific analysis of the prior art.

### A. Claim Construction

The '917 patent is expired. We review the expired patent claims according to the standard applied by the district courts. *See In re Rambus*, 694 F.3d 42, 46 (Fed. Cir. 2012). Specifically, we apply the principles set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

After considering the various claim constructions presented by both Petitioner and Patent Owner, no particular term requires an express construction in order to conduct properly our analysis of the prior art. None of the claim constructions offered by Petitioner and Patent Owner, which are material to our decision, are in dispute. For example, although Petitioner initially proposed construing “a load on the engine” as “any condition or parameter placing a demand on the engine that is affecting the amount of work done by the engine” (Pet. 6), both Petitioner and Patent Owner agree,

and we agree, that engine fuel consumption rate is an example of “a load on the engine” (Tr. 4:7–9, 6:9–21, 25:19–21). Only those terms which are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

*B. Obviousness over Aoyanagi, Steiner, and Oishi*

We have reviewed the Petition, the Patent Owner Response, and Petitioner’s Reply, as well as the relevant evidence discussed in those papers. We are persuaded, by a preponderance of the evidence, that claims 4, 9–17, 21, and 26–34 would have been obvious over Aoyanagi, Steiner, and Oishi under 35 U.S.C. § 103.

*1. Claim 4*

As noted above, claim 4 depends from claim 1, which was determined unpatentable in IPR2013-00483. IPR2013-00483, Paper 37. Claim 4 is directed to a method including detecting a vehicle collision, transmitting a distress signal after the collision, and monitoring and capturing certain production-related parameters before the collision and vital sign parameters after the collision (recited in claim 1), with the “the production-related parameters includ[ing] a load on the engine” (recited in claim 4). Petitioner contends that Aoyanagi teaches the majority of limitations recited in claim 1, and additionally cites Oishi as teaching “automatically sending a wireless distress signal from the vehicle in response to detecting the collision” recited in claim 1. Pet. 11–12. Petitioner additionally cites Steiner as teaching “the production-related parameters include a load on the engine” recited in claim 4. *Id.* at 12.

We have reviewed and are persuaded by Petitioner’s contentions regarding the limitations recited in claim 1 being taught by Aoyanagi and Oishi, and that one skilled in the art would have combined these teachings. For example, with respect to these limitations, Aoyanagi describes “a recording apparatus for vehicle running conditions . . . that records running data at the time when the vehicle has received shocks due to an accident or the like” (Ex. 1103, 70:2:3–8), and explains that “[t]he recording apparatus uses sensors to record data of the running conditions of the vehicle from these sensors, and the recorded data are used to judge the circumstances of the accident” (*id.* at 71:1:6–9). Aoyanagi describes the recorded data as including vehicle speed (*id.* at 71:1:65–2:2), accelerator pedal position (*id.* at 71:2:18–27), and brake pedal position (*id.* at 71:2:28–35), which Petitioner contends correspond to the production-related parameters recited in claim 1 including “a ground speed of the vehicle, a position of a throttle for an engine of the vehicle and a degree of braking of the vehicle,” respectively (Pet. 11). Aoyanagi additionally describes the recorded data including vehicle acceleration and deceleration from an acceleration sensor (Ex. 1103, 71:2:3–6, 71:2:65–72:1:2), which Petitioner contends correspond to the “vital sign parameters of the vehicle, including information indicative of a change in the velocity of the vehicle” recited in claim 1 (Pet. 11).

Patent Owner responds that one skilled in the art would not have selected all of the parameters listed in Aoyanagi, including the specific parameters recited in claim 1. PO Resp. 13–35. Patent Owner argues that, instead, one skilled in the art would seek to modify Aoyanagi to reduce memory requirements. *Id.* at 23–26. We are not persuaded by these arguments. Patent Owner’s allegations of “teaching away” and



“impermissible hindsight” regarding the parameters listed in claim 1 are also unpersuasive. *See id.* at 26–35. Aoyanagi specifically lists the combination of the parameters recited in claim 1 relied on by Petitioner, as discussed above. To the extent that Patent Owner alleges that Petitioner is required to provide an express rationale for selecting the exact subset of the parameters listed in independent claim 1, Patent Owner’s allegation is unpersuasive, as independent claim 1 uses the open-ended transitional terminology “comprising.” No selection is needed to read the claim language onto Aoyanagi’s list.

We also see no reason why memory constraints would have prevented one with ordinary skill in the art from monitoring the entire list of parameters taught by Aoyanagi. Memory constraints appear to be nothing more than a cost consideration, and Patent Owner’s expert, Mr. Nranian, testified that one skilled in the art would have understood the trade-off between storing more data with additional memory and the cost of the memory. Ex. 1118, 147:17–148:13. Obviousness, as a determination of unpatentability, is not a question of commercial viability as a practical business determination. *See Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1013 (Fed. Cir. 1983) (“[T]he fact that the two [prior art disclosures] would not be combined by businessmen for economic reasons is not the same as saying that it could not be done because skilled persons in the art felt that there was some technological incompatibility that prevented their combination. Only the latter fact is telling on the issue of nonobviousness.”). Accordingly, Aoyanagi’s disclosure of the list of parameters to monitor, including those expressly recited in independent claim 1, satisfies the associated claim limitations.

