

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TRW AUTOMOTIVE U.S. LLC,
Petitioner,

v.

MAGNA ELECTRONICS INC.,
Patent Owner.

Case IPR2014-01347
Patent 8,508,593 B1

Before JAMES P. CALVE, MICHAEL J. FITZPATRICK, and
BARRY L. GROSSMAN, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. BACKGROUND

Petitioner TRW Automotive U.S. LLC (“TRW”) filed a Petition (Paper 1, “Pet.”) seeking *inter partes* review of claims 1–3, 6–12, 16, 18–31, 33–39, 76–80, and 82–85 of U.S. Patent No. 8,508,593 B1 (Ex. 1002, “the ’593 patent”). Patent Owner Magna Electronics Inc. (“Magna”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). We have jurisdiction under 35 U.S.C. § 314(a), which provides that *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). For the reasons that follow, and based on the current record, TRW has established a reasonable likelihood that it will prevail with respect to at least one challenged claim.

A. *Related Proceedings*

The parties inform us that the ’593 patent is the subject of a co-pending district court case titled *Magna Electronics Inc. v. TRW Automotive Holdings Corp.*, Case 1:13-cv-00324 (W.D. Mich.). Pet. 2–3; Paper 5, 3.

B. *The ’593 Patent (Ex. 1002)*

The ’593 patent discloses a vehicle accessory system, and particularly accessories used in windshield electronics modules and interior rearview mirror assemblies. Ex. 1002, 1:26–29. Windshield mounted electronic accessory module 2110 comprises mounting module 2110a that is mounted or secured to an interior surface of windshield 2112 and accessory housing 2111 mounted to mounting module 2110a. *Id.* at 43:18–23, Figs. 66A, 66B, 67A. Figures 66A and 66B, which are reproduced below, illustrate an embodiment of accessory housing 2111.

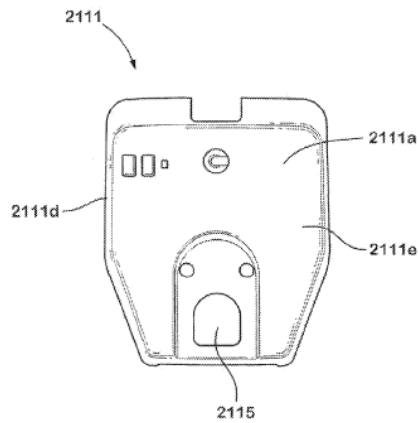


Fig. 66A

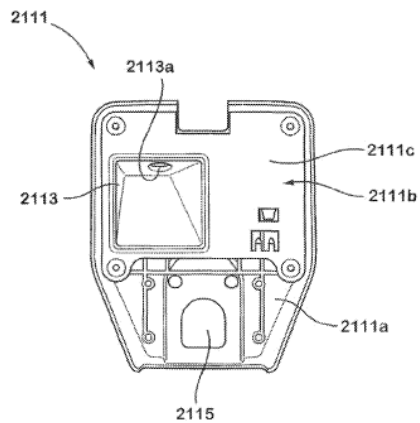


Fig. 66B

Figures 66A and 66B are plan views of accessory housing 2111.

As illustrated in Figures 66A and 66B, accessory housing 2111 has casing 2111a and cover plate 2111b mounted to casing 2111a to define a windshield facing side of surface 2111c. *Id.* at 43:23–26. Casing 2111a has aperture 2115 for receiving mirror mounting extension 2116 and mirror mounting button 2116b of accessory mounting module 2110a, which is shown in Figures 67A and 67B, reproduced below.

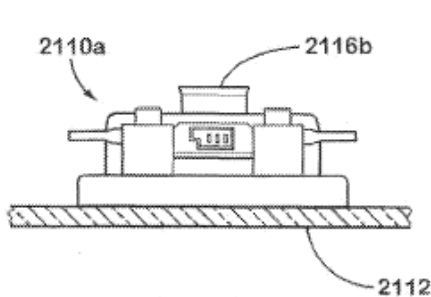


Fig. 67A

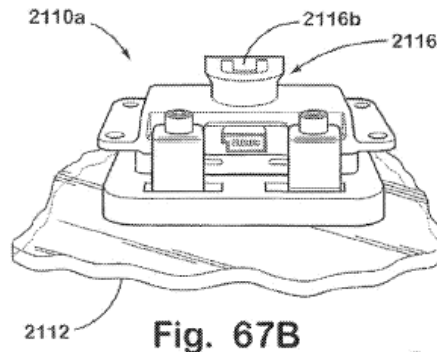
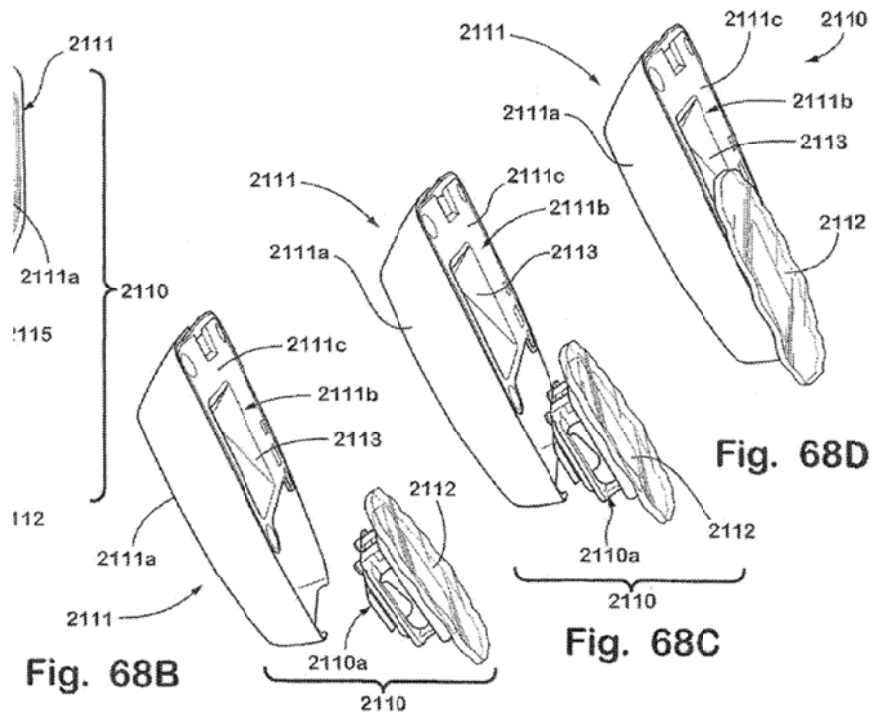


Fig. 67B

Figures 67A and 67B are side and perspective views of accessory mounting module 2110a.

