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Paper No. 35
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLKSWAGEN GROUP OF AMERICA, INC. and
PORSCHE CARS NORTH AMERICA, INC.,
Petitioner,

v.

YECHEZKAL EVAN SPERO,
Patent Owner.

IPR2023-00315*
Patent 9,955,551 B2

Before JON M. JURGOVAN, JASON W. MELVIN, and
AARON W. MOORE, *Administrative Patent Judges*.

MELVIN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Dismissing Petitioner's Motion to Exclude Evidence
37 C.F.R. § 42.64(c)

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* Porsche Cars North America, Inc, which filed a petition in IPR2023-01225, has been joined as a party to this proceeding.

I. INTRODUCTION

Volkswagen Group of America, Inc. ("Volkswagen") filed a Petition (Paper 2, "Pet.") requesting *inter partes* review of claims 24–55 of U.S. Patent No. 9,955,551 B2 (Ex. 1001, "the '551 patent"). Yechezkal Evan Spero ("Patent Owner") filed a Preliminary Response. Paper 6. We instituted review. Paper 11 ("Institution Decision" or "Inst."). Following institution, Porsche Cars North America, Inc. ("Porsche"), filed a petition for *inter partes* review and a Motion for Joinder in IPR2023-01225, requesting that Porsche be joined as a petitioner to this proceeding. IPR2023-01225, Papers 1, 3. We instituted trial in IPR2023-01225, granted the Motion for Joinder, and added Porsche as a petitioner here. *Id.*, Paper 10. A copy of that decision was entered into the record of this proceeding. Paper 23. Thus, Volkswagen and Porsche are, collectively, "Petitioner" here.

Patent Owner filed a Response (Paper 16, "PO Resp."), Petitioner filed a Reply (Paper 19, "Pet. Reply"), and Patent Owner filed a Sur-Reply (Paper 22, "PO Sur-Reply").

Petitioner filed a Motion to Exclude Evidence (Paper 27, "Mtn. Exclude"), which Patent Owner opposed (Paper 28, "Opp. Mtn. Exclude"), and Petitioner filed a Reply (Paper 31, "Reply Mtn. Exclude").

We held an oral hearing on March 20, 2024. Paper 34 ("Tr.").

For the reasons below, we conclude that Petitioner has proven claims 24, 26, 28–32, 34, 36–40, 42, and 44–47 unpatentable, but has not proven any of claims 25, 27, 33, 35, 41, 43, and 48–55 unpatentable.

A. REAL PARTIES IN INTEREST

Petitioner Volkswagen identifies itself as the real party in interest. Pet. 89. Petitioner Porsche identifies itself and its affiliate Dr. Ing. h.c. F. Porsche

Aktiengesellschaft as the real parties in interest. IPR2023-01225, Paper 1, 87. Patent Owner identifies itself as the real party in interest, noting that Torchlight Technologies LLC is the exclusive licensee of the ’551 patent. Paper 4, 1 (Patent Owner’s Mandatory Notices).

B. RELATED MATTERS

The parties identify that the ’551 patent is the subject of concluded reexamination control number 90/014,815 and pending reissue application 16/858,342. Pet. 89; Paper 4, 1–2.

Patent Owner identifies the following related federal district court litigations involving the ’551 patent: *Torchlight Techs. LLC v. Daimler AG et al.*, Case No. 1:22-cv-00751 (D. Del.); *Torchlight Technologies LLC v. General Motors LLC et al.*, No. 1:22-cv-00752 (D. Del). Paper 4, 1.

Patent Owner identifies also the following PTAB *inter partes* reviews of the ’551 patent: *Volkswagen Group of America, Inc., v. Yechezkal Evan Spero*, IPR2023-00318 (pending); *Volkswagen Group of America, Inc., v. Yechezkal Evan Spero*, IPR2023-00336 (pending). Paper 4, 2.[2]

C. THE ’551 PATENT

The ’551 patent is titled “Detector Controlled Illuminating System” and relates to an “illuminating device” whereby “illumination intensity and spectrum” are varied to illuminate “areas according to the principles of correct lighting practice,” e.g., “adapt to ambient lighting, movement, visual tasks being performed, and environmental and personal conditions.” Ex. 1001, codes (54),

[2] Patent Owner further lists matters involving patents related to the ’551 patent. Paper 4, 2 (identifying IPR2022-01500, IPR2022-01586, IPR2023-00197, IPR2023-00328, IPR2023-00335).

