

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS INC.,
Petitioner,

v.

COLLISION AVOIDANCE TECHNOLOGIES INC.,
Patent Owner.

Case IPR2017-01355
Patent 6,268,803 B1

Before BARRY L. GROSSMAN, MATTHEW R. CLEMENTS, and
MICHELLE N. WORMMEESTER, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Unified Patents Inc. (“Petitioner”) filed a Petition (Paper 3, “Pet.”) requesting an *inter partes* review of claims 21, 22, and 24–28 of U.S. Patent No. 6,268,803 B1 (Ex. 1001, “the ’803 patent”). Collision Avoidance Technologies Inc. (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 8 (“Prelim. Resp.”).

On November 14, 2017, we concluded that Petitioner satisfied the burden, under 35 U.S.C. § 314(a), to show that there was a reasonable likelihood that Petitioner would prevail with respect to claims 21, 22, 24, 25, and 28. Paper 8 (“Dec. Inst.”). We did not institute a trial on 26 and 27. *Id.*

On April 24, 2018, the Supreme Court held that a final written decision under 35 U.S.C. § 318(a) must decide the patentability of all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018). We issued an Order amending our Decision on Institution to include review of claims 26 and 27. Paper 18.

Thereafter, the parties filed a joint motion (Paper 21, “Joint Motion”) to limit the Petition in this proceeding to claims 21, 22, 24, 25, and 28 of U.S. Patent 6,268,803 (“the ’803 patent”). The parties requested that the Board withdraw claims 26 and 27 of the ’803 patent from this proceeding. *Id.* at 1. We granted the Joint Motion. Paper 22. Thus, the only claims remaining for consideration in this proceeding are claims 21, 22, 24, 25, and 28.

Patent Owner filed a Response to the Petition (Paper 17, “PO Resp.”); Petitioner filed a Reply (Paper 23, “Reply”).

Petitioner submitted fifteen exhibits (Exs. 1001–1015). Petitioner relies, in part, on the Declaration testimony of Myles H. Kitchen. (Exs. 1006; 1014).

Patent Owner submitted four exhibits (Exs. 2001–2004). Patent Owner relies, in part, on the Declaration testimony of Mr. Greg C. Pfeiffer (Ex. 2003).

A hearing was held August 7, 2018. Paper 34 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. We enter this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

Petitioner has the burden of proving unpatentability of a claim by a preponderance of the evidence. 35 U.S.C. § 316(e).

Based on the findings and conclusions below, we determine that Petitioner has proven by a preponderance of the evidence that claims 21, 22, 24, 25, and 28 would have been obvious and, thus, are unpatentable.

B. Related Matters

The parties identify two related federal district court cases involving the ’803 patent: *Collision Avoidance Technologies Inc. v. Ford Motor Company*, Case No. 6:17-cv-00051 (E.D. Tex. filed January 26, 2017) and *Collision Avoidance Technologies Inc. v. Toyota Motor Sales, USA, Inc.*, Case No. 6:16-cv-00971 (E.D. Tex. filed June 30, 2016). Pet. 1; Paper 5, 3.

The ’803 patent also is the subject of four additional *inter partes* review petitions. These are: IPR2017-01336 filed by RPX Corporation, challenging claims 1–8, 21, 22, 24, 25, and 28; IPR2017-01337 filed by RPX Corporation, challenging claims 9, 10, 17–22, 24; IPR2017-01709 filed by Denso Corporation, challenging claims 1–9, 17–22, and 24–28; and

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IPR2017-01715 filed by Denso Corporation, challenging claims 1–6, 10, 18–22, 24 and 26–28.

The challenged claims and applied references in the five petitions challenging the '803 patent are summarized in the chart below.

Case	Petitioner	Challenged Claims	References¹
IPR2017-01336	RPX Corporation	1–8, 21, 22, 24, 25, 28	Naruse Gauthier Tagami Cherry Hayashikura Ramer
IPR2017-01337	RPX Corporation	9, 10, 17–22, 24	Naruse Ramer Lemelson Cherry Gauthier Hayashikura
IPR2017-01355	Unified Patents Inc.	21, 22, 24–28	Hayashikura Cherry JP '265 (Nakajima)
IPR2017-01709	Denso Corporation	1–9, 17–22, and 24–28	Kikuta Nakajima Yamamoto
IPR2017-01715	Denso Corporation	1–6, 10, 18–22, 24 and 26–28	Ichinose Hayashikura Yamamoto

¹ We use the shorthand identification used in each Petition to identify the references asserted. Not all references are asserted against all claims in each case. As necessary, in other sections of this Decision, we provide complete citations of the specific references asserted against each claim.

As shown in the summary chart above, the various challenges are filed by three different petitioners; challenge different claims, with minimum overlap; and rely on different combinations of references, again with minimum overlap. Patent Owner did *not* request that we exercise our discretion under 35 U.S.C. § 314(a) and deny institution under this section of the statute. See *General Plastic Industries Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017) (Section II.B.4.i designated as precedential), slip op. at 15–19 (discussing factors used to evaluate the equities of permitting follow-on petitions)). Moreover, there is no evidence to which we have been directed that any of the three petitioners identified in the chart above are related in any way, or are a defendant in the two lawsuits involving the ’803 patent identified above.

C. The Asserted Grounds

Petitioner challenged the patentability of claims 21, 22, and 24–28 on the following four grounds, each of which is based on 35 U.S.C. § 103² (see Pet. 3):

Claim(s) Challenged	Reference(s)
21, 22, 26–28	Hayashikura ³
24	Hayashikura and Cherry ⁴

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2012. Because the application for the patent at issue in this proceeding has an effective filing date before that date, we refer to the pre-AIA versions of the statute.

³ U.S. Patent No. 5,654,715, issued August 5, 1997 (Ex. 1002, “Hayashikura”).

⁴ U.S. Pat. No. 5,235,315, issued August 10, 1993 (Ex. 1005, “Cherry”).

Claim(s) Challenged	Reference(s)
21, 22, 25–27	JP '265 ⁵
24	JP '265 and Cherry

As stated above, claims 26 and 27 were eliminated from this proceeding upon the Joint Motion of the parties. *See* Paper 22. Thus, the only claims remaining for consideration in this proceeding are claims 21, 22, 24, 25, and 28.

II. ANALYSIS

A. *The '803 Patent*

The '803 patent discloses a system and method to help drivers of vehicles avoid collisions. The disclosed system and method is a multi-sensor collision avoidance system which combines data from two or more sensors to provide range, range rate, or location information of objects in proximity to a vehicle. *Ex.* 1001, 1:8–10. To put the disclosed system in a specific context, some embodiments of the disclosed invention are in the context of a tractor-trailer truck. *E.g., id.* at 4:51–63 (tractor-trailer avoiding a post behind the truck; *id.* at 6:29–42 (tractor-trailer backing up to a loading dock).

The basic elements of the disclosed system are shown in Figure 1 from the '803 patent, which is reproduced below.

⁵ Japanese Patent Publication JPH07-092265, published April 7, 1995 (*Ex.* 1003, “JP '265” or “Nakajima”) (*English Translation at Ex.* 1004).

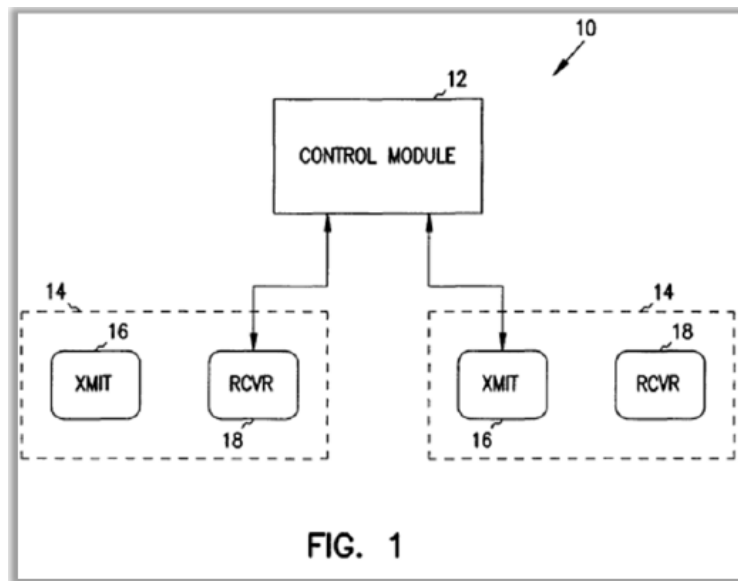


Figure 1 from the '803 patent is a schematic illustration of a control module and two sensors, with each sensor including a transmitter and a receiver.