As shown in Figure 66B, cover plate 2111b defines cavity 2113 that is recessed in casing 2111a. *Id.* at 43:36–37. Accessory module housing 2111 also includes a camera or image sensor (not shown) that is positioned within housing 2111 and aligned with aperture or opening 2113a at cavity 2113 of

cover plate 2111b. *Id.* at 43:37–41. Accessory module housing 2111 may snap or otherwise secure to mounting module 2110a to retain accessory module housing 2111 at windshield 2112. *Id.* at 44:14–18. When accessory module housing 2111 is assembled and mounted to mounting module 2110a at windshield 2112, the camera is positioned adjacent to cavity 2113 of cover plate 2111b and oriented in a generally horizontal position for viewing through aperture 2113a and capturing an image of an exterior scene that occurs generally forward of the vehicle. *Id.* at 44:20–25. Cavity 2113 is angled with respect to windshield facing surface 2111c of cover plate 2111b so the camera is positioned generally horizontally and directed forwardly through windshield 2112 when accessory module housing 2111 is mounted to mounting module 2110, as illustrated in Figures 68B–68D, reproduced below. *Id.* at 43:41–47.



Figures 68B–68D are perspective views of accessory housing 2111 being mounted to mounting module 2110a.

C. Illustrative Claim

Claims 1 and 76 are independent. Claims 2, 3, 6–12, 16, 18–31, and 33–39 depend from claim 1. Claims 77–80 and 82–85 depend from claim 76. Claim 1, reproduced below, is illustrative of the claimed subject matter.

1. An accessory system for a vehicle, said vehicular accessory system comprising:
 - a mounting element attached at a vehicle windshield of a vehicle equipped with the accessory system;
 - wherein said mounting element comprises an attachment portion at a first side of said mounting element for attachment of said mounting element at the vehicle windshield;
 - wherein, at least when said mounting element is attached at the vehicle windshield, a module is mounted at a second side of said mounting element that opposes said first side;
 - wherein said module includes attaching structure that cooperates with attaching structure of said mounting element in order to detachably mount said module at said mounting element;
 - wherein said module has a windshield-facing side that faces towards the vehicle windshield when said module is mounted at said mounting element attached at the vehicle windshield;
 - wherein said module has a cabin-facing side that faces away from the vehicle windshield towards the interior cabin of the equipped vehicle when said module is mounted at said mounting element attached at the vehicle windshield;
 - wherein said module has a housing having a windshield-facing side and a cabin-facing side;
 - wherein a camera is disposed in said module;
 - said camera comprising a CMOS imaging array sensor and a lens;
 - wherein said camera, with said module mounted at said mounting element attached at the vehicle windshield, views forwardly through the vehicle windshield via a

generally wedge-shaped structure of the windshield-facing side of said housing;
wherein said camera captures image data for a driver assistance system of the equipped vehicle; and
wherein electrical circuitry is disposed in said module and wherein, with said module mounted at said mounting element attached at the vehicle windshield, said electrical circuitry communicates over a vehicle communication bus with at least one system of the equipped vehicle.

D. The Prior Art

TRW relies on the following references:

Reference	Patent/Printed Publication	Date	Exhibit
Campbell	WO 99/43242 A1	Sept. 2, 1999	1004
Goldbeck	<i>Lane Detection and Tracking by Video Sensors</i> , 74–79 (IEEE)	1999	1005
Kuehnle	WO 01/77763 A1	Oct. 18, 2001	1006
Yanagawa	JP S62-131837	June 15, 1987	1007

E. The Asserted Grounds of Unpatentability

TRW challenges the patentability of claims 1–3, 6–12, 16, 18–31, 33–39, 76–80, and 82–85 of the '593 patent on the following grounds:

References	Basis	Claims Challenged
Campbell, Goldbeck, Kuehnle	§ 103	1–3, 6–12, 16, 18–21, 23–31, 33–36, 38, 76–80, 82–85
Campbell, Goldbeck, Kuehnle, Yanagawa	§ 103	22, 37, 39

II. ANALYSIS

A. Real Parties-In-Interest

In accordance with 37 C.F.R. § 42.8(b)(1), Petitioner identifies “TRW Automotive U.S. LLC of Farmington Hills, Michigan” as the sole real party-in-interest. Pet. 2.

Magna asserts that TRW “has made statements that call into question the true identities” of the real parties-in-interest; therefore the requirements of 35 U.S.C. § 312(a)(2) have not been met. Prelim. Resp. 4. Magna also contends that TRW “muddies the issue” by identifying “TRW Automotive Holdings Corp.” and “TRW Vehicle Safety Systems Inc.” as co-defendants in related litigation. *Id.* Magna asserts that TRW Automotive Holdings Corp. is the ultimate parent corporation of Petitioner TRW Automotive U.S. LLC and “undoubtedly exhibits a significant measure of control over TRW Automotive U.S. LLC.” *Id.* at 5. According to Magna, the discussion of TRW’s financial position and operating results in the Annual Report of TRW’s parent corporation “suggests a tight financial integration” between the two companies. *Id.* at 6. Magna does not clarify, however, whether it is arguing that TRW Automotive Holdings Corp. *and* TRW Vehicle Safety Systems Inc. are real parties-in-interest, or whether it is arguing that only TRW’s parent company, TRW Automotive Holdings Corp., is a real party-in-interest. We address the merits of Magna’s assertions for both entities.

A petition for *inter partes* review (“IPR”) may be considered only if, *inter alia*, “the petition identifies all real parties in interest.” 35 U.S.C. § 312(a)(2). The Office Patent Trial Practice Guide provides guidance regarding factors to consider in determining whether a party is a real party-in-interest. 77 Fed. Reg. 48,756, 48,759–60 (Aug. 14, 2012) (Trial Practice Guide). Considerations may include whether a non-party “funds and directs and controls” an IPR petition or proceeding. *Id.* at 48,760. Additional relevant factors include: the non-party’s relationship with the petitioner; the non-party’s relationship to the petition itself, including the nature and/or degree of involvement in the filing; and the nature of the entity filing the

petition. *Id.* A party does not become a “real party-in-interest” merely through association with another party in an unrelated endeavor. *Id.* A party also is not considered a real party-in-interest in an IPR solely because it is a co-defendant with a petitioner in a patent infringement suit or is part of a joint defense group with a petitioner in the suit. *Id.*

Whether a party who is not a named participant in a given proceeding is a “real party-in-interest” to that proceeding “is a highly fact-dependent question.” *Id.* at 48,759. There is no “bright line test.” *Id.* Courts invoke the term “real party-in-interest” to describe relationships and considerations that justify applying conventional principles of estoppel and preclusion. *Id.*

A non-party’s participation with a petitioner may be overt or covert, and the evidence may be direct or circumstantial, but the evidence as a whole must show that the non-party possessed effective control over the petitioner from a practical standpoint. *Zoll Lifecor Corp. v. Philips Elec. N. Am. Corp.*, Case IPR2013-00609, slip op. at 10 (PTAB Mar. 20, 2014) (Paper 15). We look to the evidence on which Magna relies to determine the fact dependent issue of whether TRW Automotive Holdings Corp. and TRW Vehicle Safety Systems Inc. are real parties-in-interest in this proceeding.