As for the “detecting a collision of the vehicle in response to a sudden change in the velocity of the vehicle” recited in claim 1, Petitioner cites Aoyanagi’s discussion of “when a shock occurs and then the vehicle speed becomes zero in a short time, it is judged that a crash accident has occurred” (Ex. 1103, 72:2:21–23). Pet. 11–12. Patent Owner responds that “Aoyanagi does not store data as a result of merely detecting a collision, in the manner specified by the claims” and, instead, “discloses a two-step process for judging if a crash has occurred: ‘when a shock occurs and then the vehicle speed becomes zero in a short time, it is judged that a crash accident has occurred.’” PO Resp. 53 (quoting Ex. 1103, 72:2).<sup>7</sup> Patent Owner does not explain persuasively, however, why the “shock” and “the vehicle speed becom[ing] zero in a short time” do not indicate a “sudden change in velocity,” as recited in the claim.

Aoyanagi describes “shocks” as being due to “an accident or the like” (Ex. 1103, 70:2:7–8) and, as noted above, provides the example that “when a shock occurs and then the vehicle speed becomes zero in a short time, it is judged that a crash accident has occurred” (*id.* at 72:2:21–23). Based on this description in Aoyanagi, we are persuaded that one skilled in the art would have appreciated that the “shock” and “the vehicle speed becom[ing] zero in a short time” described in Aoyanagi indicate a “sudden change in velocity.” We also are persuaded, therefore, that Aoyanagi’s discussion of “judging that a crash accident has occurred” based on these parameters teaches “detecting a collision in response to a sudden change in velocity,” as recited by claim 1. To the extent Patent Owner’s argument additionally requires

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<sup>7</sup> Patent Owner appears to mistakenly cite Exhibit 1101, rather than Exhibit 1103.

detecting a collision each and every time there is a sudden change in velocity of the vehicle, this argument finds no support in the claim. The claim simply requires “detecting a collision of the vehicle in response to a sudden change in the velocity of the vehicle,” not that a collision must be detected each and every time there is a sudden change in velocity. The specification of the ’917 patent also fails to specify such a requirement.

Patent Owner’s argument that because Aoyanagi does not define specifically the term “shock” or the magnitude of the time or velocity for the “vehicle speed becom[ing] zero in a short time,” it does not teach the claimed “sudden change in velocity” (PO Resp. 53) is also unpersuasive. Patent Owner fails to identify, and we do not see, anything in the claim requiring a specific magnitude for the claimed “sudden change in velocity.” The specification of the ’917 patent also fails to require a specific magnitude for the “sudden change in velocity.” For example, the discussion at column 25 of the ’917 patent simply explains that “[i]n the illustrated embodiment, the system recognizes a crash when the value of the data sampled from the accelerometer 73L exceeds a pre-programmed critical value 116.” Ex. 1101, 25:7–10.

With respect to the “automatically sending a wireless distress signal from the vehicle in response to detecting the collision” limitation from claim 1, Petitioner cites Oishi as teaching this limitation. Pet. 12. We have reviewed, and are persuaded by, Petitioner’s contentions regarding the teachings of Oishi. Petitioner contends that Oishi and Aoyanagi both are directed to an apparatus installed on a vehicle to address collisions (*id.* at 8–10), and reasons that one skilled in the art would have combined the teachings of Oishi with Aoyanagi to “facilitat[e] the handling of an accident

and the treatment of injured persons” (*id.* at 10 (citing Ex. 1105, 633:2:20–27)) and to “inform[] other vehicles of an accident and reduc[e] traffic jams” (*id.* (citing Ex. 1105, 633:2:27–29)).

Patent Owner does not dispute Petitioner’s contentions regarding the teachings of Oishi, which we find persuasive as noted above, but challenges Petitioner’s rationale for combining Oishi’s teachings with Aoyanagi. PO Resp. 41–46. Patent Owner argues that: (1) the references have different functions (*id.* at 42); (2) Petitioner has not identified anything in the record explaining why one skilled in the art would have used Aoyanagi’s disclosure to enhance the benefits of sending an automatic distress signal, or why one skilled in the art would have used an automatic distress signal feature to enhance Aoyanagi’s data storage functionality (*id.* at 43); and (3) the fact that both Aoyanagi and Oishi “detect[] variously defined accident scenarios” does not support Petitioner’s contention that one skilled in the art would have combined the references (*id.* at 43–46).