As shown in Figure 1, collision avoidance system 10 includes control module 12 and at least two sensors 14. Ex. 1001, 3:36–42. Each sensor includes transmitter 16 and receiver 18. *Id.* The sensors may be, for example, acoustic transducers (*id.* at 3:43–44), micropower impulse radar devices (*id.* at 3:54–55), or microwave transceiver devices (*id.* at 3:62–63). A plurality of sensors may be mounted around the periphery of a vehicle. *Id.* at 4:5–7, Fig. 2.

Figure 3 from the '803 patent, reproduced below, shows a system block diagram of a more complete collision avoidance systems, including a plurality of peripheral sensors.

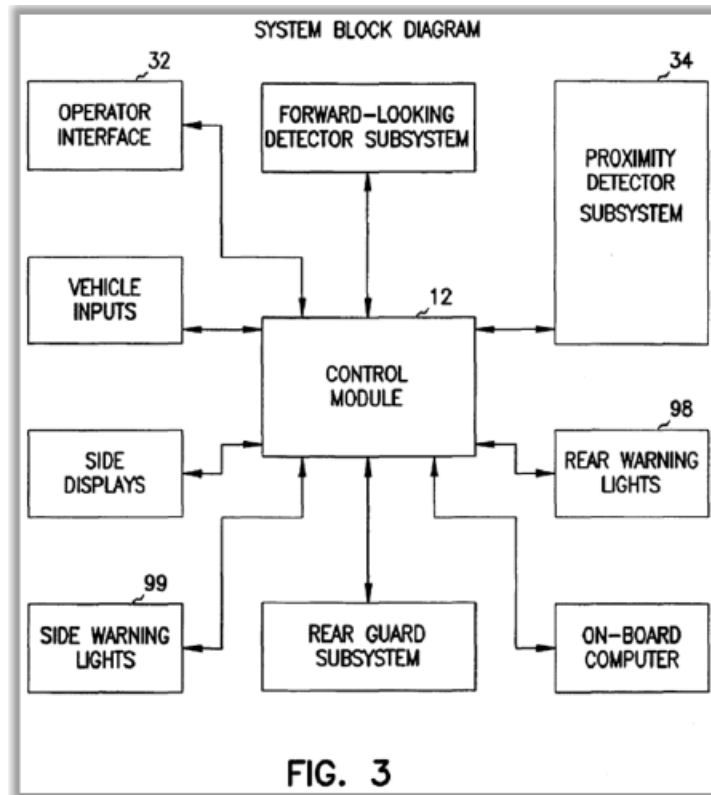


Figure 3 from the '803 patent is a system block diagram of the disclosed collision avoidance system.

As shown in Figure 3, sensors 14 are grouped in peripheral detection subsystems, such as a forward-looking detector subsystem, a proximity detector subsystem, and a rear-guard subsystem. Ex. 1001, 4:15–19. The output of each sensor in each detection subsystem is fed into control module 12. *Id.* at 4:19–20. The system also includes operator interface 32 and optional subsystems, such as rear warning lights 98 and side warning lights 99. *Id.* at 4:21–25.

Control module 12 takes readings from the sensors, triangulates from the data received, and calculates an actual perpendicular distance from the vehicle to an object, and its transverse location. *Id.* at 4:39–42, 60–63. The distance calculated and the “transverse location” of the object are displayed to the driver. *Id.* at 4:60–63; *see also id.* at 5:59–62 (“in one embodiment,

control module 12 calculates transverse location and communicates that information via a graphical indicator such as bar graph 22 of FIG. 4a”). The Specification states that “the transverse location of the object” is a representation of whether the object is “directly behind the vehicle, off to the side, or far enough to the left or right that the driver will not hit it.” *Id.* at 2:12–15.

According to the Specification, the triangulation procedure provides “a precision distance measuring system.” *Id.* at 4:47–48. In order to triangulate, however, the distance between sensors “must be known.” *Id.* at 5:44–45. In general operation, the transmitter of each sensor transmits a signal to its associated receiver; the receiver receives the signal sent and transmits a return signal. The control module includes measurement circuitry to process the signals and determine the distance and transverse location of a detected object. *Id.* at 2:49–67.⁶

B. Illustrative Claim

The only claims remaining for consideration in this proceeding are claims 21, 22, 24, 25, and 28. See Paper 22. Claim 21 is the only independent claim. Claims 22 and 24, 25, and 28 depend from claim 21. Independent claim 21 is reproduced below.

21. A collision avoidance system, which provides object detection around the exterior of a vehicle, comprising:
a control module;

⁶ We note to ensure full consideration of the entire disclosure of the ’803 patent that the patent includes a fifty-one page Certificate of Correction. Ex. 1001, 48–98. Beginning at column 16, line 64, the Certificate of Correction adds 46 pages of detailed description of the disclosed invention. Numerous other corrections are made to the Specification and drawings.

a plurality of transmitting devices connected to the control module, wherein each of the plurality of transmitting devices transmits a signal;

a plurality of receiving devices connected to the control module, wherein each of the plurality of receiving devices receives a return representative of one of the plurality of transmitted signals and wherein each of the plurality of receiving devices transmits to the control module a return signal representative of the return received by that receiving device; and

wherein the control module measures the return signals, detects an object as a function of the return signals, calculates a distance to and location of the object and displays the distance to and the location of the object.

C. Level of Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“the level of skill in the art is a prism or lens through which a judge, jury, or the Board views the prior art and the claimed invention”).

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology, and (6) educational level of workers active in the field. *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.* Moreover, these factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *Daiichi*

Sankyo Co. Ltd, Inc. v. Apotex, Inc., 501 F.3d 1254, 1256 (Fed. Cir. 2007). In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355. Additionally, the Supreme Court informs us that “[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR*, 550 U.S. at 421.

Neither party presents a detailed evidentiary showing of factors typically considered in determining the level of ordinary skill.

Petitioner provides a one-sentence conclusory statement that a person of ordinary skill in the art at the time of the alleged invention would have had a B.S. degree in Electrical Engineering or an equivalent field, as well as at least 2–3 years of academic or industry experience in automotive electronics, including control systems and sensors. Pet. 9 (citing Ex. 1006 ¶ 33). Mr. Kitchen merely repeats as his opinion the one-sentence conclusory level of skill asserted by Petitioner, with no further analysis of the information or factors that informed his opinion. This testimony has minimal probative weight. See 37 C.F.R. 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

In its Response, Patent Owner refers to the level of ordinary skill (see e.g. PO Resp. 21, arguing that “Hayashikura . . . provides no teaching that would lead one of ordinary skill in the relevant art to leap to the type of solution recited in claim 22”) but does not assert any specific level of ordinary skill. We note that Patent Owner proposed a level of ordinary skill in its Preliminary Response that was similar to the level of skill proposed by Petitioner. See Prelim. Resp. 10. We also note that Mr. Pfeiffer provides an

opinion on the level of ordinary skill in the art. *See* Ex. 2002 ¶ 11. Patent Owner does not cite to Mr. Pfeiffer’s testimony on this issue. Thus, we do not consider Mr. Pfeiffer’s testimony on the level of ordinary skill. *See e.g., Fidelity National Information Services, Inc. v. DataTreasury Corp.*, IPR2014-00489, Paper 9, slip op. at 9–10 (PTAB Aug. 13, 2014) (“We, therefore, decline to consider information presented in a supporting declaration, but not discussed sufficiently in a petition; among other reasons, doing so would permit the use of declarations to circumvent the page limits that apply to petitions.”).

Based on the record and evidence before us, including the prior art references and Mr. Kitchen’s testimony, we determine that a person of ordinary skill in the relevant technology would have had a bachelor’s or advanced degree in a discipline such as electrical engineering, computer engineering, or related disciplines, and would have had at least two years of practical experience in automotive collision avoidance systems.

D. Claim Construction

The Petition in this proceeding was filed on May 3, 2017. Paper 3. Thus, under the rules applicable to this Petition at the time it was filed, we would have construed the claims by applying the broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b) (2016).

The patent application that matured into the ’803 patent, however, was filed on August 6, 1998. *See* Ex. 1001, 1 (INID Code “(22)”). Accordingly, the ’803 patent expired on August 6, 2018. Prelim. Resp. 16; PO Resp. 5; 35 U.S.C. § 154(a)(2). Thus, in this specific circumstance, we construe the claims in the ’803 patent in accordance with the principles followed in district court. *See In re CSB-Sys. Int’l, Inc.*, 832 F.3d 1335, 1341 (Fed. Cir.