Magna speculates about what the evidence “undoubtedly exhibits” or “suggests” concerning the relationship of TRW to its parent corporation, TRW Automotive Holdings Corp. Prelim. Resp. 5–6. This speculation is based on general evidence of a parent/subsidiary relationship in a required Annual Report (Form 10-K) submitted to the U.S. Securities and Exchange Commission (Ex. 2002). The statement in this Annual Report that TRW Automotive Holdings Corp. “conduct[s] substantially all of [its] operations through subsidiaries” (Ex. 2002, 5) is not persuasive or sufficient evidence

to establish “an involved and controlling parent corporation representing the unified interests of itself and Petitioner,” as found in *Zoll*. IPR2013-00609, Paper 15, slip op. at 12.

In *RPX Corp. v. Virnetx, Inc.*, Case IPR2014-00171, slip op. at 6–10 (PTAB June 23, 2014) (Paper 52), the Board discussed a number of factors to determine whether the petitioner RPX was a proxy for a non-party. Those factors include whether the petitioner is compensated by the non-party for filing the petition; whether the petitioner was authorized, explicitly or implicitly, by the non-party to file the petition or to represent the non-party in the *inter partes* review; and whether the petitioner is a “nominal plaintiff” with “no substantial interest” in the IPR challenge. *Id.* at 7–10. Unlike the facts in *RPX*, based on the record before us, there is no persuasive evidence that TRW is acting as a proxy for TRW Automotive Holdings Corp.

Magna has not directed us to any evidence of establishing a real party-in-interest relationship between TRW and TRW Vehicle Safety Systems Inc., other than TRW’s identification of TRW Vehicle Safety Systems Inc. as “related” and a co-defendant in a pending lawsuit. In *Denso Corp. v. Beacon Navigation GmbH*, Case IPR2013-00026, slip op. at 10–11 (PTAB Mar. 14, 2014) (Paper 34), the Board determined that the mere fact that parties are co-defendants or concurrent defendants in litigation does not make them real parties-in-interest. In *Denso*, as here, there was no persuasive evidence that the non-party engaged in strategic planning, preparation, and review of the *inter partes* review petition. Magna’s speculation that TRW Vehicle Safety Systems Inc. is a real party-in-interest in this proceeding has no persuasive evidentiary support.

TRW's identification of the two other TRW entities as "related to Petitioner" (Pet. 3) does not contradict TRW's identification of the sole real party-in-interest in this proceeding. Magna's speculation about the motives of TRW, i.e., that TRW "appears to be attempting to evade the estoppel effect" of this proceeding (Prelim. Resp. 6), also is unpersuasive.

Accordingly, based on the evidence before us, Magna fails to establish that either TRW Automotive Holdings Corp. or TRW Vehicle Safety Systems Inc. is a real party-in-interest in this proceeding.

B. *Claim Interpretation*

In an *inter partes* review, claims of an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see also* Trial Practice Guide, 77 Fed. Reg. at 48,766. Claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. *"generally wedge-shaped structure"*

TRW notes that the limitation "generally wedge-shaped structure," which is recited in claim 1, does not appear in the '593 patent specification and asserts the term "wedge" is used only to refer to a known mirror mount.¹ Pet. 4. TRW contends that the description accompanying Figures 66–68 describes "cavity 2113 which is recessed within casing 2111a" and does not describe any "wedge." *Id.* at 5 (citing Ex. 1002, 43:37). TRW asserts that

¹ This limitation also appears in claim 77, which depends from independent claim 76. *See* Prelim. Resp. 36, 39.

the only indication of a wedge shape for cavity 2113 is a few perspective lines that come together near opening 2113a. *Id.* at 5–6. TRW argues that “generally wedge-shaped structure” should be interpreted to mean “a recess in the housing that tapers from one portion to another.” *Id.* at 6. Magna does not propose a construction for this limitation. Prelim. Resp. 36–39 (arguing that even assuming TRW’s proposed construction is correct, the prior art does not teach or suggest this limitation).

On this record, we interpret “generally wedge-shaped structure” to mean “a structure that tapers from a wider portion at one end to a narrower portion at the other end.” This interpretation is consistent with the specification of the ’593 patent, which discloses that cover plate 2111b defines cavity 2113 that is recessed within casing 2111a. Ex. 1002, 43:36–37. Cavity 2113 tapers from a wider opening at windshield facing surface 2111c of cover plate 2111b to a narrow opening at aperture 2113a. *Id.*, Figs. 66B, 66C, 68D. Claim 12, which depends from claim 1, recites that “said wedge-shaped structure is widest at the vehicle windshield and tapers from the vehicle windshield towards where said camera is located.”

C. Asserted Grounds of Unpatentability

1. Obviousness of Claims 1–3, 6–12, 16, 18–21, 23–31, 33–36, 38, 76–80, and 82–85 Over Campbell, Goldbeck, and Kuehnle

a. Overview of Campbell (Ex. 1004)

Campbell discloses an optical assembly mounted removably to a vehicle windshield. Ex. 1004, 1:4–7, Fig. 1. The optical assembly includes bracket 1 and optical device 2. *Id.* at 5:15. Bracket 1 is attached fixedly at its front surface 14 to windshield 31 by adhesive 41. *Id.* at 5:18–21, Fig. 2.

Optical device 2 can be inserted into mounting bracket 1, as shown in Figure 2, which is reproduced below with Figure 5.

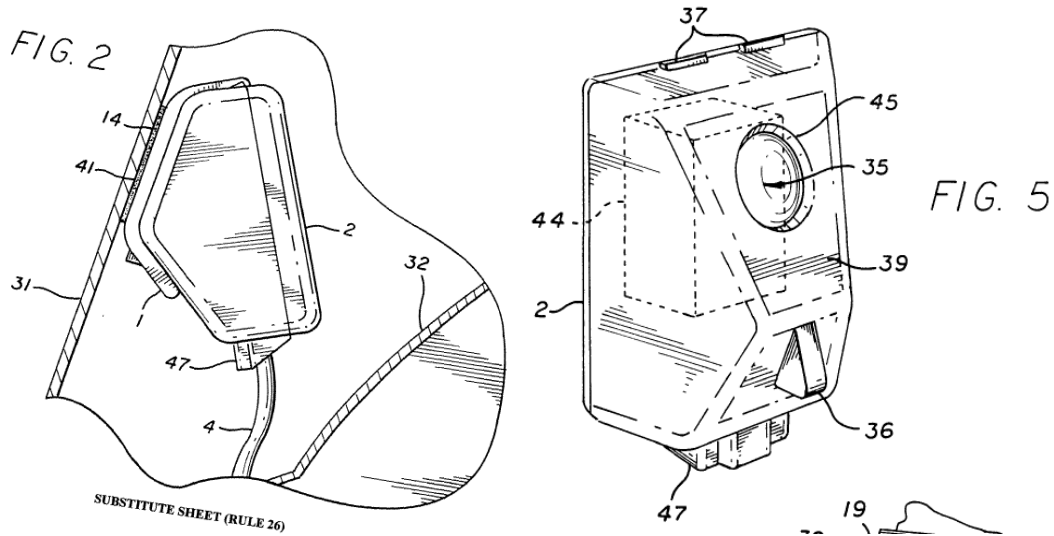


Figure 2 is a side view of an embodiment of an optical assembly. Figure 5 is a front perspective of optical device 2.