(57). The specification generally describes a lighting device that "incorporates one or more discrete light sources and their ancillary optical and electrical control equipment in an integrated illuminating element." *Id.* at 13:34–36. The combined unit is referred to as a Digital Lighting Fixture (DLF). *Id.* at 18:18–22.

The specification further describes transportation vehicle applications. *Id.* at 50:38–57:37. One such application involves a DLF headlamp device that includes a cluster of LEDs for flexible illumination. *Id.* at 50:50–58. With LEDs having a variety of aims, the headlamp's light distribution pattern may be controlled based on a number of factors, including detected oncoming vehicles. *See id.* at 51:43–47, 52:59–65.

D. CHALLENGED CLAIMS

Petitioner challenges claims 24–55 of the '551 patent. Pet. 1, 3. Claim 24 is independent and is reproduced, below, with limitation identifiers reproduced from the Petition's claim appendix (Pet., Appx B):

[.p] 24. An illuminating device having automatic control of light provided to an illuminated area comprising:

[.1] a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;

[.2] a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;

[.3] electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;

[.4] one or more processors;

[.5] one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area, at least one of said cameras in

communication with power, and in communication with at least one of the one or more processors;

[.6] a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and

[.7] memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:

[.8] determine coordinates corresponding to another vehicle, based on the coordinate-specific information;

[.9] select a cluster of the LEDs that emit light toward at least a portion of the other vehicle based on the LEDs having emission aimings associated with the first coordinates; and

[.10] change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the cluster to create headlamp illumination that preserves a first level of illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle.

Ex. 1035 (Reexam. Cert.), 1:21–63; Ex. 1002, 1011 (Certificate of Correction). Claims 32 (Ex. 1035, 2:42–3:19), 40 (*id.* at 4:20–5:5), and 48 (*id.* at 6:24–7:5) are the other independent claims and Petitioner asserts that each recites only limitations similar to those of independent claim 24 (Pet. 22–36). Remaining claims 25–31 (Ex. 1035, 1:64–2:41), 33–39 (*id.* at 3:20–4:19), 41–47 (*id.* at 5:6–6:23), and 49–55 (*id.* at 7:6–8:13) depend, directly or indirectly, respectively (as grouped) from independent claims 24, 32, 40, and 48.

E. Prior Art and Asserted Grounds

Petitioner asserts the following unpatentability grounds:

Claims Challenged	35 U.S.C. §	References/Basis
24, 25, 30–33, 38–41, 46–49, 54, 55	103	Beam,[3] Satonaka[4]
26–29, 34–37, 42–45, 50–53	103	Beam, Satonaka, Kobayashi[5]
24, 25, 30–33, 38–41, 46–49, 54, 55	103	Karlsson,[6] Nakamura[7]
26–29, 34–37, 42–45, 50–53	103	Karlsson, Nakamura, Gotou[8]

Pet. 3. Petitioner also relies on the Declarations of Dr. Jianzhong Jiao. Ex. 1003; Ex. 1052.

F. Level of Ordinary Skill in the Art

Petitioner submits that an ordinarily skilled artisan "would have had a bachelor's degree (B.S.) in mechanical engineering, electrical engineering, optical engineering, applied physics, or an equivalent field, as well as at least 2 years of industry experience in the area of automotive lighting and lighting-control systems." Pet. 7 (citing Ex. 1003 ¶¶ 44–46, 67). Petitioner adds that such artisans "may work as part of a team, for example, with computer engineers to

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[3] Beam, U.S. Patent No. 6,144,158, issued Nov. 7, 2000. Ex. 1005, code (45).

[4] English translation of Satonaka et al., Japan Patent Publication No. H7-101291, published Apr. 18, 1995. Ex. 1014, 0001, code (43).

[5] Kobayashi, U.S. Patent No. 6,049,749, issued Apr. 11, 2000. Ex. 1008, code (45).

[6] Karlsson, WIPO Patent Publication No. 98/54030, published December 3, 1998. Ex. 1010, code (43).

[7] English translation of Nakamura et al., Japan Patent Publication No. H7-65603, published Mar. 10, 1995. Ex. 1013, 0001, code (43).

[8] Gotou, U.S. Patent No. 5,588,733, issued Dec. 31, 1996. Ex. 1012, code (45).

integrate/program controllers and various control inputs to affect control of a given light source." *Id.* Patent Owner does not dispute that proposed level of skill (PO Resp. 9), and we adopt it here.