2016), *cert. denied sub nom. CSB-Sys. Int'l, Inc. v. Lee*, 137 S. Ct. 1384, 197 L. Ed. 2d 555 (2017) (“When a patent expires during a reexamination proceeding, the PTO should thereafter apply the *Phillips*⁷ standard for claim construction.”). “[O]nce a patent expires, the PTO should apply *Phillips* standard for claim construction.” *Id.* at 832 F.3d 1342. *See also Facebook, Inc. v. Pragmatus AV, LLC*, 582 Fed.Appx. 864, 868–69 (Fed. Cir. 2014) (non-precedential) (applying *Phillips* standard when patent expired after the Board’s reexamination decision pending appeal to the Federal Circuit).

Petitioner proposes constructions for the following claim terms: “location” (Pet. 12); “distance” (*id.* at 12–13); and “fuses” (*id.* at 13–14).

Patent Owner proposes constructions for the following ten claim terms: “location;” “distance;” “fuses data;” “control module;” “sensor;” “measure;” “detects an object;” “calculates a distance to . . . the object;” “transverse location;” and “calculates a . . . location of the object.” PO Resp. 7–13.

For six of the proposed constructions (“control module;” “sensor;” “measure;” “detects an object;” “calculates a distance to . . . the object;” and “calculates a . . . location of the object.”), Patent Owner incorporates the claim construction from its Preliminary Response. *Id.* at 10–13.

Incorporation by reference is a direct violation of our rules, which prohibit incorporation by reference from other documents. 37 C.F.R. § 42.6(a)(3). *E.g., see Apple, Inc. v. Ameranth, Inc.*, CBM2014-00013, Paper 37, 8 (PTAB March 20, 2015), *aff’d-in-part, rev’d-in-part on other grounds*, 842

⁷ *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

F.3d 1229 (Fed. Cir. 2016) (“Patent Owner attempts to incorporate certain arguments made in its Preliminary Response (Paper 13) into the Patent Owner Response. Our rules prohibit incorporating arguments by reference.”). As explained in *Apple*, “[i]ncorporation by reference circumvents our rule limiting the pages [or words] in the Patent Owner response.” *Id.* “Arguments that are not developed and presented in the Patent Owner Response, itself, are not entitled to consideration.” *Id.*; see also *DeSilva v. DiLeonardi*, 181 F.3d 865, 866-67 (7th Cir. 1999) (stating that incorporation “by reference amounts to a self-help increase in the length of the [] brief[,]” and “is a pointless imposition on the court's time.”).

Accordingly, we do not consider any proposed constructions that fail to comply with our rules.

For the proposed construction of “transverse location,” Patent Owner provides no evidence to support its argued construction. PO Resp. 12 (stating only that “[b]ecause the addition of ‘transverse’ to location suggests the closest location normal to the vehicle, the term ‘transverse location’ should be construed to mean ‘the position of an object relative to the closest portion of the vehicle.’”).

In our Decision to Institute, we held that an explicit construction of claim terms was not necessary for the purposes of determining whether there is a reasonable likelihood that the Petitioner would prevail with respect to at least one of the claims challenged in the Petition. Dec. Inst. 9. Instead, we stated that “claim construction, in general, is an issue to be addressed at trial. Claim construction will be determined at the close of all the evidence and after any hearing.” *Id.* All the evidence and arguments are now in the record. We determine that an explicit construction of only two terms,

“control module” and “fuses data,” is necessary for the purposes of determining whether the challenged claims would have been obvious in view of the cited references. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (we need to construe only those terms “that are in controversy, and only to the extent necessary to resolve the controversy.”).

Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.

Renishaw PLC v. Marposs Societa’ per Azioni, 158 F.3d 1243, 1250 (Fed. Cir. 1998) (citations omitted).

1. Control Module

In our Decision to Institute, we did not construe the term “control module.” Similarly, in the related cases of IPR2017-01336 and IPR2017-01337, we also did not construe this term. In the decisions to institute in each of the related cases of IPR2017-01709 and IPR2017-01715, however, involving different petitioners, different arguments, and different references than the case now before us, we did construe the term “control module” as used in the ’803 patent. In those two decisions to institute, we construed to the term “control module” to mean “circuitry for interfacing with sensors, performing calculations, and displaying information or interfacing with a

display.” See *Denso Corp. v. Collision Avoidance Technologies*, IPR2017-01709, Paper 7, slip op. at 24 (PTAB Jan. 23, 2018).⁸

In the Petition, Petitioner did not propose a construction for the term “control module.” In its Reply, however, Petitioner addresses, and disagrees with, Patent Owner’s proposed construction. Reply 4–8. To put Petitioner’s arguments in their proper context, we first discuss Patent Owner’s proposed construction, then return to Petitioner’s arguments.

Initially, as stated above, we ignore Patent Owner’s efforts to incorporate by reference its proposed construction from its Preliminary Response because it violates our rules prohibiting incorporation by reference. Patent Owner, however, offers some additional comments in its Response, which we consider. In its Response, Patent Owner discusses the Declaration of Mr. Pfeiffer, wherein he discusses the functionality of a control module and opines that “[i]n 1998, a customized PC would have been required to perform all of this functionality.” PO Resp. 10–11 (citing Ex. 2002 ¶¶ 32–39⁹). Mr. Pfeiffer opines that “[i]n 1998, a customized PC would have been required” to perform the claimed functions of a control module. Ex. 2002 ¶ 25.

Petitioner counters that a proper construction of the term “control module” should not be limited to one of many disclosed embodiments, noting that a control module that is a customized PC only in the Figure 16

⁸ This same construction also was adopted in the decision to institute a trial in the related case of IPR2017-01715. See *Denso Corp. v. Collision Avoidance Technologies*, IPR2017-01715, Paper 7, slip op. at 30–31 (PTAB Jan. 23, 2018) (“*Denso*, 1715”).

⁹ The cited paragraphs are incorrect. The correct citation for the material quoted on page 11 of Patent Owner’s Response is Ex. 2002 ¶ 25.

embodiment of the '803 patent. Reply 7 (“At best, this is a description of the specific Figure 16 embodiment, not a definition that applies to all embodiments of the '803 patent’s control module.”). Petitioner also asserts that “[i]f a construction [of the term control module] is deemed necessary, it should explicitly include a microprocessor or microcontroller, based on the ordinary and customary use of the term, as supported by the non-limiting embodiments disclosed in the specification” and the cross-examination testimony of Mr. Pfeiffer. *Id.* at 8 (citing Ex. 1015, 1–7 (stating that a microprocessor or microcontroller was “one example” of a control module on which Mr. Pfeiffer worked before 1998)).

Under the *Phillips* standard, words of a claim are generally given their ordinary and customary meaning. *Phillips*, 415 F.3d at 1312 (“the words of a claim are generally given their ordinary and customary meaning”) (citations and internal quote marks omitted). “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Id.* at 1313. Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification. *Id.*

To provide the ordinary and customary meaning of disputed terms, we look to “the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.” *Phillips*, 415 F.3d at 1314 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004).

a. The Claims

We begin with the words of the claims. The term “control module” appears in independent claim 21.

The “control module” limitation in claim 21 recites that a “control module” is a positive element of the claim (“a control module”). Ex. 1001, 20:1. Claim 21 also recites that transmitting devices and receiving devices are connected to the control module and send signals to the control module. *Id.* at 20:2–10. Additionally, claim 21 recites the specific functions of the control module. As recited in claim 21, the control module performs the following functions: “measures” signals; “detects” an object as a function of the measured signals; “calculates” a distance to, and location of, the object; and “displays” the distance and location information. *Id.* at 20:11–14.

Other claims recite similar structure and functions for the control module (*e.g.*, claim 1), although some claims recite additional functionality for the control module (*e.g.* claim 17, reciting that the control module “includes a built-in-test function”).

The functional statements in claim 21, however, do not control the interpretation of “control module.” A claim expressing certain requirements for a term has a different scope from claims that do not impose those additional requirements. *See Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1377 (Fed. Cir. 2014) (construing “interface board” to require two-way communication capability only in claims that separately imposed such a requirement, not in claims silent on the requirement). Indeed, such an approach makes sense because if the claim separately requires certain functionality, it would not change the claim scope for the term “control

module” to itself impose that functionality. Accordingly, we do not read the functionality of claim 21 into the term “control module.”