Flexible cable 4 routes signals for vehicle status (speed, turn signal status), disable inputs, and warning/stereo mute signals, between optical device 2 and vehicle 3. *Id.* at 5:23–26. Cable 4 also provides power from a vehicle power supply to optical device 2, or a battery can be included in or on optical device 2. *Id.* at 5:26–29. Optical device 2 includes notches 37 that lock into groove members 19 of bracket 1 to secure optical device 2 to bracket 1. *Id.* at 7:19–21, 24–27, Fig. 6.

b. Overview of Goldbeck (Ex. 1005)

Goldbeck discloses an improved vehicle video sensor system that uses a CMOS camera for real time lane detection. Ex. 1005, 1 (Abstract). The system includes a high luminance dynamic CMOS video camera, a video signal processing and evaluation system with interface circuitry connecting the sensor to the vehicle’s controller area network (“CAN”) infrastructure. *Id.* (Introduction).

c. Overview of Kuehnle (Ex. 1006)

Kuehnle discloses optical sensor 20 that can detect raindrops on a vehicle. Ex. 1006, 1:5–6, Fig. 1. Figure 2, which is reproduced below, illustrates a rain sensor.

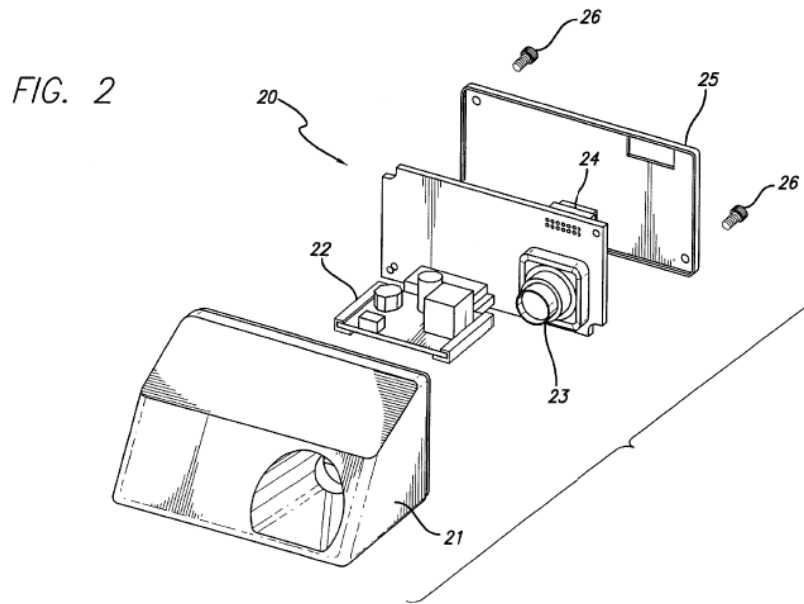


Figure 2 is an assembly view of a rain sensor in one embodiment.

Sensor 20 has front housing 21 and back housing 25 that are secured together by screws 26 to enclose microprocessor circuitry 22 and optical detector 23. *Id.* at 5:11–15. Optical detector 23 may be any of various types of optical image detector such as an analog or digital camera, video camera, or CCD array that captures optical images. *Id.* at 5:15–18. Optical detector 23 is connected to microprocessor circuitry that has a microprocessor, memory devices, and logic devices that digitize, transfer, and process video or optical image frames. *Id.* at 5:18–21. Communication bus 24 protrudes from back housing 25 and can be connected to a communication bus of another device, or a wireless transmission device can transmit signals to a wireless receiver in vehicle 12. *Id.* at 5:21–6:2.

d. Analysis

TRW contends that claims 1–3, 6–12, 16, 18–21, 23–31, 33–36, 38, 76–80, and 82–85 are unpatentable under 35 U.S.C. § 103(a) over Campbell, Goldbeck, and Kuehnle. For reasons that follow, TRW has demonstrated a reasonable likelihood of prevailing with respect to its challenge of these claims.

Regarding claim 1, TRW asserts that Campbell discloses the claimed vehicle accessory system comprising a mounting element (bracket 1) that is attached to vehicle windshield 31 by an attachment portion at a first side (flat front surface 14), a module (optical device 2) detachably mounted to a back surface 18 of bracket 1, where optical device 2 has front surface 39 facing toward windshield 31 when optical device 2 is mounted at bracket 1 and a cabin facing side (Fig. 2), a digital camera disposed in optical device 2 and having lens element 45 viewing forwardly through the vehicle windshield via a generally wedge-shaped structure (opening 35) of front surface 39 of module housing to capture image data for a driver assistance system (i.e., roadway images for lane detection), wherein electrical circuitry is disposed in optical device 2 and communicates over flexible cable 4 that routes signals between optical device 2 and vehicle 3. Pet. 13–20, 22–23.

TRW asserts that Campbell does not disclose a CMOS camera but such cameras were well-known, as illustrated by Goldbeck, which teaches the use of a CMOS imaging array in place of “commonly used CCD [digital] cameras.” Pet. 18–19. TRW asserts that a skilled artisan would have recognized that a CMOS camera yielded predictable results and an improved system over Campbell’s digital camera for the same basic lane detection system as Campbell. *Id.* at 19. Dr. Homayoon Kazerooni states that a

CMOS camera is combinable with Campbell and an improvement in forward facing windshield camera systems. Ex. 1008 ¶¶ 29–30.

TRW asserts that Campbell suggests that opening 35 bevels and tapers from front surface 39 of module 2 toward lens element 45, but does not state that opening 35 in front of lens 45 is “generally wedge-shaped.” Pet. 20, 23. TRW asserts that Kuehnle discloses a front face of housing member 21 with a generally wedge-shaped recess in Figures 2 and 3. *Id.* at 20–21. TRW further asserts that Figure 3 of Kuehnle illustrates a wedge shape forward of a camera lens with tapered perspective lines.² *Id.* at 21. TRW contends that this shape is well-known for camera housings and allows cameras to have a desired outward field of vision, and Campbell provides further motivation to use Kuehnle’s wedge-shaped structure by teaching that lens element 45 can be “located within or behind opening 35.” *Id.* Dr. Kazerooni states that Kuehnle discloses “a generally wedge-shaped structure” and is combinable with Campbell because both references disclose substantially forward-facing cameras for a front windshield. Ex. 1008 ¶ 31. Dr. Kazerooni also states that combining structural features of Kuehnle’s housing into Campbell’s housing involves the application of basic obvious structural design choices that are well within the capabilities of a skilled artisan. *Id.*; *see id.* ¶ 27.