Oishi describes “an apparatus which can automatically notify an automobile accident after obtaining the impact force of the accident.” Ex. 1105, 634:1:3–5. As Petitioner contends (Pet. 8–10), and Patent Owner acknowledges (PO Resp. 43), both Aoyanagi and Oishi are directed to accident detection, with Oishi providing the additional benefit of automatic accident notification. We are persuaded that one skilled in the art would have combined the automatic distress signal from the accident detection system of Oishi with Aoyanagi’s accident detection system based on the benefits cited by Petitioner, discussed above, regardless of whether the systems of Aoyanagi and Oishi generally perform different functions.

Turning to the “load on the engine” limitation recited in claim 4, Petitioner cites Steiner as teaching monitoring and capturing a load on the engine by monitoring and recording fuel consumption. Pet. 12. Petitioner contends that Steiner and Aoyanagi both are directed to monitoring and capturing vehicle parameters relative to vehicle collisions (*id.* at 9–10), and reasons that one skilled in the art would have combined the teachings of Steiner with Aoyanagi to include a fuel sensor in Aoyanagi’s system to measure and capture engine fuel consumption rate for “(A) providing additional data for post-collision analysis; (B) providing valuable data related to average fuel consumption, which is particularly important to a commercial vehicle to facilitate fuel cost savings (Ex. 1110, 9:41–45); and (C) applying a known technique to improve a similar device in the same way.” Pet. 10.

As indicated above, fuel consumption rate indicates a load on an engine. Pet. 6–7; PO Resp. 52; Tr. 6:9–21; 25:19–21. Patent Owner, however, disagrees that Steiner teaches monitoring and capturing a fuel consumption *rate*. PO Resp. 52. Patent Owner argues, instead, that “Steiner monitors only change in fuel levels without regard to the passage of time.” *Id.* Patent Owner contends that one skilled in the art would understand that Steiner’s electronic pulses represent a predetermined change in fuel consumption value, independent of time. *Id.* (citing Ex. 1110, 7:22–25; Ex. 2060 ¶¶ 95, 125). Patent Owner further argues that “even if Steiner’s disclosure of recording fuel consumption data amounts to engine load data (and it does not), Steiner does not teach or suggest capturing such data in response to detecting a collision.” *Id.* at 51.

Steiner explains that “[s]ensor inputs 630, are polled by microprocessor 504, at a rate high enough to detect any data from the sensors.” Ex. 1110, 7:23–25. Steiner’s Figure 6 indicates that sensor inputs 630 include distance 640, revolutions per minute (RPM) 641, and fuel 642. Steiner describes the pulses received from sensor inputs 630 using the example of distance sensor 640, explaining that “[a]t successive fixed time intervals, the count of pulses received from distance sensor 640, during each fixed time interval, is stored in memory buffer within data memory 506.” Ex. 1110, 7:29–32. We agree with Petitioner that this discussion using the example of distance sensor 640 is intended to apply to fuel sensor input 642 as well and, therefore, teaches monitoring and capturing fuel consumption rate (i.e., engine load) by counting pulses from fuel sensor input 642 at fixed time intervals. *See* Pet. Reply 7; Tr. 49:7–14. As for Patent Owner’s argument that Steiner does not teach or suggest capturing fuel consumption data *in response to* detecting a collision, we note that this argument is not commensurate with the scope of the claim. Claim 4 recites that the “load on the engine” is a production-related parameter, and claim 1 recites “capturing the production-related parameters of the vehicle *before* detection of the collision” (i.e., not *in response to* detecting a collision).

With respect to Petitioner’s rationale to combine the teachings of Steiner and Aoyanagi, Patent Owner alleges, generally, that one skilled in the art would not have included monitoring and capturing fuel consumption rate (engine load) in Aoyanagi because of memory concerns. PO Resp. 16–17. Patent Owner alleges that these memory concerns present a burden which is outweighed by the benefit of monitoring and capturing engine load. *Id.* at 16. We are not persuaded by Patent Owner’s argument. Even if some

memory limitation did exist in Aoyanagi that would not allow both the parameters taught by Aoyanagi and the additional fuel consumption rate taught by Steiner to be monitored, the evidence of record does not support a finding that one of ordinary skill in the art would not have been able to employ larger amounts of memory to store more data.

As indicated above, additional memory does not appear to be anything more than a cost consideration, and Patent Owner's expert, Mr. Nranian, testified that one skilled in the art would have understood the trade-off between storing more data with additional memory and the cost of the memory. Ex. 1118, 147:17–148:13. We are not persuaded that one skilled in the art would not have considered including engine load data in Aoyanagi's system because of the cost of the alleged additional memory requirement. *See Orthopedic Equip. Co.*, 702 F.2d at 1013. We are persuaded that one skilled in the art would have combined Steiner's teachings with Aoyanagi's system for the reasons set forth by Petitioner, noted above, which Patent Owner does not challenge specifically.