Neither party addresses whether the term “control module” is a “nonce word,” that is, simply a generic description for disclosed structure that performs a specified function. If it is a “nonce word,” the term “control module” should be construed under 35 U.S.C. § 112, paragraph 6, as a means-plus-function term. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1351 (Fed. Cir. 2015) (en banc) (determining that the claim term “distributed learning control module” fails to recite sufficiently definite structure; that the presumption against means-plus-function claiming is rebutted; and this limitation is subject to the provisions of 35 U.S.C. § 112, para. 6). “‘Module’ is a well-known nonce word.” *Id.*, 792 F.3d at 1350.

The determination of whether § 112, ¶ 6 applies must be made under the traditional claim construction principles, on an element-by-element basis, and in light of evidence intrinsic and extrinsic to the asserted patent. *Zeroclick, LLC v. Apple Inc.*, 891 F.3d 1003, 1007 (Fed. Cir. 2018) (citing *Personalized Media Commc’ns, LLC v. Int’l Trade Comm’n*, 161 F.3d 696, 702–04 (Fed. Cir. 1998) (stating that “[w]hether certain claim language invokes 35 U.S.C. § 112, ¶ 6 is an exercise in claim construction” and that the presumption that § 112, ¶ 6 does not apply “can be rebutted if the evidence intrinsic to the patent and any relevant extrinsic evidence so warrant”). The mere fact that the disputed limitations incorporate functional language does not automatically convert the words into means for performing such functions. *Zeroclick*, 891 F.3d at 1008.

In *Williamson*, the Court found that

the written description fails to impart any structural significance to the term [distributed learning control module]. At bottom, we *find nothing in the specification or prosecution history* that might lead us to construe that expression as the name of a sufficiently definite structure as to take the overall claim limitation out of the ambit of § 112, para. 6.

Id., 792 F.3d at 1351 (emphasis added). Thus, the Specification and prosecution history may establish that a term that is a well-known nonce word in one patent is *not* a nonce word in another patent. As we discuss below, this is the determination here. Based on the written description, we find that the Specification establishes that the term “control module” is the name of sufficiently definite structure as to take the overall claim limitation out of the ambit of § 112, para. 6.

b. The Specification

The '803 patent describes several different embodiments, demonstrating the breadth of the claimed control module.

The Specification describes the control module as circuitry that interfaces with a variety of sensors, performs calculations, and either displays information or interfaces with a display. Ex. 1001, 4:9–11 (control module interfaces with sensors), 4:20–22 (same), 4:39–40 (same), 4:40–42 (control module calculates), 4:57–60 (same), 5:16–19 (same), 5:29–31 (same), 5:53–54 (same), 4:60–61 (control module includes display), 5:59–6:6 (same), 6:6–10 (control module communicates with interface unit for display).

In one embodiment, control module 12 is highly programmable and dealers and fleet owners are given an ability to program key parameters that the system can use to more adequately address the needs of that application and the customer. *Id.* at 8:20–31. In another embodiment, if there is no on-

board computer, data storage is provided in control module 12 so that it can store the data internally. *Id.* at 8:64–66. The Specification also discloses that “[p]rocessor speed, memory, and interface drivers will determine the CM [control module] configuration *based on a nominal set of performance requirements and hardware/cost tradeoffs.*” *Id.*, Cert. Corr., 18 (emphasis added). Thus, the Specification suggests to pick the control module structure for the task at hand.

The Specification states:

The CM [control module] is a customized PC. *Processor speed, memory, and interface drivers will determine the CM configuration based on a nominal set of performance requirements and hardware/cost tradeoffs.* A functional diagram of the CM 280 is shown in Figure 28. The CM 280 consists of two primary elements: an Interface Card 282 and the Processor Board 284.

Ex. 1001, Cert. Corr. 18 (emphasis added). This statement appears in a “SYSTEM DESCRIPTION” and is followed by reference to Figure 28: “A functional diagram of the CM 280 is shown in Figure 28.” *Id.*

This passage appears as part of the description of a “Collision Warning System.” *See id.* at Cert. of Correction 4–45. Although that description does not appear to limit itself to a particular embodiment, that it does so is evident in comparison to the preceding portions of the Specification, which describe the invention much more generally. *Compare* Ex. 1001, 3:37–16:64, *with id.* at Cert. of Correction 4–45.

The control module performs various signal/data processing functions, including “data fusion” and operating the display driver. *Id.* at Cert. Corr. 19. In one embodiment of the system, control module 12 takes the readings from rear-mounted sensors 14, determines whether it can triangulate, and

calculates an actual perpendicular distance from a vehicle to a detected object. *Id.* at 4:36–41; *see also, e.g.*, 4:57–60 (“Control System 12 calculates that the actual distance to the post as 5.2 feet and determines it is located just to the right of the center of the trailer.”).

To provide more accurate information, in one embodiment, control module 12 calculates transverse location and communicates that information via a graphical indicator such as bar graph. *Id.* at 5:58–63. In addition, control module 12 tests its internal circuitry to ensure “that the system comes up running.” *Id.* at 9:15–16.

We understand Patent Owner not to assert that every detail of the system description written description, including the Certificate of Correction, is required by every claim. Moreover, Mr. Pfeiffer, Patent Owner’s declarant, testified at his deposition that the term “PC” was “coined by IBM as a marketing ploy” Ex. 1015, 31:1–3. He also testified that “the term PC is far too general to be of any technical use.” *Id.* at 31:4–8.

Patent Owner has provided no persuasive evidence for selectively gleaning the phrase “customized PC” from the numerous disclosed embodiments, at least one of which does *not* use a PC (*see id.*, 8:64–67) or from the extensive disclosure of the “Control Module Functional Description.” *See* Ex. 1001, Cert. Correction 18–45.

Read as a whole, the Specification describes multiple possible embodiments for the control module. Those embodiments encompass “a customized PC” as Patent Owner seeks to have the term construed, but they are not limited to a customized PC. *See, e.g.*, Ex. 1001, 8:20–24 (“In one embodiment, control module 12 is highly programmable and dealers and fleet owners are given an ability to program key parameters that the system

can use to more adequately address the needs of that application and that customer.”), 8:64–66 (“In another embodiment, if there is no on-board computer there, data storage is provided in control module 12 so that it can store the data internally.”), 9:17–19 (“[I]f the micro controller or microprocessor in control module 12 were to fail . . .”). Given the various descriptions of the control module, on the present record, we do not read the Specification as limiting the claimed invention to a customized PC.

As mentioned above, the Specification describes the control module as circuitry that interfaces with a variety of sensors, performs calculations, and either displays information or interfaces with a display. Ex. 1001, 4:9–11 (control module interfaces with sensors), 4:20–22 (same), 4:39–40 (same), 4:40–42 (control module calculates), 4:57–60 (same), 5:16–19 (same), 5:29–31 (same), 5:53–54 (same), 4:60–61 (control module includes display), 5:59–6:6 (same), 6:6–10 (control module communicates with interface unit for display).

c. Conclusion Regarding “Control Module”

Based on the evidence and analysis above, we determine that the ordinary and customary meaning the term “control module” would have had to a person of ordinary skill in the art in question at the time of the invention is “circuitry for interfacing with sensors, performing calculations, and displaying information or interfacing with a display.”

2. Fuses Data

Claim 22 depends from claim 21 and recites that the control module “fuses data received from the plurality of sensors to detect objects within a 360° view surrounding the vehicle.” Ex. 1001, 20:15–17.

Claim 28 also depends from claim 21 and recites that the control module “fuses data received from the plurality of sensors and provides a single picture of all objects within a 360° view surrounding the vehicle.” *Id.* at 20:35–38.

Petitioner asserts that “[t]he term ‘fuses’ should be interpreted to mean ‘combine.’” Pet. 13. According to Petitioner, “the proposed construction is consistent with the specification of the ’803 patent, and with the ordinary use of the term ‘fuses.’” *Id.* at 13–14 (citing portions of the Specification and Ex. 1006 ¶ 44).

Patent Owner asserts that “fuses data” means “updating the distance and location of an object by combining additional measurements of an object with previous detections of that object.” PO Resp. 8 (emphasis deleted) (citing Ex. 2002, “¶40, pp. 10-11”).¹⁰ According to Patent Owner, not only is “fuses data” used to detect objects, it is “an iterative process that relies not only on a single detection, but multiple detections.” *Id.*

As described in the Specification, data fusion is “a software feature.” Ex. 1001, 14:8–9) (“Another extremely important software feature for reliable system performance is Data Fusion.”). The Data Fusion algorithm is specifically designed not to require any specific number of sensors and adapts as sensors are added. *Id.* at 14:11–13. The algorithm uses a technique called “Deepest Hole” to combine the data from multiple sensors to fuse this data together. *Id.* at 14:24–26. The Specification discloses how the Deepest Hole software functions:

¹⁰ Paragraph 40 of Exhibit 2002 is the wrong cite. It deals with the disclosure of the Nakajima reference. Mr. Pfeiffer opines on the term “fuses data” in paragraphs 27–30.