Magna argues that Campbell does not state that opening 35 is tapered, and Figure 5 of Campbell shows opening 35 with parallel edge lines that indicate that opening 35 does not taper. Prelim. Resp. 37. Magna further argues that Kuehnle does not illustrate or discuss the “recess” in Figures 2

² TRW asserts that the ’593 patent illustrates recess 2113 with converging or tapered perspective lines in Figure 66D. Pet. 21.

and 3, and it is impossible to conclude that the void in front housing member 21 discloses the claimed tapered recess because the majority of the void is obscured by the front surface of front housing member 21 and not visible. *Id.* at 38–39. Magna asserts that the drawing lines on the side of the void in front housing 21 indicate the void does not taper “as *the lines are parallel and do not angle or converge.*” *Id.* at 38. Magna argues that Dr. Kazerooni does not explain why Kuehnle has a wedge-shaped structure. *Id.* at 39.

Magna’s arguments are not persuasive in view of our construction of “generally wedge-shaped structure” to mean “a structure that tapers from a wider portion at one end to a narrower portion at the other end.” Kuehnle discloses front housing 21 that tapers from a wider opening at the front surface of front housing 21 to a narrower opening where optical detector 23 is inserted into front housing 21. Ex. 1006, Figs. 2, 3. Kuehnle illustrates the recess with tapering or converging lines at the bottom of the recess.³ *Id.*

TRW asserts that Kuehnle discloses communication bus 24 that can be connected to a communication bus of another device and therefore it was well-known in the art to have a forward-facing windshield camera accessory system communicate with other vehicle systems over a communication bus. Pet. 23. Dr. Kazerooni states that Kuehnle and Goldbeck teach the well-known use of a communication bus. Ex. 1008 ¶ 31.

Magna argues that Kuehnle’s “communication bus 24” is an electrical connector for connecting the circuitry of Kuehnle’s camera to an electrical

³ Campbell discloses tapered opening 12 in bracket 1 in Figure 3 and teaches that optical device is mounted to this bracket 1. Ex. 1004, 7:22–23. The ’593 patent illustrates recess 2113 with converging line in Figures 66B, 66C, 68B, and 68C.

wire or wires of the vehicle. Prelim. Resp. 35. Magna asserts that TRW relies on communication bus 24 for the claimed “connector for connecting to said vehicle communication bus.” *Id.* at 36.

Magna’s arguments are not persuasive in view of the disclosure in Kuehnle that communication bus 24 protrudes from back housing member 25 and can be connected to a communication bus of another device. Ex. 1006, 5:21–23, Fig. 2. Kuehnle also discloses that when sensor 20 detects moisture by acquiring a two-dimensional optical image array with optical detector 23, the acquired optical image data is transmitted from optical detector 23 to microprocessor circuitry 22 via a communication bus or wireless transmissions, and circuitry 22 processes and analyzes the optical image data. *Id.* at 5:23–6:9, Fig. 5. Thus, Kuehnle discloses element 24 in Figure 2 as part of a vehicle communication bus that transmits signals from optical detector 23 and microprocessor circuit 22 to other vehicle systems.

Magna asserts that TRW did not establish that Goldbeck qualifies as a printed publication under 35 U.S.C. § 102(b). Prelim. Resp. 10–11. Magna asserts that TRW failed to provide sufficient evidence that Goldbeck was publicly accessible prior to the alleged 2002 priority date of the ’593 patent. *Id.* at 11. Magna’s arguments are not persuasive in view of the current record, which includes a 1999 copyright to IEEE that appears on the first page of Goldbeck with the amount “\$10.00” immediately preceding the copyright. Ex. 1005, 1. On the record before us, we are persuaded that the 1999 date appears to be an accurate statement as to when IEEE made this document publicly available.

(1) Level of Ordinary Skill in the Art

Magna asserts that TRW's Petition defines a person of ordinary skill in the art differently than TRW's expert, Dr. Kazerooni. Prelim. Resp. 16–17. Magna asserts that the Petition defines a skilled artisan as someone with “at least the qualifications of or equivalent to either a[n] undergraduate degree in electrical engineering or mechanical engineering with course work or research in automobile accessory systems with at least two years of work making automobile accessory systems.” *Id.* (quoting Pet. 13). Magna argues that Dr. Kazerooni defines a skilled artisan as someone with “at least the qualifications of or equivalent to an undergraduate degree in mechanical engineering with at least two years of work adapting computer vision systems for mounting in automobiles.” *Id.* at 17 (quoting Ex. 1008 ¶ 10).

In fact, Dr. Kazerooni's Declaration provides two definitions of a person of ordinary skill in the art. Dr. Kazerooni states that:

In view of at least the types of problems encountered in the art, the prior art solutions to those problems and the high sophistication of the technology, all as addressed herein, it is submitted that the person of ordinary skill in the art of the '593 Patent at the time of the invention would have had at least the qualifications of or equivalent to either a undergraduate degree in electrical engineering or mechanical engineering with course work or research in automobile accessory systems with at least two years of work making automobile accessory systems.

Ex. 1008 ¶ 32. This discussion appears in a section of Dr. Kazerooni's Declaration titled “LEVEL OF ORDINARY SKILL.” Ex. 1008 ¶ 32. This discussion of level of ordinary skill in paragraph 32 follows Dr. Kazerooni's discussion of the “STATE OF THE ART IN THE RELEVANT TIMEFRAME” in paragraphs 25 through 31. *Id.* ¶¶ 25–31. The definition

of a skilled artisan in paragraph 32 of Dr. Kazerooni's Declaration matches TRW's definition of a skilled artisan in the Petition and is cited as the basis of TRW's definition of a skilled artisan. *See* Pet. 13; Ex. 1008 ¶ 32.

Another definition of a skilled artisan appears in Dr. Kazerooni's Declaration in a section titled "SUMMARY OF OPINIONS." Ex. 1008 ¶ 10. It is unclear what use, if any, is made of this definition of a skilled artisan that appears in paragraph 10 of Dr. Kazerooni's Declaration. For the purposes of this decision, and at this stage of the proceeding, we understand TRW and Dr. Kazerooni to rely on the same definition for a skilled artisan, which definition appears at page 13 of the Petition and paragraph 32 of Dr. Kazerooni's Declaration.

(2) Qualifications of Dr. Kazerooni

Magna also asserts that the Board should disregard the Declaration of Dr. Kazerooni because TRW and Dr. Kazerooni have not established that Dr. Kazerooni can attest to the perspective of a skilled artisan in the relevant technology at the time of the invention. Prelim. Resp. 18, 55–59. Magna asserts that Dr. Kazerooni's definition of a skilled artisan differs from that of the Petition and his declaration fails to show that Dr. Kazerooni is familiar with the perspective of a skilled artisan at the relevant time or that he is qualified to testify about making automobile accessory systems or computer vision systems for mounting in automobiles. *Id.*

Based on the current record, Magna's arguments are not persuasive in view of our discussion *supra* regarding the level of ordinary skill in the art, and Dr. Kazerooni's identification of the relevant period of the technology at issue as the January 31, 2003 original filing date of parent Application No. 10/355,454 of the '593 patent, and the 2002 filing dates of provisional

applications from which Application No. 10/355,454 claimed priority. Ex. 1008 ¶ 25. The filing dates of the other, later continuations and divisions would establish relevant timeframes for any inventions related to disclosures added in those later continuations.