## 2. *Claim 9*

Claim 9 is directed to an apparatus for recording operation of a vehicle and includes sensors for monitoring production-related and vital sign parameters, and a transmitter for automatically transmitting a distress signal in response to detection of the collision of the vehicle, similar to the parameters and automatic distress signal recited in claim 1. Petitioner's contentions, and Patent Owner's response, relative to these limitations are similar to those discussed above relative to the challenge to claim 4 (which includes the limitations of claim 1). *See* Pet. 12–16; PO Resp. 15–35, 41–

46. We are persuaded by Petitioner's contentions regarding these limitations for the reasons set forth above regarding the challenge to claim 4.

Claim 9 additionally recites "a first memory for capturing information from one or more of the sensors for monitoring production-related parameters," "a second memory for receiving the information from the first memory," and "a processor . . . for transferring into the second memory the information captured by the first memory in response to detection of the collision of the vehicle." Petitioner cites the combination of Aoyanagi and Steiner as teaching these additional limitations of claim 9. We have reviewed, and are persuaded by, Petitioner's contentions. For example, Petitioner cites Steiner's discussion of a dual memory system including a circular buffer in data memory 506 and a separate area in data memory 506 for retaining the contents of the circular buffer when a collision occurs as teaching the recited first memory and second memory, respectively. Pet. 13–14. Petitioner contends that one skilled in the art would have modified Aoyanagi's system to include Steiner's dual memory because:

(A) a circular buffer (first memory) reduces the amount of memory required to record data by permitting data to be overwritten, and the second memory permits data from the circular buffer to be preserved for "subsequent analysis" when there is a collision (Ex. 1110, 2:7–13; 8:1–47); and (B) recording the data to separate memory allows for continued recording, without losing the information in the circular buffer (*id.* at 5:29–34).

Pet. 13.

Patent Owner does not dispute Petitioner's contentions regarding the specific teachings of Aoyanagi and Steiner relative to the first and second memory and processor recited in claim 9, but argues that one skilled in the



art would not have combined their teachings as proposed by Petitioner. *See* PO Resp. 35–40. Specifically, Patent Owner argues that although “the skilled artisan would have found it desirable to reduce Aoyanagi’s memory requirements” and “Steiner discloses the concept of a second memory, Steiner does not disclose that ‘one purpose of using two memories is to reduce the total amount of memory required.’” *Id.* at 37. Regardless of whether Steiner teaches reducing memory requirements, we are persuaded that one skilled in the art would have found it obvious to modify Aoyanagi to include a dual memory system as taught by Steiner in order to have “data from the circular buffer [] be preserved for ‘subsequent analysis’ when there is a collision” and “allow[] for continued recording, without losing the information in the circular buffer,” as Petitioner contends. Pet. 13. We are not persuaded by Patent Owner’s response that one skilled in the art would not have made the proposed modification to Aoyanagi’s system to include a second memory because of the alleged burden imposed by adding the second memory. *See* PO Resp. 40 n.8. Similar to the discussion above regarding the addition of engine load to Aoyanagi’s system, including a second memory in Aoyanagi does not appear to be anything more than a cost consideration for producing a commercial product.

Patent Owner additionally asserts, generally, that a reasonable expectation of success is required when combining references, but has not explained persuasively why the proposed combination lacks a reasonable expectation of success. *See* PO Resp. 35–36. Patent Owner acknowledges that the first embodiment of Steiner including writing to a circular buffer “is fundamentally the same [as] that Aoyanagi uses to preserve data in its storage device.” PO Resp. 39. Given that Steiner’s second embodiment,

relied on by Petitioner in the proposed combination (Pet. 13–14), includes the circular buffer from the first embodiment and simply adds a second memory which is written to by the circular buffer (Ex. 1110, 5:1–35), we are persuaded that one skilled in the art would have had a reasonable expectation of success in modifying Aoyanagi as proposed by Petitioner. *See In re O’Farrell*, 853 F.2d 894, 903–904 (Fed. Cir. 1988) (Absolute predictability that the substitution will be successful is not required, all that is required is a reasonable expectation of success.).

*3. Claims 10–12 and 14–17*

Claims 10–12 and 14–17 depend from claim 9. Claim 10, for example, further recites that “the second memory is a permanent memory,” which Petitioner contends is taught by Steiner. Pet. 16 (citing Ex. 1110, 8:28–30). As for claims 11, 12, and 14–17, Petitioner identifies portions of Aoyanagi teaching the limitations of these claims. Pet. 17–19 (citing Ex. 1103, 71:1:54–71:2:6, 71:2:18–35, 71:2:62–64, 72:1:33–36, 72:1:62–67, 72:2:31–23). Patent Owner does not respond to Petitioner’s contentions regarding these claims specifically. We have reviewed the cited portions of Steiner and Aoyanagi, and are persuaded by Petitioner’s contentions.