It is assumed that multiple sensor sets may find the same object and that multiple radar modules within a sensor set will often see and report on the same object. The Deepest Hole function resolves these redundant tracks into a set of fused tracks, one per object. The output of this function is a list of track links linking the tracks from multiple radar modules together for one object.

Id. at 14:28–35. This process is summarized in the Specification as simply averaging the speeds of the redundant tracks. *Id.* at 14:37–38 (“The speeds of each track are averaged together.”).

Petitioner asserts that the Deepest Hole disclosure does not support Patent Owner’s proposed construction for “fuses data.” Reply 10–11 (citing Mr. Pfeiffer’s Deposition testimony (Ex. 1015, 46:4–14) that the “deepest hole function” is “not a form of data fusion. It’s the software activity that happens after data fusion.”).

The Specification repeatedly uses the word “resolve” to describe the fusion of data from multiple sensors. *E.g., id.* at 14:31–33 (“The Deepest Hole function resolves these redundant tracks into a set of fused tracks, one per object.”); Cert. Correction 32 (repeating that “The Deepest Hole function will resolve these redundant tracks into a set of fused tracks, one per object.”). The Specification also uses the word “combine” to describe data fusion. *E.g., id.* at 14:24–25 (“The algorithm uses a technique called Deepest Hole to combine the data”).

Mr. Pfeiffer also uses the word “resolve” to define the term “fuses data.” Mr. Pfeiffer testifies a “POSITA would understand that in order to ‘fuse’ the data, the data from multiple sensors must be *resolved* for the same object.” Ex. 2002, ¶ 28 (emphasis added).

In 1709 DI, the Board preliminarily construed the term “fuses data” as “combines data from multiple sensors to determine the location of an object.” *Denso* 1709, 25.

Accordingly, based on the substantial and consistent evidence discussed above, we determine that the term “fuses data” is properly construed as “resolves or combines distance and location information from the data of multiple sensors.”

*E. Patentability of Claims 21 and 22,
Based on Hayashikura or JP’265 (Nakajima);
Patentability of Claim 28 Based on Hayashikura*

In this Section of our Decision, we address Ground 1, which asserts unpatentability of claims 21, 22 and 28 under Section 103 based on Hayashikura, and part of Ground 3, which asserts unpatentability of, *inter alia*, claims 21 and 22 under Section 103 based on JP’265. Patent Owner’s Response argues these Grounds together (*e.g.*, see PO Resp. 17), and we address Patent Owner’s arguments as they were presented.

1. Legal Principles of Obviousness

Section 103 forbids issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR*, 550 U.S. at 406. The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, evidence such as commercial success, long felt but unsolved needs, and failure of others. *Graham v. John*

Deere Co., 383 U.S. 1, 17–18 (1966); *see KSR*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls.”). The Court in *Graham* explained that these factual inquiries promote “uniformity and definiteness,” for “[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context.” 383 U.S. at 18.

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To reach this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*; *see also Orexo AB v. Actavis Elizabeth LLC*, No. 2017-1333, 2018 WL 4288961, at *7 (Fed. Cir. Sept. 10, 2018) (“The question is not whether the various references separately taught components of the ’330 Patent formulation, but whether the prior art suggested the selection and combination achieved by the ’330 inventors.”).

Moreover, in determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences

themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F. 2d 158, 164 (Fed. Cir. 1985) (“It is elementary that the claimed invention must be considered as a whole in deciding the question of obviousness.” (citation omitted)); *see also Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983) (“[T]he question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention as a whole would have been obvious.” (citation omitted)).

“A reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect.” *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985).

As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421. This does not deny us, however, “recourse to common sense” or to that which the prior art teaches. *Id.*

Against this general background, we consider the references, other evidence, and arguments on which the parties rely.

2. *Hayashikura*

Hayashikura discloses an apparatus capable of monitoring conditions around a vehicle by means of a plurality of electromagnetic wave transmitter and receiver sections (radar devices) provided on and along the periphery of the vehicle. Ex. 1002, 1:6–10. The apparatus “inform[s] the vehicle operator of conditions around the vehicle and automatically restrict[s] or

control[s] the operator's driving operation so as to safely avoid any possible obstacles or objects the vehicle may encounter." *Id.* at 1:11–14.

Figure 4 from Hayashikura is reproduced below.

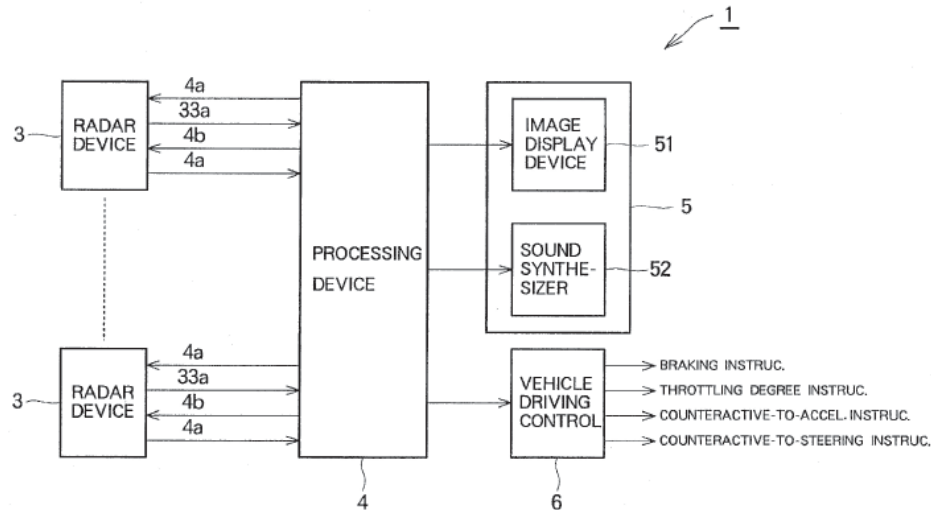
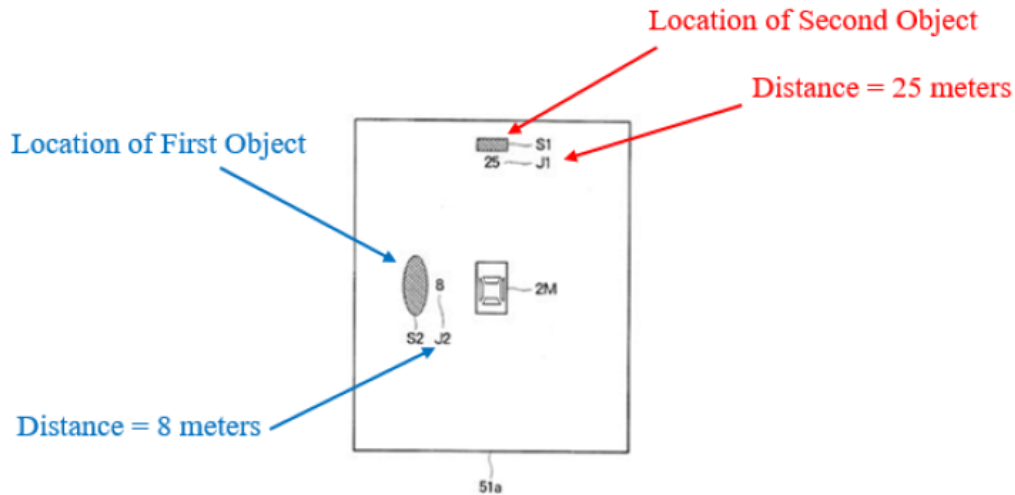


Figure 4 from Hayashikura is a block diagram of the general structure of the disclosed vehicle-surroundings monitoring apparatus.

As described in Hayashikura, radar devices 3 comprise a set of transmitter and receiver sections and a phase difference detector section constituting a part of processing device 4. *Id.* at 3:35–38. Processing device 4 obtains digital data 33b representative of a distance to an obstacle present within the respective detection ranges of radar devices 3 and then activates one or more other radar devices 3 oriented to other directions. *Id.* at 4:47–54. In this way, processing device 4 determines the presence or absence of an obstacle over the entire range (virtually 360°) around the vehicle and a distance to the obstacle if any. *Id.* at 4:55–57. Display section 5 includes image display device 51 and sound synthesizer 52. *Id.* at 4:65–66. Processing device 4 visually presents, on the screen of the image display device, data representative of the distance and direction to the obstacle. *Id.* at 5:1–3.