Dr. Kazerooni states that his experience as a Professor of Mechanical Engineering at the University of California, Berkeley, during this time frame gives him familiarity with the state of the art because he taught students who were employed subsequently in engineering jobs where they undertook routine assignments such as the design of mounting structures for electronics and optoelectronics. *Id.* ¶ 26. Dr. Kazerooni states that he has more than 28 years of experience in mechanical engineering and holds a Ph.D. and M.S. in Mechanical Engineering from the Massachusetts Institute of Technology in design, control systems, robotics, and manufacturing machines. *Id.* ¶¶ 11–12. As Professor in the Mechanical Engineering Department at the University of California, Berkeley, Dr. Kazerooni teaches graduate and undergraduate courses in design, electromechanical devices, robotics, and control and has received numerous awards and affiliations. *Id.* ¶ 13. Dr. Kazerooni’s research includes machine design, robotics, control systems, mechatronics, orthoses, prostheses, bioengineering, and power and propulsion. *Id.* ¶¶ 17–18. At this point of the proceeding, based on the record before us, we consider Dr. Kazerooni qualified to address the level of ordinary skill in the art and the other matters discussed in his Declaration.

*(3) Claims 1–3, 6–12, 16, 18–21, 23–31,
23–31, 33–36, 38, 76–80, and 82–85*

Regarding dependent claims 2 and 3, TRW contends that Campbell discloses that mounting bracket 1 is “flat” and can be made of any suitable

material, including metal, as recited in claim 2. Pet. 28 (citing Ex. 1004, 6:11, 5:5–6). TRW asserts that Campbell discloses notches 37 on optical device 2 that lock into groove members 19 on mounting bracket 1, and a skilled artisan would understand that the attachment is a “snap attachment” as recited in claim 3, because notches 37 lock into groove member 19 after aligning support extension 36 with elongated opening 13. *Id.* at 28.

Magna argues that TRW admits that Campbell does not use the word “snap” in relation to attachment of module 2 to mounting bracket 1. Prelim. Resp. 40. Magna asserts that TRW’s statement that Campbell provides two-step instructions that a skilled artisan would understand to constitute a “snap attachment” does not explain clearly whether TRW relies on inherency or obviousness to teach a snap feature in Campbell. *Id.* Magna further argues that Campbell’s disclosure of locking notches 37 into groove members 19 does not show a snap attachment inherently. *Id.* at 40–41. Magna asserts that TRW does not explain how Campbell’s instructions constitute a “snap attachment.” *Id.* Magna does not provide any arguments regarding claim 2.

Magna’s arguments are not persuasive in view of Campbell’s teaching that support extension 36 on optical device 2 are placed inside opening 13 and then notches 37 are “locked” into groove members. Ex. 1004, 7:22–27, Fig. 6. Campbell also teaches that the optical assembly device is “easily removable when mounted to the windshield of a vehicle.” *Id.* at 1:4–7.

TRW asserts that Campbell discloses a lens spaced from the vehicle windshield, as recited in claim 6, and protruding from the module into the wedge-shaped structure, as recited in claim 7. Pet. 28–29. TRW contends that Campbell discloses that lens element 45 is located within or behind opening 35 and lens element 45 located behind opening 35 would space lens

45 from the vehicle windshield when module 2 is attached to mounting bracket 1 at windshield 31. *Id.* at 29. Regarding claim 7, TRW asserts that Campbell discloses lens element 45 as generally convex in Figure 5 and at least this convex portion would protrude from module 2 into opening 35. *Id.* TRW argues that Kuehnle illustrates how a lens portion of camera 23 would protrude into the wedge-shaped structure of housing 21 in Figure 2. *Id.*; *see* Prelim. Resp. 19 (claim 7 requires the lens to protrude at least partially *into* the wedge shaped structure). Magna does not present arguments for claim 6.

Regarding claim 8, TRW asserts that Figures 2–4 of Kuehnle disclose wedge-shaped structure in front housing 21 angled relative to the front face of module 20. Pet. 29–30. Magna argues that Kuehnle does not suggest that the opening is angled relative to the plane of the face of housing 21. Prelim. Resp. 42. Magna contends that many lines in Figure 2 are parallel and do not show how the opening is angled relative to the front face. *Id.* at 42–43.

Magna’s arguments are not persuasive because claim 8 requires that the wedge-shaped structure is “angled relative to the general plane of the windshield-facing side of said module.” Figures 2 and 3 of Kuehnle disclose a recess that is angled relative to a front surface of front housing 21. Claim 8 does not specify a particular angle.

Claim 9 recites that, with the mounting element attached at the vehicle windshield and the module mounted at the mounting element, the angling relative to the general plane of the windshield sets the principal axis of the forward field of view of the camera generally at or below horizontal. Claim 10 recites that the principal axis of the forward field of view of the camera is generally at or below horizontal with the module mounted at the mounting element. TRW asserts that Campbell discloses that imager 44 captures “an

image of the roadway ahead of the vehicle” and therefore the forward field of view of the camera captures images below horizontal, as recited in claims 9 and 10, because the road is below the vehicle windshield. Pet. 30–31 (citing Ex. 1004, 7:16–17). TRW asserts that Kuehnle discloses that the optical detector is “pointed down toward the hood of the automobile” and the region of interest may be lowered further when ambient light does not illuminate the hood. *Id.* (citing Ex. 1006, 5:10, 4:13–16).

Magna argues that claim 9 requires that “said angling [of the wedge-shaped structure] relative to the general plane of the windshield-facing side sets the *principal axis* of the forward field of view of said camera generally at or below horizontal,” and a camera with a field of view that captures images below horizontal does not necessarily have a principal axis that is below horizontal. Prelim. Resp. 43–44 (emphasis added). Magna asserts that Campbell’s lens 45 is directed skyward and above horizontal. *Id.* at 44–45. Magna also argues that replacing Campbell’s camera opening with Kuehnle’s opening results in Campbell’s module with Kuehnle’s opening. *Id.* at 46. Magna argues that Kuehnle shows module 20 with two faces in Figure 3, and Figure 1 shows camera mounted to the windshield by the upper face. *Id.* at 46–47.

Magna’s arguments are not persuasive in view of the disclosure in Kuehnle that sensor 10 is installed on an upper part of the windshield so the optical detector points down toward the hood of automobile 12 or roadway. Ex. 1006, 5:8–10, 7:5–13. This orientation sets the principal axis of the forward field of view of optical detector 23 at or below horizontal, as recited in claims 9 and 10. Combining Kuehnle’s wedge-shaped structure with Campbell would include Kuehnle’s housing 21, as housing 21 provides the

wedge-shaped structure that forms the tapered opening for optical detector 23. Orienting the principal axis of the camera of the modified Campbell device at or below horizontal, as taught by Kuehnle, is consistent with Campbell's teaching that the camera's field of view is set at the roadway.

TRW asserts that Kuehnle discloses a detachable cover (back housing member 25) that is detachable to access the camera, as recited in claim 11. Pet. 31. TRW asserts that back housing member 25 is detachable by screws 26 to access the camera 23. *Id.* (citing Ex. 1006, 5:11–15, Figs. 2, 4).