*4. Claim 13*

Claim 13 depends from claim 9 and further recites that “the sensors for monitoring production-related parameters includes a sensor for detecting an on/off status of the braking system.” Petitioner contends that Aoyanagi’s hydraulic pressure sensor 28 teaches a sensor for monitoring “a degree of braking by a braking system of the vehicle” (claim 9) and “an on/off status of the braking system” (claim 13). Pet. 14, 17 (citing Ex. 1103, 71:2:28–35). Patent Owner acknowledges that the claims do not require separate sensors

for monitoring “a degree of braking by a braking system of the vehicle” (claim 9) and “an on/off status of the braking system” (claim 13). Tr. 16:5–6.

Patent Owner does not dispute Petitioner’s contention that Aoyanagi’s determination of brake pedal position teaches monitoring a degree of braking as required by claim 9. Patent Owner offers no explanation as to why brake pedal position does not teach the claimed “on/off status.” PO Resp. 14–21; Tr. 56:8–9. Instead, Patent Owner focuses on whether a brake pressure measurement provides brake on/off status (PO Resp. 48) and the presumption of different scope for claims 9 and 13 (i.e., the degree of braking from claim 9 does not include the brake on/off status from claim 13) (*id.* at 49–50), and alleges, generally, that the proposed combination of references fail to disclose both brake on/off status and degree of braking (*Id.* at 50).

Initially, we note that we are persuaded that determining the position of a brake pedal also determines whether the brake is on or off. We are also persuaded, therefore, that Aoyanagi teaches capturing brake on/off status by capturing the brake pedal position. Ex. 1103, 71:2:28–35. With respect to Patent Owner’s argument regarding the presumption of different claim scope for claim 9 (“degree of braking”) and claim 13 (“brake on/off status”), we note that this is only a presumption. *Phillips*, 415 F.3d at 1315 (“the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.”). The claims, however, must be read in view of the specification. *Id.* “[A]ny presumption created by the doctrine of claim differentiation will be overcome by a contrary construction dictated by the written description or

prosecution history.” *Retractable Tech., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1305 (Fed. Cir. 2011) (citations and internal quotation marks omitted).

As noted above, Patent Owner concedes that claim 13 does not require a separate sensor for monitoring brake on/off status, and the specification of the ’917 patent supports this interpretation. For example, the specification of the ’917 patent does not discuss using *both* a sensor for degree of braking and a sensor for brake on/off status in the same system. *See* Ex. 1101, 10:43–62. Rather, the ’917 patent explains that a “simple on/off status sensor” *or* a “sensor [that] senses the degree of braking” can be used, and discusses the example of “the brake sensor 67I . . . which senses the degree of braking” to determine various conditions (e.g., vehicle speed, inclination, etc.) when the brakes are applied (i.e., based on brake on/off status). *Id.* Thus, we are not persuaded that the claims require more than the degree of braking to provide an indication of brake on/off status. We are persuaded, therefore, that the brake sensor discussed in Aoyanagi monitors both “a degree of braking by a braking system of the vehicle” (claim 9) and “an on/off status of the braking system” (claim 13).

#### 5. *Claim 21*

Claim 21 depends from claim 18, which was determined unpatentable in IPR2013-00483. IPR2013-00483, Paper 37. Claim 21 is directed to a method including detecting a vehicle collision, transmitting a distress signal after the collision, and monitoring and capturing certain production-related parameters before the collision and vital sign parameters after the collision (recited in claim 18), with the “the production-related parameters includ[ing] a load on the engine” (recited in claim 21), similar to claim 4 discussed

above. The only difference between claim 21 and claim 4 is that claim 18, from which claim 21 depends, recites “monitoring . . . an on/off status of a braking system of the vehicle,” while claim 1, from which claim 4 depends, recites “monitoring . . . a degree of braking of the vehicle.” Petitioner’s contentions regarding claim 21 are similar to those discussed above regarding claim 4, except for the “monitoring . . . an on/off status of a braking system of the vehicle” limitation. Pet. 19–20. Petitioner’s contentions regarding the “monitoring . . . an on/off status of a braking system of the vehicle” limitation in claim 21 are similar to those discussed above regarding the similar limitation in claim 13. *Id.* at 20. Patent Owner’s response to Petitioner’s contentions regarding claim 21 are the same as those discussed above relative to claims 4 and 13. PO Resp. 13–35, 41–54. We are persuaded by Petitioner’s contentions for the reasons discussed above relative to claims 4 and 13.

6. *Claim 26*

Similar to claim 9, discussed above, claim 26 is directed to an apparatus for recording operation of a vehicle and includes sensors for monitoring production-related and vital sign parameters, a transmitter for automatically transmitting a distress signal in response to detection of the collision of the vehicle, a first and second memory, and a processor. The only difference between claim 9 and claim 26 is that claim 26 includes a sensor “for monitoring . . . an on/off status of a braking system of the vehicle,” while claim 9 includes a sensor “for monitoring . . . a degree of braking of the vehicle.” We additionally note that claim 13, which depends from claim 9 and is discussed above, recites the same “on/off status of a braking system” recited in claim 26. Petitioner’s contentions regarding

claim 26 are the same as those discussed above regarding claims 9 and 13 (Pet. 21–22), and Patent Owner’s response to those contentions is the same as the response to Petitioner’s contentions regarding claims 9 and 13 (PO Resp. 13–50). We are persuaded by Petitioner’s contentions for the reasons discussed above relative to claims 9 and 13.