Petitioner provides the following annotated Figure 5 from Hayashikura illustrating the display, which shows location and distance of an object relative to a vehicle.



Petitioner's annotated Fig. 5 from Hayashikura showing location and distance of an object relative to a vehicle. Pet. 25.

3. JP '265 (*Nakajuma*)

JP '265 discloses a device that detects "the distance and direction to an obstacle when an obstacle exists to the front or to the rear of an automobile." Ex. 1004, Abstract. In general, the device disclosed in JP '265 includes:

[a]t least one ultrasonic transmitter and at least two receivers are disposed on each side in a directions in which an obstacles is to be detected, the transmitter on each side produces an ultrasonic signal of a different frequency, either simultaneously or at different times, the ultrasonic signal that is emitted from the transmitter at a given side strikes and is reflected by an obstacle in that direction, and is detected by the receivers on that side, the length of paths between the transmitter, the obstacle, and the receivers are calculated from differences in the times at which the ultrasonic signals are received by the receivers and the time at which the ultrasonic signal was sent by the transmitter, and the

distance to the obstacle and the direction to the obstacle are calculated based on two or more receivers existing on each side.

Id. When, after the ultrasound has been transmitted, the reflected signals are received, the differences between the transmission times and the reception times are calculated. *Id.* ¶ 18. The distance and direction from the automobile to an obstacle that exists in the surrounding environment are calculated by microcomputer 18 from the time differences. *Id.*

The disclosed device also includes a display that shows the distance and location of any obstacle detected. *Id.* Figure 4 of JP '265, illustrating a display, is reproduced below, as annotated by Petitioner.

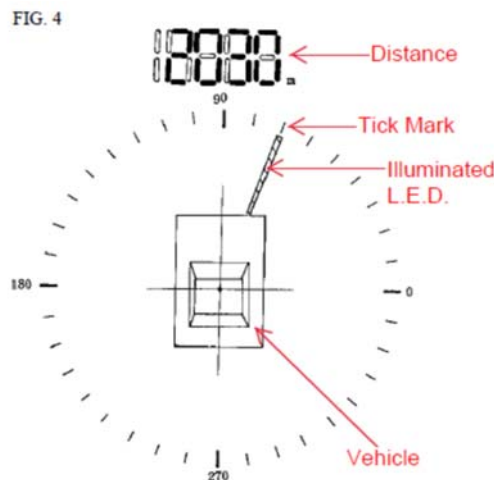


Figure 4 from JP '265 is an example of a display panel, annotated by Petitioner. Pet. 42.

As shown in Figure 4 and explained in the related text, the host vehicle is displayed in the center of the display panel. *Id.* ¶ 49. Angle “tick marks,” indicating directions in 360° around the host vehicle, are provided at 10° intervals. *Id.* The direction to the right is defined as 0°, the direction that is straightforward is defined as 90°, the left is 180°, and the rear is 270°. *Id.* The direction of the obstacle can be indicated by the angle. *Id.*

4. Analysis

Petitioner provides a clause-by-clause analysis of independent claim 21, identifying where in Hayashikura each claimed element is disclosed in Hayashikura. Pet. 17–26. Petitioner relies on the declaration testimony of Mr. Kitchen for support. *Id.* (citing *passim* Ex. 1006). For example, Petitioner asserts that the claimed “control module” in claim 21 is disclosed by processing device 4 in Hayashikura. Pet. 18 (citing Ex. 1006 ¶ 50). According to Petitioner, processing device 4 “provides various forms of control, including signal processing with respect to the radar devices, image and sound control, and general vehicle control.” *Id.*

The Petition does not identify expressly what element is not disclosed by Hayashikura, but explained at the hearing, “Hayashikura doesn't use the exact same terminology of Claim 21 . . . we decided it more appropriate just because of this terminology issue, to make it a 103 ground rather than a 102 ground.” Tr. 13:13–14:5.

Petitioner asserts, however, that a person of ordinary skill in the art would have understood that the transmitters 10 and receivers 20 in Hayashikura are “connected to” processing device 4, as recited in claim 21, because the transmitters 10 and receivers 20 are “communicatively coupled” to processing device 4. Pet. 19 (citing Ex. 1006 ¶ 52), 20 (citing Ex. 1006 ¶ 55).

According to Petitioner, processing device 4 of Hayashikura calculates the distance to and the location of the object for display. *Id.* at 24 (citing Ex. 1006 ¶ 60). Figure 4 of Hayashikura shows processing device 4 in communication with display section 5, including image display device 51. Petitioner also asserts that a person of ordinary skill in the art would have

understood that the marks “S1” and “S2” on Figure 4 of Hayashikura represent the locations of objects. *Id.*

Petitioner also provides a clause-by-clause analysis of claim 22, identifying where in Hayashikura each claim element is disclosed or would have been obvious. Pet. 26–28.

Petitioner also provides a clause-by-clause analysis of claims 21 and 22, identifying where in JP ’265 a claimed element is disclosed in the reference or would have been obvious based on the disclosure. Pet. 41–65. Petitioner relies on the declaration testimony of Mr. Kitchen for evidentiary support. *Id.* (citing *passim* Ex. 1006).

Patent Owner states that “In addition to the arguments [in Patent Owner’s Response], *Patent Owner specifically incorporates by reference its arguments in the Preliminary Response* (Paper No. 8), at 24 – 29.” PO Resp. 17 (emphasis added). As discussed above in the context of claim construction, incorporation by reference is not permitted by our rules. 37 C.F.R. § 42.6(a)(3) (“*Incorporation by reference; combined documents. Arguments must not be incorporated by reference from one document into another document. Combined motions, oppositions, replies, or other combined documents are not permitted.*”). Accordingly, we do not consider any arguments not included in Patent Owner’s Response. We address the arguments in Patent Owner’s Response in turn.

- a. “*wherein each of the plurality of receiving devices receives a return representative of one of the plurality of transmitted signals*”

Independent claim 21 recites that “each of the plurality of receiving devices receives a return representative of one of the plurality of transmitted signals.” Ex. 1001, 20:6–8. Patent Owner asserts that Hayashikura teaches

that “each transmitter and receiver are exclusively paired.” PO Resp. 18 (citing Ex. 1002, 3:28-31). The cited passage from Hayashikura states that “radar devices 3 are disposed in such a manner that their detecting ranges together cover about 360° around the vehicle 2 without substantially overlapping each other.” Ex. 1002, 3:28–31. Patent Owner concludes that Hayashikura thus “*teaches away* from the plurality of receiving devices receiving a return signal *from any one of* a plurality of transmitting devices, as required by the claim.” PO Resp. 18 (emphases added). Patent Owner cites neither evidence nor legal authority to support its “teaching away” argument. Moreover, Patent Owner’s argument misstates the claim language and thus reaches an incorrect conclusion.

The phrase “teaching away” has a defined meaning in patent law. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (quoting *Ricoh Co., Ltd. v. Quanta Comput. Inc.*, 550 F.3d 1325, 1332 (Fed. Cir. 2008)). A reference does not teach away “if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy*, 567 F.3d at 1327 (quoting *In re Fulton*, 391 F.3d at 1201).

Patent Owner does not provide any evidence that a person of ordinary skill, upon reading Hayashikura, would be discouraged from using Hayashikura’s arrangement of receivers and transmitters. The evidence of record shows that in Hayashikura’s radar device 3, which comprises a set of

transmitter and receiver sections 10 and 20, each of receiver section 20 “would receive[] a return representative of one of the plurality of transmitted signals,” i.e., the return representative of the signal transmitted from transmitter section 10, as required by claim 21.

Patent Owner also misstates the requirements of claim 21. Patent Owner argues that claim 21 requires the plurality of receiving devices be capable of “receiving a return signal *from any one of* a plurality of transmitting devices.” PO Resp. 18 (emphasis added). This is not what claim 21 recites. Claim 21 recites that “each of the plurality of receiving devices receives a return representative of *one of* the plurality of transmitted signals.” Ex. 1001, 20:6–8 (emphasis added). Petitioner adds the word “any” to the language of the claim, which distorts its meaning and results in an incorrect conclusion. Petitioner makes a similar argument for JP’265 (Nakajima). PO Resp. 19.