Magna argues that TRW failed to provide a reason why it would have been obvious to modify Campbell with this feature of Kuehnle. Prelim. Resp. 25. Magna also argues that Kuehnle merely states that front housing member 21 and back housing member 25 are secured together by screws 26 and there is no disclosure that screws 26 are removable to allow detachment of one housing member from another. *Id.* at 25–26. Magna contends that TRW's reliance on Kuehnle for a communication bus and camera opening is unrelated to the detachable cover so any reason to include Kuehnle's bus and opening in Campbell does not apply to the detachable cover. *Id.* at 26.

Magna's arguments are not persuasive in view of TRW's proposal to modify Campbell with the wedge-shaped structure of Kuehnle's housing 21 to provide a wedge-shaped structure that forms a recess for optical detector 23. Kuehnle further teaches that housing 21 includes back housing 25 and front and back housings 21, 25 are secured together by screws 26.

TRW asserts that Kuehnle discloses a wedge-shaped structure that is widest at the vehicle windshield and tapers from the windshield towards where the camera is located, as recited in claim 12. Pet. 31 (citing Ex. 1006, Figs. 2, 3). TRW that asserts that the perspective lines in Figures 2 and 3

provide details of the wedge-shaped structure. *Id.* at 31–32. Magna argues that Figures 1 and 2 of Kuehnle do not show any tapering from the vehicle windshield towards the camera because the straight, parallel lines indicate, at most, a generally cylindrical, non-tapering passageway. Prelim. Resp. 48.

Magna’s arguments are not persuasive in view of the disclosure in Figures 2 and 3 of Kuehnle of front housing 21 including an opening on a front face that is wider or of greater dimensions than a second opening at the rear portion of housing 21 where optical detector 23 is inserted into front housing 21. As a result, the opening at the front portion of front housing 21 tapers or decreases in size toward the rear of front housing 21 where optical detector 23 protrudes into front housing 21.

TRW asserts that Goldbeck discloses a CAN bus, as recited in claim 16, by disclosing a CAN infrastructure, onboard CAN interface, and CAN bus. Pet. 32. Magna does not present any arguments for claim 16.

TRW asserts that Kuehnle discloses a printed circuit board in module 20 with electronic circuitry comprising microprocessor 22 and memory, as recited in claim 18, wherein the electronic circuitry communicates over a communication bus to activate a vehicle system (windshield wipers 11), as recited in claim 19. Pet. 32–33 (citing Ex. 1006, 5:18–21, 6:21, Fig. 2).⁴ TRW asserts that it is well-known in the art for microprocessors to have their own power supply, and Campbell discloses that module 2 receives power directly from cable 4 or from a battery in or on optical device 2. *Id.*

⁴ TRW also relies on Kuehnle to disclose these same features in claims 27–29, which depend directly from claim 1. *See* Pet. 36–37.

Magna argues that TRW fails to explain why a skilled artisan would have modified Campbell to include Kuehnle's microprocessor circuitry 22, as recited in claims 18 and 19. Prelim. Resp. 23–24, 25. Magna asserts that reliance on Kuehnle's for a camera and communication bus does not apply to modifying Campbell with Kuehnle's microprocessor circuitry. *Id.* at 23.

Magna's arguments are not persuasive in view of TRW's reliance on Kuehnle for a more specific disclosure of electrical circuitry of a windshield camera communicating over Kuehnle's vehicle communication bus. Pet. 23. Kuehnle discloses microprocessor 22 that communicates over bus 24, which TRW has incorporated into Campbell for claim 1. Campbell also discloses generally that circuitry is configured inside optical device 2. Pet. 22–23.

TRW contends that Kuehnle outputs a status indication over a vehicle communication bus, as recited in claim 20, and rain sensor status or exterior condition status from rain sensor module 20, as recited in claim 21. Pet. 33–34. Magna argues that TRW has not explained why it would have been obvious to apply Kuehnle's circuitry and rain sensor module to Campbell's optical assembly. Prelim. Resp. 26–28.

Magna's arguments are not persuasive in view of TRW's reliance on Kuehnle to disclose electrical circuitry communicating signals from optical detector 23 of sensor 20 over Kuehnle's bus 24, as discussed *supra* for claims 18 and 19. Pet. 22–23; *see* Ex. 1006, 5:18–6:21.

Claim 23 recites that “said electrical circuitry receives an input over said vehicle communication bus from at least one system of the equipped vehicle.” Claim 24 recites that the input received over the communication bus comprises, *inter alia*, vehicle speed and turn signal status. TRW asserts that Campbell suggests these features by disclosing that flexible cable 4

routes signals for vehicle status (speed, turn signals), disable inputs, and warning/stereo mute signals between optical device 2 and vehicle 3. Pet. 34–35. TRW also asserts that Kuehnle discloses that microprocessor circuitry 22 receives data input from the vehicle, including windshield wiper 11 status. *Id.* at 35. Magna does not present arguments for these claims.

TRW contends that Kuehnle discloses a multi-pin connector 24 that connects to the vehicle communication bus, as recited in claims 25 and 26. *Id.* at 35–36 (citing Ex. 1006, 5:21–23, Fig. 4). Magna argues that element 24 is an electrical connector for connecting circuitry of Kuehnle’s camera to electrical wires of the vehicle. Prelim. Resp. 35. Magna’s argument is not persuasive because Kuehnle discloses element 24 as a communication bus that can be connected to a communication bus of a vehicle device, as discussed *supra* for claim 1. *See* Ex. 1006, 5:21–23, Fig. 4.

Claims 27–29 recite electrical circuitry comprising a microprocessor, memory, and power supply, respectively. As for claim 18, TRW argues that Kuehnle discloses a microprocessor and memory, and power supplies are well known and taught by Campbell. Pet. 36–37. Magna asserts that TRW alleges that Kuehnle suggests these limitations but TRW does not establish the obviousness of claims 27–29. Prelim. Resp. 24. Magna’s arguments are not persuasive for the reasons set forth *supra* for claim 18.

TRW asserts that Campbell discloses that bracket 1 is attached fixedly to vehicle windshield 31 by an adhesive, as recited in claims 30 and 35. Pet. 37, 40. Magna does not present arguments for claims 30 and 35.

TRW asserts that Kuehnle shows a windshield-facing side of housing 21 of module 20 with a wedge-shaped recess that forms part of the wedge-shaped structure recited in claim 31, and Kuehnle discloses a principal axis

of the forward field of view of the camera directed toward the hood or lower and therefore at or below horizontal, as recited in claim 34. Pet. 37, 39–40. TRW also relies on earlier discussions of these features in claims 1 and 9. TRW asserts that Campbell teaches structure for module 2 that compensates, at least partially, for windshield angle, as recited in claim 33. Pet. 37–39.