II. ANALYSIS

A. CLAIM CONSTRUCTION

Petitioner asserts that no claim requires express construction. Pet. 7–8. Petitioner notes that, during reexamination of the '551 patent, the Office interpreted "electronic circuitry apparatus for the controlled powering of the LEDs" as a means-plus-function limitation and identified the corresponding structure as "logic control electronics unit 7." *Id.* at 8 (citing Ex. 1002, 929–39; Ex. 1001, 25:34–52).

Patent Owner asserts that "[n]o claim construction is necessary because Patent Owner's arguments do not hinge on the outcome of an actual controversy about claim interpretation." PO Resp. 9. As to the "electronic circuitry apparatus," Patent Owner does not dispute that the claim language reads on the asserted prior art under any construction. Thus, we need not address the construction of that term. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms that . . . are in controversy, and only to the extent necessary to resolve the controversy.'") (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

B. OBVIOUSNESS OVER KARLSSON AND NAKAMURA

Petitioner asserts that claims 24, 25, 30–33, 38–41, 46–49, 54, and 55 are unpatentable as obvious over Karlsson and Nakamura. Pet. 54–79.

Karlsson is titled "A Lighting Device Having a Controllable Lighting Pattern" and is directed to a lighting device that automatically adjusts the lighting

pattern and intensity of a vehicle's headlights to reduce blinding oncoming traffic. Ex. 1010, codes (54), (57). Karlsson's system uses "a plurality of controllable spotlight beams . . . . such as LEDs, which can preferably be controlled either individually or in groups." *Id.* at 13:24–14:4. "[T]he pattern of the emitted light beam is varied automatically in an efficient manner and with maximum sensitivity in response to at least one control signal delivered by light-sensitive sensor." *Id.* at 2:30–35. Karlsson sought to improve road safety, noting that the desire for increased illumination leads to "the problem of blinding oncoming traffic which, in turn, may lead to a hazardous situation." *Id.* at 1:21–26. Karlsson describes that its controllable beams may be responsive to a sensor to provide a desired pattern. *Id.* at 4:25–31. That sensor may detect light from oncoming traffic, including "precisely the direction from which light is being detected, so that subsequently a precise adjustment of the pattern of the light beam can be carried out, for example so as not to emit light in the direction of the detected light." *Id.* at 5:16–32; *accord id.* at 9:18–26 ("glaring or blinding of oncoming traffic is effectively prevented"). Karlsson discloses that it may use a variety of sensors to detect light from oncoming traffic, including "a matrix of photo diodes" and "a photo-sensitive plate as used in modern video cameras." *Id.* at 12:19–24.

Nakamura is titled "Vehicle Headlamp Device" and is directed to "illuminat[ing] [in] front of a vehicle without any reduction of driver visibility even when the vehicle is traveling along a . . . winding road." Ex. 1013, code (57). Referencing a flow diagram of steps (*id.*, Fig. 12), Nakamura discloses that its device operates as follows:

> The positions of the preceding vehicle and oncoming vehicle, the deviation angle, and the output signals of the beam-switching switch are read (202, 204), and the low-beam lamps are controlled to the deflection angle according to the curved road when the high-beam

> lamps are illuminated (light distribution control B, 212). When the high-beam lamps are turned off and the low-beam lamps are not disconnected (208, 210), there will be control to the deflection angle according to the curved road (light distribution control A, 214). When the low-beam lamps are disconnected, the deflection angle will be set to the initial angle when proceeding straight forward (light distribution control C, 216). In this way, it will be possible to perform deflection to the low-beam according to the road shape even when the high-beams are turned on, improving visibility near the vehicle.

Id., code (57); *see also id.* ¶¶ 54–60 (describing Fig. 12).

1. Sensors including a camera (claims 24, 32, 40, 48)

The independent claims recite "one or more sensors, including one or more cameras." *E.g.*, Ex. 1035, 1:35. Petitioner relies on Karlsson's sensors as the claimed camera. Pet. 62–64. We agree with Petitioner that the claim language reads on Karlsson's sensor 23, which it describes as including "a photo sensitive plate as used in modern video cameras." Ex. 1010, 12:22–24.