The language at issue in claim 21 requires that each receiver receives a return signal that is representative of *one of* the transmitted signals. The word “any” does not appear in the claim to modify the source of the received signal. Even if paired as argued by Patent Owner, Hayashikura and JP’265 disclose that each of the several receivers in its system will receive a return signal that is representative of *one of* the transmitted signals, even if the received return signal comes from a transmitter with which the receiver is paired. That is all claim 21 requires. The word “any,” added by Patent Owner to claim 21 in its argument, distorts the clear, unambiguous language of the claim. See Reply 12–16.

Moreover, “we construe the claim as written, not as the patentees wish they had written it.” *Chef America, Inc. v. Lamb-Weston, Inc.*, 358 F. 3d

1371, 1374 (Fed. Cir. 2004). In *Chef America*, the claim required “heating the resulting batter-coated dough to a temperature in the range of about 400° F. to 850° F.” *Id.* at 1373. The problem is that if the batter-coated dough is heated to a temperature range of 400° F. to 850° F., as the claim instructs, it would be burned to a crisp. *Id.* Chef America argued to construe the claim as if it read “heating the ... dough at a temperature in the range of,” i.e., to apply the heating requirement to the place where the heating takes place (the oven) rather than the item being heated (the dough). *Id.* at 1373–74. As stated in *Chef America*, however, the Federal Circuit repeatedly and consistently has recognized that courts may not redraft claims, whether to make them operable or to sustain their validity. *Id.* at 1374.

b. Fuses Data

Patent Owner argues that neither Hayashikura nor JP’265 disclose or suggest the “fuse data” limitation recited in claims 22. PO Resp. 19–21. Again, Patent Owner combines its argument for claims challenged in both Grounds 1 and 3. We address Patent Owner’s arguments similarly.

Claim 22 depends from claim 21 and recites that “the control module fuses data received from the plurality of sensors to detect objects within a 360° view surrounding the vehicle.”

There is no credible dispute that Hayashikura and JP’265 disclose a system that has a 360° detection range around the vehicle, as shown in Figure 1 and described in the related text. Hayashikura discloses, for example, that “[t]he radar devices 3 are disposed in such a manner that their detecting ranges together cover about 360° around the vehicle 2 without

substantially overlapping each other.” Ex. 1002, 3:27–30. As further explained in Hayashikura,

The processing device 4 repeats its operations of giving the transmission-enable signal 4a to one or more radar devices 3 so as to obtain the digital data 33b representative of a distance to an obstacle present within the respective detection ranges of the radar devices 3 and then activating one or more other radar devices 3 oriented to other directions. In this way, the processing device 4 determines presence or absence of an obstacle over the entire range (virtually 360°) around the vehicle and a distance to the obstacle if any.

Id. at 4:48–57. Petitioner asserts that a person skilled in the art “would have been taught” by this disclosure “that the data of Hayashikura is fused at least by being cumulatively stored and combined to represent object detection in all directions.” Pet. 27 (citing Ex. 1006 ¶ 64).

For JP’265, Petitioner asserts a person of ordinary skill in the art would have understood that microcomputer 18 fuses the data received from oscillators 4 through 15. Pet. 57 (citing Ex. 1006 ¶ 116). According to Petitioner, JP ’265 discloses that each of the plurality of receiving oscillators 4, 6, 7, 9, 10, 12, 13, and 15 transmits reception times to microcomputer 18. *Id.* at 57–58 (citing Ex. 1004 ¶¶ 21–22). Microcomputer 18 then determines the distance and direction to an object. *Id.* at 58 (citing Ex. 1004 ¶¶ 18, 22).

Patent Owner asserts that JP’265 does not disclose updating the distance and location of an object by combining additional measurements of an object with previous detections of that object. PO Resp. 21. Patent Owner’s argument is not persuasive, however, because it is based on Patent Owner’s proposed construction of the term “fuses data,” which we decline to adopt for the reasons discussed above.

We are persuaded that JP'265 and Hayashikura each “fuses data” as claimed in claim 22 because they combine data from multiple devices to generate a single image.

Claim 28 is challenged in Ground 1 based on Hayashikura. It is not challenged in Ground 3 based on JP'265. In the “fuses data” section of its Response, Patent Owner also addresses claim 28. PO Resp. 22.

Claim 28 depends on claim 21 and further recites that “the control module fuses data received from the plurality of sensors and provides a single picture of all objects within a 360° view surrounding the vehicle.” Claim 28 is similar to claim 22.

Petitioner asserts that processing device 4 in Hayashikura “provides a single picture of all objects within a 360° view surrounding the vehicle” by providing a single picture to display device 51. Pet. 31 (citing Ex. 1002, 4:66–5:3; Ex. 1006 ¶ 70).

Patent Owner argues that “fuses data” “requires much more than simply ‘combining data’ on a ‘display.’” PO Resp. 22. Based on our construction of the term “fuses data,” we disagree. Petitioner has shown that Hayashikura “fuses data,” as we construe that term above.

c. Conclusion for Claims 21, 22, and 28

Based on the evidence and analysis above, we determine that Petitioner has shown by a preponderance of the evidence that claims 21 and 22 would have been obvious based over either of Hayashikura or JP'265, and that claim 28 would have been obvious based on Hayashikura.

*F. Patentability of Claim 24 Based on Hayashikura and Cherry
or Based on JP'265 and Cherry*

Petitioner contends that claim 24 would have been obvious over the combination of Hayashikura and Cherry. Pet. 33–40.

1. Cherry

Cherry discloses an object detection system and method for detecting the presence of objects in the path of a vehicle. Ex. 1005, Abstract. The system includes “a self test operation.” *Id.* Cherry recognizes that “[i]n consideration of the importance of the operability of such object detection systems, it is often desirable for such systems to include self testing capabilities.” Ex. 1005, 1:15–17. In the “Background” section of the written description, Cherry discloses various prior devices that included self testing capabilities. In one device, for example, signals provided by a transmitter are reflected by acoustic shunts or acoustic reflectors for reception by a receiver for self testing purposes.” *Id.* at 1:25–28. Cherry states that the described prior art devices “may be undesirable due to the need for additional structures such as reflecting elements to be attached to the vehicle, and because the systems may require specific positioning of the transmitter and receiver.” *Id.* at 1:40–45. The system disclosed in Cherry overcomes the problems of prior devices by operating in the following manner:

The system includes a transmitter which transmits object detection signals and a receiver which receives reflections of the transmitted object detection signals. A controller is provided for adjusting the gain and signal threshold of the receiver so that the receiver initially is able to detect reflections from irregularities in the ground surface. Once the receiver receives a signal reflected from the ground surface, an indication is provided that the system is in a ready or operable state. Thereafter, the

controller adjusts the receiver gain and signal detection threshold so that signals reflected from the ground surface are effectively ignored and only signals reflected from significant objects in the path of the vehicle are detected.

Ex. 1005, 1:64–2:9. Cherry discloses his system in the context of a vehicle 10 having a single transmitter 14 and a single transmitter 16. *Id.* 2:34–36; Fig. 1.

2. Analysis

Claim 24 depends from independent claim 21. Claim 24 recites that “the control module includes a built-in-test function which sequentially commands each transmitting device to transmit a signal, detects a return of the signal and sends a signal representative of said return to the control module for system verification.”

Petitioner contends that both Hayashikura (Ground 2) and JP’265 (Ground 4) teach the basic system claimed in claim 24. Petitioner relies on Cherry for the disclosure of a built-in-test function. Pet. 34–35 (“Cherry discloses an object detection system for a vehicle that includes a built-in, self-test operation.”). According to Petitioner, Cherry’s built-in-test function commands each transmitting device to transmit a signal, detects a return of the signal, and sends a signal representative of the return to the control module for system verification. *Id.* at 35 (citing Ex. 1006 ¶ 73).

Petitioner acknowledges that Cherry does not explicitly disclose that the built-in-test function sequentially commands multiple transmitting devices to conduct the test. *Id.* at 36. As Petitioner explains, Cherry’s disclosed system uses only one transmitter and receiver pair, and thus there was no need to sequentially command multiple devices. According to Petitioner, “it naturally follows that since a typical operation of Hayashikura

involves subsequently activating the individual radar devices 3 to avoid interference with other radar devices, the self-test operation would be performed in a similar matter.” Pet. 38 (citing Ex. 1006 ¶ 79).