Magna asserts that TRW has failed to establish that any of the asserted references discloses a wedge-shaped structure of claim 31 for the reasons discussed for claim 1. Prelim. Resp. 48–49. Magna asserts that Campbell teaches that camera lens 45 is oriented perpendicular to the front surface 39 of optical device 2 so that the viewing axis is oriented above horizontal and is not angled to compensate for the slant of the windshield as required by claim 33. *Id.* at 50. Magna does not present arguments for claim 34.

Magna’s arguments regarding claim 31 are not persuasive in view of Kuehnle’s disclosure of housing 21 with wedge-shaped structure that tapers from a wider opening to a narrower opening into which optical detector 23 protrudes. Magna’s arguments as to claim 33 are not persuasive in view of Campbell’s disclosure of optical device 2 with front surface 39 that orients lens element 45 perpendicular to windshield 31. Ex. 1004, Figs. 2, 5, 6. This orientation would “at least partially compensate for the windshield angle of the vehicle windshield” under a broadest reasonable interpretation.

TRW asserts that Campbell discloses the use of its system and imager 44 as a lane departure warning system, as recited in claim 36 (option i). Pet. 40. TRW also asserts that Campbell discloses that many other active and passive vehicle safety and driver assistance applications are possible, and Goldbeck discloses the use of a forward facing camera accessory system and CMOS camera for such applications that determine lane boundaries, detect

obstacles, and interpret road signs, as recited in claim 36 (options i, iii, and v–vii) and claim 38 (options i–iv). Pet. 41–42.

Magna asserts that Campbell and Goldbeck, at best, show that camera data may be used to detect obstacles instead of lanes, rather than to provide camera data “*to at least two systems,*” as recited in claim 38. Prelim. Resp. 51–52 (emphasis in original). Magna does not argue claim 36.

Magna’s arguments are not persuasive in view of Campbell’s teaching that optical assembly 2 may be used with many other active and passive vehicle safety and driver assistance applications, and Goldbeck’s teaching of such multiple uses of camera image data including obstacle detection, which encompasses pedestrian and vehicle detection, which are two systems listed in claim 38 as options iiiii and iv.

TRW asserts that independent claim 76 recites substantially identical subject matter as claim 1, except for the “generally wedge-shaped structure,” which is recited in dependent claim 77, and the inclusion of subject matter from claims 6, 18–21, 23, 24, 38, 39, and 41. Pet. 42. TRW incorporates by reference its analysis of claims 1, 6, 18–21, 23, 24, 38, 39, and 41 into its arguments regarding claims 76 and 77. *Id.* at 42–48.

Magna argues that TRW’s reliance on Kuehnle’s microprocessor circuitry 22 fails to provide an explanation of obviousness. Prelim. Resp. 25. This argument is not persuasive for the reasons set forth for claim 19.

Regarding dependent claims 78–80 and 82–85, TRW asserts that the features recited in these claims are essentially the same as subject matter of claims 8–12, 16, 20, 21, 24–26, 31, and 33, and are rendered obvious by one or more of Campbell, Kuehnle, and Goldbeck, as set forth for claims 8–12, 16, 20, 21, 23–26, 31, and 33. Pet. 48–52. Magna asserts that TRW does

not explain why it would have been obvious to modify Campbell with Kuehnle's detachable cover, as recited in claim 80, or add Kuehnle's microprocessor circuitry to Campbell to provide status indications, as recited in claim 83. Prelim. Resp. 25–28. Magna's arguments are not persuasive for the reasons discussed *supra* for claims 11, 20, and 21. *See id.* (arguing claims 11 and 80 as a group and claims 20, 21, and 83 as a group).

2. *Obviousness of Claims 22, 37, and 39 Over Campbell, Goldbeck, Kuehnle, and Yanagawa*

a. *Overview of Yanagawa (Ex. 1007)*

Yanagawa discloses a system that uses an imaging apparatus to recognize headlights and taillights of other vehicles and control a vehicle's headlights automatically. Ex. 1007, 1 (3. Detailed description).

b. *Analysis*

TRW asserts that claims 22, 37, and 39 are unpatentable under 35 U.S.C. § 103(a) over Campbell, Goldbeck, Kuehnle, and Yanagawa. For reasons that follow, TRW has demonstrated a reasonable likelihood of prevailing with respect to its challenge of claims 22, 37, and 39.

TRW asserts that Yanagawa discloses that it was well-known in the art to control and activate automatically the high beams of a headlight based on output of forward-facing camera 11 communicated to headlight switch 17. Pet. 52, 54, 55. TRW contends that Yanagawa may be combined with Campbell's camera module and teachings of Campbell, Goldbeck, and Kuehnle because Yanagawa presents an example of the many other possible driver assistance applications suggested by Campbell, and very similar basic image processing tasks for driver assistance systems, as taught by Goldbeck. *Id.* at 52–53. TRW asserts that it would have been obvious to communicate Yanagawa's camera output over Kuehnle's communication bus because that

is the very purpose of such a bus. *Id.* at 55 (citing Ex. 1008 ¶ 31). Magna does not present arguments for claim 22. *See* Prelim. Resp. 28–29.

TRW asserts that Yanagawa’s disclosure of high beam activation discloses a headlamp control system, as recited in claim 37, and Yanagawa also teaches that image data from camera 11 is capture and used to control the vehicle’s headlamps, as recited in claim 39. Pet. 56–58. Magna argues that TRW fails to explain why it would have been obvious to modify an already-modified Campbell with Yanagawa’s headlamp control system and it is unclear how TRW’s rationale for claim 22 applies to claims 37 and 39, which recite headlamp control systems. Prelim. Resp. 28–29. Magna also argues that Yanagawa’s disclosure of an analog television camera does not teach a camera capturing “image data” as recited in claim 39. *Id.* at 29–30.

Magna’s arguments are not persuasive in view of TRW’s assertion that Yanagawa’s high beam activation system discloses a headlamp control system of claims 37 and 39. *See* Pet. 56, 57. Use of camera image data to activate high beams thereby controls a vehicle headlamp. Nor has Magna persuaded us that images captured by Yanagawa’s television camera are not image data under a broadest reasonable interpretation. Campbell, Kuehnle, and Goldbeck disclose the use of image data, and Yanagawa teaches to use image data for high beam activation and headlamp control.

III. CONCLUSION

For the foregoing reasons, TRW has demonstrated that a reasonable likelihood exists that it would prevail in establishing the unpatentability of claims 1–3, 6–12, 16, 18–31, 33–39, 76–80, and 82–85 of the ’593 patent. At this stage of the proceeding, we have not made a final determination as to the patentability of any challenged claim.

IV. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314, an *inter partes* review is instituted on the following grounds:

1. Claims 1–3, 6–12, 16, 18–21, 23–31, 33–36, 38, 76–80, and 82–85 under 35 U.S.C. § 103(a) as obvious over Campbell, Goldbeck, and Kuehnle.
2. Claims 22, 37, and 39 under 35 U.S.C. § 103(a) as obvious over Campbell, Goldbeck, Kuehnle, and Yanagawa.

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, *inter partes* review of the '593 patent shall commence on the entry date of this Order and notice is hereby given of the institution of a trial.

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Patent 8,508,593 B1

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