*7. Claims 27–29 and 31–34*

Claims 27–29, 31, 33, and 34 depend from claim 26, and recite limitations similar to those in claims 10–12, 14, 16, and 17, respectively. Petitioner identifies the same portions of Aoyanagi teaching each of the limitations of these claims as noted above regarding claims 10–12 and 14–17. Pet. 22–24. Claim 32 depends from claim 26, and is similar to claim 15, which depends from claim 9, but recites that the information captured by the production-related sensors includes “the on/off status of the braking system leading up to the detection of the collision,” rather than “the degree of braking leading up to the detection of the collision” recited in claim 15. Patent Owner does not dispute Petitioner’s contentions regarding the specific limitations of these claims. We have reviewed the portions of Steiner and Aoyanagi relied on by Petitioner in the challenges to these claims, and are persuaded by Petitioner’s contentions.

*8. Claim 30*

Claim 30 depends from claim 26, and the limitations recited in claims 26 and 30 are the same as those recited in claims 9 and 13 (claims 9 and 30 recite “degree of braking” and claims 13 and 26 recite “on/off status of a braking system”). Petitioner’s contentions regarding these limitations are the same for claims 26 and 30 as those discussed above for claims 9 and 13 (Pet. 21–23), and Patent Owner’s response is also the same as discussed

above (PO Resp. 13–50, 52–54). We are persuaded by Petitioner’s contentions for the reasons discussed above relative to claims 9 and 13.

9. *Commercial Success*

Patent Owner presents certain evidence of alleged commercial success to be considered along with Petitioner’s evidence of obviousness. PO Resp. 54–60. Patent Owner alleges that “the commercial success of the claimed inventions is demonstrated by Toyota’s own infringement of several claims of the ’917 Patent.” *Id.* at 55. We are not persuaded by Patent Owner’s arguments.

Patent Owner simply cites to the sales price of Toyota’s subscription service as commercial success. *Id.* at 58 (citing Ex. 2050). That does not establish “commercial success” as objective evidence of nonobviousness. Patent Owner does not provide information regarding sales volume or market share information as compared to providers of competing products. Even the number of units sold, without market share information, is only weak evidence, if any, of commercial success. *See In re Applied Materials, Inc.*, 692 F.3d 1289, 1299 (Fed. Cir. 2012).

Furthermore, Patent Owner has not even attempted to show a nexus between any sales and the merits of the claimed invention. Although Patent Owner references several claim limitations, there is no explanation as to how these limitations are related to the alleged commercial success of the claimed invention other than simply alleging that the limitations are present in Toyota’s 12EDR device. *See* PO Resp. 55–58. For example, Patent Owner simply alleges that “vehicles equipped with Toyota’s 12EDR system in combination with Safety Connect systems are *covered by* at least claims 1, 9–11, 13–18, 26–28 and 30–34 of the ‘917 Patent.” *Id.* at 42 (emphasis

added). Patent Owner’s general allegation of “a strong nexus between Toyota’s sales of EDR/ACN-equipped vehicles and the claims of the ’917 Patent” because “absent infringement of at least claims 18, 26, 27 and 31-34 of the ’917 Patent, Toyota would be unable to equip its vehicles with both an EDR compliant with the EDR Regulations and the ACN functionality of its Safety Connect system” (*id.* at 60) is similarly conclusory, and thus also unpersuasive.

Initially, we note that Petitioner disputes Patent Owner’s assertion that Toyota infringes the claims challenged in the ’917 patent. Pet. Reply 11–12. We further note that Patent Owner has not established the alleged infringement. Nevertheless, “[e]vidence of commercial success, or other secondary considerations, is only significant if there is a nexus between the claimed invention and the commercial success.” *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311–12 (Fed. Cir. 2006). To show how commercial success supports nonobviousness, Patent Owner must prove that the sales were a direct result of the unique characteristics of the invention, and not a result of economic and commercial factors unrelated to the quality of the patented subject matter. *Applied Materials*, 692 F.3d at 1299–1300. Patent Owner, however, fails to provide sufficient proof of such a relationship between any alleged sales and the unique characteristics of the invention.

For example, any alleged commercial success could be due to the automatic collision notification feature (Toyota’s “Safety Connect” system), rather than the other limitations recited in the claims. Patent Owner does not dispute that automatic collision notification systems were known in the art. *See* PO Resp. 9–10, 54–60. If the feature that created the commercial



success was known in the prior art, the success is not pertinent to the issue of obviousness. *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 740 (Fed. Cir. 2013).