Petitioner’s rationale as to why it would have been obvious to add Cherry’s built-in-test to the system disclosed in Hayashikura is that because of “the similarities in structure, objectives, and operation” between Hayashikura and Cherry, one would have been motivated to add the self-test features of Cherry to the object-detecting system of Hayashikura to obtain “the benefits disclosed by Cherry, including the ability to reject signals caused by small ground irregularities, while focusing on objects that are most important to detect.” *Id.* at 37. Petitioner also explains why it would have been obvious to a person of ordinary skill to apply the built-in-test system disclosed in Cherry for a single transmitter/receiver pair to sequentially command the multiple transmitter/receiver pairs used in Hayashikura. Pet. 38 (citing Ex. 1006 ¶ 79).

Petitioner also concludes that a person of ordinary skill in the art would have found it obvious to combine the self-test mode of Cherry with the collision avoidance system of JP ’265. Pet. 68. The rationale for why the proposed combination would have been obvious is that the “combination would have provided the benefits disclosed by Cherry, including the ability to reject signals caused by small ground irregularities, while focusing on objects that are most important to detect. *Id.* (citing Ex. 1006 ¶ 139).

The entirety of Patent Owner’s Response to the challenges to claim 24 in Grounds 2 and 4 is:

Grounds 2 and 4 of the Petition relate to the self-test limitation of claim 24. However, while it is clear that Cherry fails to disclose a customized PC, it likewise does not include test

functionality that determines anything more than calibration. The self-test feature of the '803 Patent, however, requires that each transmitter is commanded to transmit a signal, and the overall functionality of the system is verified by the control module.

PO Resp. 23. Patent Owner cites no evidence to support this argument.

Based on the evidence and analysis above, we determine that a preponderance of the evidence establishes that claim 24 would have been obvious based either on the combination of Hayashikura and Cherry or on the combination of JP'265 and Cherry.

G. Patentability of Claim 25 Based on JP '265

Petitioner asserts that claim 25 would have been obvious based on JP '265. Pet. 60–63. We have addressed above claims 21 and 22 on this asserted Ground. Claims 26 and 27 have been withdrawn from this proceeding.

Claim 25, dependent from claim 21, recites that the control module determines whether it can triangulate and calculates an actual perpendicular distance to the object and location of the object with respect to the vehicle.

Figure 3 from JP '265 is reproduced below.

FIG. 3

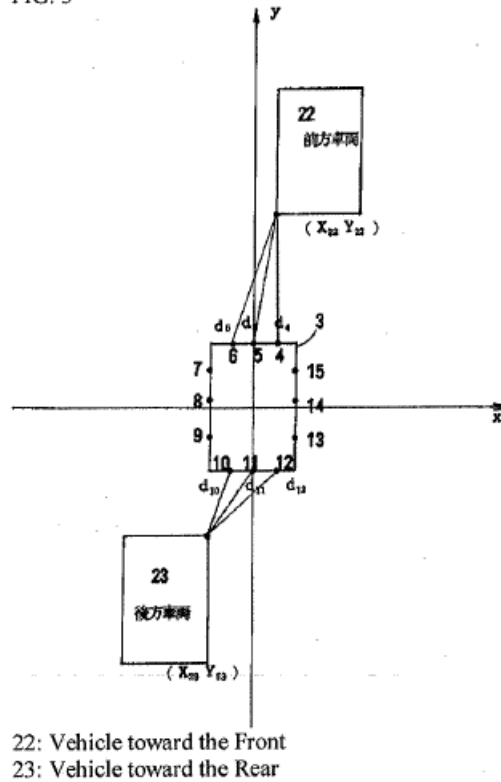


Figure 3 from JP '265 illustrates ultrasound from the sonar sensor transmitted, reflected, and received back by the sonar sensors from front and rear obstacles.

As explained in JP '265, with reference to Figure 3, an ultrasound from sonar sensor 11 strikes the rearward vehicle and is reflected thereby. Ex. 1004 ¶ 27. The reflected signal from rearward vehicle 23 is received at time T_4 by ultrasonic receiver 10. *Id.* The reflected signal from rearward vehicle 23 is received by ultrasonic receiver 12 at time T_5 . *Id.* Microcomputer 18 calculates the distance, such as d_4 , d_5 , d_6 , d_{10} , d_{11} , and d_{12} , and location to preceding vehicle 22 and rearward vehicle 23 based on ultrasound transmission time T_0 of the host vehicle and the reception times T_1 , T_2 , T_4 , and T_5 , by the various ultrasonic receivers 4, 6, 10, and 11. *Id.* As shown in Figure 3, this results in calculations by microcomputer 18 (*id.* ¶¶ 29–43) based on a series or network of triangles in order to

determine the distances and relative positions of points spread over a territory or region based on the data.

Petitioner asserts that JP '265 discloses that, in solving equations for the various distances, a person of ordinary skill in the art would have understood that microcomputer 18 uses triangulation to satisfy the disclosed equations. Pet. 61 (citing Ex. 1006 ¶ 122). According to Petitioner, at least some of the equations in JP '265 “use Pythagorean’s theorem, which is a known geometric calculation that uses triangulation.” *Id.* Petitioner also asserts that a person of ordinary skill in the art also would have understood that microcomputer 18 “determines whether it can triangulate” based on whether the data available allows for a solution of the required equations. *Id.* (citing Ex. 1006 ¶ 123).

Petitioner provides a clause-by-clause analysis of claims 21 and 25, identifying where in JP '265 a claimed element is disclosed in the reference or would have been obvious based on the disclosure. Pet. 43–56, 60–63. Petitioner relies on the declaration testimony of Mr. Kitchen for evidentiary support. *Id.* (citing *passim* Ex. 1006).

Petitioner asserts that “microcomputer 18 (the identified control module) measures the returned reception times (the identified return signals) because microcomputer 18 determines the difference between each reception time and an ultrasound transmission time.” Pet. 50 (citing Ex. 1004 ¶ 27). According to Petitioner, because microcomputer 18 calculates the distance and direction to an object using the difference between each reception time and an ultrasound transmission time, microcomputer 18 also detects an object as a function of the return signals). *Id.*

JP '265 discloses that “[a]n ultrasonic transceiver 16 is provided in order to process the signals from the various sonar sensors.” Ex. 1004 ¶ 17. It further discloses that after the ultrasound signal has been transmitted, the reflected signals “are received,” the differences between the transmission times and the reception times are calculated by microcomputer 18 from the time differences. *Id.* ¶ 18.

Petitioner asserts that a person of ordinary skill in the art would have “understood that microcomputer 18 determines whether it can triangulate when it determines whether it has received necessary reception and transmission time values and is capable of satisfying equations 1 through 2. Pet. 61; Ex. 1014 ¶ 42.

Patent Owner argues, without citation of any evidence, that “[r]egardless of whether Nakajima performs any triangulation, it does not disclose making any determination as to whether triangulation is even possible.” PO Resp. 22.

We find that if JP'265 teaches “determin[ing] whether it can triangulate” by trying to perform triangulation. If the system gets no measurement, it has determined that it cannot triangulate. If the system obtains a measurement, it has determined that it can triangulate.

Based on the evidence and analysis above, we determine that a preponderance of the evidence establishes that claim 25 would have been obvious based on JP '265.

III. CONCLUSION

Based on the evidence and analysis in this Decision, we determine that Petitioner has established by a preponderance of the evidence that

claims 21, 22, 24, 25, and 28 would have been obvious, and thus are not patentable, as set forth in the Order below.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that:

- A. Claims 21, 22, and 28 would have been obvious in view of Hayashikura, and thus are unpatentable;
- B. Claim 24 would have been obvious in view of Hayashikura and Cherry, and thus is unpatentable;
- C. Claims 21, 22, and 25 would have been obvious in view of JP '265, and thus are unpatentable;
- D. Claim 24 would have been obvious in view of JP '265 and Cherry, and thus is unpatentable; and

FURTHER ORDERED that this is a Final Written Decision under 35 U.S.C. § 318(a), and that parties to the proceeding seeking judicial review of the Decision under 35 U.S.C. § 319 must comply with the notice and service requirements of 37 C.F.R. § 90.2.

PETITIONER:

Jonathan Stroud
Ashraf A. Fawzy
UNIFIED PATENTS INC.
jonathan@unifiedpatents.com
afawzy@unifiedpatents.com

David L. Cavanaugh
Daniel V. Williams
Ellyar R. Barazesh
WILMER, CUTLER, PICKERING, HALE AND DORR LLP
cavanaugh@wilmerhale.com
Daniel.Williams@wilmerhale.com
Ellyar.Barazesh@wilmerhale.com

PATENT OWNER:

Decker A. Cammack
Richard L. Schwartz
WHITAKER CHALK SWINDLE & SCHWARTZ PLLC
dcammack@whitakerchalk.com
rschwartz@whitakerchalk.com