#### *10. Conclusion*

We have considered the entirety of the evidence, including the evidence of obviousness and the evidence submitted by Patent Owner to show commercial success. For the reasons set forth above, Petitioner has established, based on a preponderance of the evidence, that claims 4, 9–17, 21, and 26–34 would have been obvious over the combination of Aoyanagi, Steiner, and Oishi.

#### *C. Obviousness over Aoyanagi, Steiner, and Vollmer*

We have reviewed the Petition, the Patent Owner Response, and Petitioner's Reply, as well as the relevant evidence discussed in those papers. We are persuaded, by a preponderance of the evidence, that claims 4, 9–17, 21, and 26–34 would have been obvious over Aoyanagi, Steiner, and Vollmer under 35 U.S.C. § 103.

The claims challenged as obvious over the combination of Aoyanagi, Steiner, and Vollmer are the same as those challenged as obvious over the combination of Aoyanagi, Steiner, and Oishi, discussed above. Petitioner's contentions regarding the teachings of Aoyanagi and Steiner are the same as those discussed above with respect to the challenge based on the combination of Aoyanagi, Steiner, and Oishi. Pet. 24–32. Patent Owner's response to these contentions is similar to those discussed above relative to the challenge based on Aoyanagi, Steiner, and Oishi. PO Resp. 13–40, 46–54. We are persuaded by Petitioner's contentions regarding Aoyanagi and Steiner for the reasons discussed above.

Again, Petitioner acknowledges that Aoyanagi does not teach “automatically sending a wireless distress signal,” as required by the claims, but now cites Vollmer for this teaching. Pet. 24–31. Petitioner’s reasoning for the combination of Aoyanagi and Vollmer is similar to that discussed above relative to the combination of Aoyanagi and Oishi. Specifically, Petitioner reasons that one skilled in the art would have combined the teachings of Aoyanagi and Vollmer because “Aoyanagi, Steiner, and Vollmer are directed to the same field of endeavor” (Pet. 24) and adding Vollmer’s automatic distress signal to Aoyanagi’s system would “decreas[e] the time before emergency services are notified relative to a manually-made emergency call,” “avoid[] problems that a person may have in making a call manually,” and “avoid[] a situation where emergency services receive incomplete information from a person manually making a call to report an accident.” *Id.* at 25 (citing Ex. 1107, Abstract, 1:3–2:3, 3:5–13).

Patent Owner does not dispute Petitioner’s contentions regarding the teachings of Vollmer, but challenges Petitioner’s rationale for combining Vollmer’s teachings with Aoyanagi. PO Resp. 41–46. Patent Owner’s response to Petitioner’s rationale for combining Aoyanagi and Vollmer is similar to that provided in response to Petitioner’s rationale for combining Aoyanagi and Oishi, which we do not find persuasive as discussed above.

Vollmer describes “[a]n emergency call system for vehicles [that] sends an automatic emergency call in the event of danger, accident or breakdown.” Ex. 1107, Abstract. We are persuaded that one skilled in the art would have combined the automatic distress signal from the system of Vollmer, which includes accident detection, with Aoyanagi’s accident detection system based on the benefits cited by Petitioner, discussed above.

We have considered Patent Owner’s evidence of commercial success and Petitioner’s evidence of obviousness, and conclude that the evidence of obviousness outweighs the evidence of nonobviousness. As explained above, Patent Owner simply cites to the sales price of Toyota’s subscription service as commercial success (*id.* at 58 (citing Ex. 2050)), which is not sufficient to establish “commercial success,” and has not attempted even to show a nexus between any sales and the merits of the claimed invention. Accordingly, after considering the entirety of the evidence, including the evidence of obviousness and the evidence submitted by Patent Owner to show commercial success, we determine that Petitioner has established, based on a preponderance of the evidence, that claims 4, 9–17, 21, and 26–34 would have been obvious over Aoyanagi, Steiner, and Vollmer.

*D. Obviousness over Aoyanagi and Hagenbuch ’835*

We have reviewed the Petition, the Patent Owner Response, and Petitioner’s Reply, as well as the relevant evidence discussed in those papers. We are persuaded, by a preponderance of the evidence, that claim 35 would have been obvious over Aoyanagi and Hagenbuch ’835 under 35 U.S.C. § 103.

Claim 35 is directed to a method for recording operation of a vehicle and recites “monitoring positions of a throttle for an engine for the vehicle and a load carried by the vehicle,” “detecting a collision of the vehicle,” and “recording one or more positions of the throttle and a condition of the load preceding the detection of the collision.” Petitioner identifies portions of Aoyanagi teaching the limitations of claim 35 directed to monitoring throttle position, detecting a collision, and recording the throttle position prior to detecting the collision, similar to the portions of Aoyanagi discussed above

relative to similar features in claims 1, 9, 18, and 26. Pet. 55–56 (citing 1103, 71:2:18–27, 72:1:62–67). Petitioner identifies portions of Hagenbuch ’835 teaching the limitations of claim 35 directed to vehicle load. *Id.* (citing Ex. 1108, 23:55–59, 24:31–37). Petitioner reasons that it would have been obvious to include the vehicle load parameter from Hagenbuch ’835 in Aoyanagi’s system in order to “provid[e] additional, critical data for post-collision analysis,” “ensur[e] the distance needed to stop the vehicle remains within a certain safety range,” “prevent[] the vehicle/engine from being overloaded,” and because including the load parameter is simply “applying known techniques to improve a similar device in the same way.” *Id.* at 54.

Patent Owner addresses claim 35 with all challenged claims (*See* PO Resp. 15–35), generally, and with respect to claim 35 specifically, only alleges that “Aoyanagi [does not] ascribe any particular importance to monitoring and/or capturing the combination[] of . . . throttle position, carried load and collision, as required by claim 35” (PO Resp. 29). This argument is not persuasive. Petitioner relies on Aoyanagi for monitoring throttle position, detecting a collision, and recording the throttle position prior to detecting the collision in claim 35. As noted above, Petitioner provides a persuasive explanation for modifying Aoyanagi to include vehicle load based on Hagenbuch ’835, which Patent Owner does not address specifically. Patent Owner does not allege commercial success to rebut Petitioner’s obviousness challenges to claim 35.

We have reviewed the cited portions of Aoyanagi and Hagenbuch ’835, and are persuaded by Petitioner’s contentions and the rationale for the proposed combination. Accordingly, after considering the entirety of the evidence, we determine that Petitioner has established, based on a

preponderance of the evidence, that claim 35 would have been obvious over Aoyanagi and Hagenbuch '835.

*E. Obviousness over Aoyanagi, Hagenbuch '835, and Steiner*

We have reviewed the Petition, the Patent Owner Response, and Petitioner's Reply, as well as the relevant evidence discussed in those papers. We are persuaded, by a preponderance of the evidence, that claims 36–38 would have been obvious over Aoyanagi, Hagenbuch '835, and Steiner under 35 U.S.C. § 103.

Claims 36–38 depend from claim 35. Claim 36 recites “monitoring a status of a braking system of the vehicle and recording the status in response to detection of the collision.” Claim 37 recites “monitoring a status of a seat belt and recording the status in response to detection of the collision.” Claim 38 recites “monitoring a ground speed of the vehicle and recording the ground speed in response to detection of the collision.” Petitioner identifies portions of Aoyanagi as teaching monitoring brake status, seat belt status, and ground speed, similar to the portions of Aoyanagi relied on in the challenges to claims 4, 9, 13, 17, 18, 26, 30, and 34 which include similar limitations. Pet. 57–58. Petitioner cites Steiner as teaching the recording recited in each of the claims and reasons that “it would have been obvious to a person of ordinary skill in the art . . . to further modify Aoyanagi to record the status of monitored parameters in response to a collision” because “recording the data retains the data for subsequent analysis,” and “recording the data in response to a collision results [in] retaining the most recent/relevant data.” *Id.* at 56–58.

Patent Owner does not address Petitioner's contentions regarding claims 36–38 specifically and, instead, only address these claims generally

with all challenged claims, alleging that there is no evidence that one skilled in the art would select the parameters recited by the claims, which we do not find persuasive as explained above. *See* PO Resp. 15–35. Patent Owner does not allege commercial success to rebut Petitioner’s obviousness challenges to claims 36–38.

Accordingly, after considering the entirety of the evidence, we determine that Petitioner has established, based on a preponderance of the evidence, that claims 36–38 would have been obvious over Aoyanagi, Hagenbuch ’835, and Steiner.

*F. Patent Owner’s Objection to Petitioner’s Reply Brief Materials*

Patent Owner objects to certain arguments and evidence included in Petitioner’s Reply directed to the issue of whether Aoyanagi teaches a “load on the engine” recited in claims 4 and 21. Paper 33. This objection is moot, and thus need not be reached, as it is not material to our decision. As indicated above, our decision relies on Petitioner’s contentions regarding Steiner as teaching the “load on the engine” feature recited in claims 4 and 21, not the contentions regarding the alleged teachings of Aoyanagi.

### III. SUMMARY

Petitioner has demonstrated, by a preponderance of the evidence, that claims 4, 9–17, 21, and 26–34 are unpatentable as obvious over the combination of Aoyanagi, Steiner, and Oishi, that claims 4, 9–17, 21, and 26–34 are unpatentable as obvious over the combination of Aoyanagi, Steiner, and Vollmer, that claim 35 is unpatentable as obvious over the combination of Aoyanagi and Hagenbuch ’835, and that claims 36–38 are

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unpatentable as obvious over the combination of Aoyanagi, Hagenbuch '835, and Steiner. This is a final written decision under 35 U.S.C. § 318(a).

#### IV. ORDER

For the reasons given, it is

ORDERED that claims 4, 9–17, 21, and 26–38 of the '917 patent are *unpatentable*.

FURTHER ORDERED that parties to the proceeding seeking judicial review of this final written decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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