Patent Owner argues that Karlsson discloses two alternative sensors—"a matrix of photo-diodes" and "a photo-sensitive plate as used in modern video cameras." PO Resp. 43–44 (quoting Ex. 1010, 12:22–24). Patent Owner tacitly recognizes that Karlsson's sensor 23 is a camera, but contends that sensor 23 is disclosed only in connection with Figure 3 and "Karlsson does not disclose that the light source 2 described with reference to Figure 3 embodiment includes a plurality of LEDs." PO Resp. 45. Patent Owner expresses the argument also in connection with the reason to combine, submitting that "the Karlsson-Nakamura combination does not teach a 'a plurality of individually controllable LEDs' compatible with the 'one or more cameras' embodiment." *Id.* at 54.

We do not agree, as Karlsson discloses that LEDs are an exemplary light source. Ex. 1010, 21:13–17; Pet. Reply 19. Karlsson discloses multiple approaches for controlling its light distribution. While one such approach uses a light modulator to control the distribution from a single light source (*see* Ex. 1010, 9:3–6, 12:14–19), Karlsson additionally describes modulating the light source itself (*id.* at 13:24–14:4). Indeed, Karlsson notes that its spotlight beams may be provided either by individually controlled sources (*id.* at 14:1–4) or by a "suitable modulator means" (*id.* at 14:5–15), thus confirming the interchangeability of the two approaches within its disclosed invention. That description of two possible approaches refers to "light source 2," which is the element depicted in multiple figures as the light source. *See id.*, 14:1–4, Figs. 1–4, 7, 8. And Karlsson further describes an embodiment designating "light source 2" as comprising individual light sources controlled in response to sensor 23 (*id.* at 14:22–32),[9] further supporting Petitioner's contention that Karlsson discloses using individually controllable LED with a camera sensor.

Patent Owner submits that Petitioner relies on Karlsson's "matrix of photo diodes as illustrated in Figure 14 for satisfying various control limitations." PO Resp. 46 (citing Pet. 66, 68, 69, 73, 74, 75). Patent Owner contends that Petitioner needed to explain why skilled artisans would have modified Karlsson's Figure 14 embodiment to include a camera sensor rather than the disclosed photo diodes. PO Sur-Reply 16. In the cited portions, however, Petitioner cites Karlsson's Figure 14 as one of several supporting disclosures, not as the sole basis for Petitioner's contentions. Moreover, nothing about Petitioner's contentions

[9] Although the particular embodiment uses light sources coupled through optical fibers, it speaks to Karlsson's disclosure regarding individual light sources in combination with camera sensors.

relies on an aspect of Figure 14's sensors unique to that embodiment. In particular, Karlsson describes that Figure 14 depicts "an embodiment of a spatial distribution of spotlight sources and spotlight sensors . . . in particular for use in a headlight of a motor vehicle, such as a car." Ex. 1010, 19:18–21. Karlsson describes an approach where distributed sensors may each be coupled with a spotlight source but clarifies that its invention encompasses "manual adjustment of the pattern of the light beam to be emitted" and control "to effect a desired lighting pattern." *Id.* at 20:6–11. In other words, aspects of the Figure 14 embodiment relate to an alternative control strategy that Petitioner does not rely on. For the "plurality of individually controllable LEDs," Petitioner relies on Karlsson's disclosure distinct from the Figure 14 embodiment. Pet. 60 (citing Ex. 1010, 11:29–32, 13:24–29 (disclosing a "plurality of controllable spotlight beams," each that may be "a light beam from LED")). Thus, we do not agree that Figure 14 undermines Petitioner's contentions.

We find that Karlsson discloses a system that may use a variety of configurations but does not limit its exemplary operations to a particular configuration. Thus, by relying on Karlsson's teaching that LEDs may be "controlled either individually or in groups" (Pet. 67–68 (quoting Ex. 1010, 14:1–4) (emphasis omitted)), Petitioner does not also rely on Karlsson's spotlight sensors (which Patent Owner submits are not a "camera"). In sum, we conclude that Petitioner has shown that Karlsson's sensor 23 is the claimed camera and that nothing in Petitioner's contentions or Karlsson's disclosures is inconsistent with a system using that camera with an array of individually controllable LEDs.

2. *Detecting coordinate-specific information (claims 24, 32, 40, 48)*

The independent claims require that the camera is "for detecting coordinate-specific information about the illuminated area" and that the controller's determination is "based on the coordinate-specific information." *E.g.*, Ex. 1035, 1:35–37, 1:51–53. Petitioner contends that Karlsson's camera detects coordinate-specific information about the illuminated area because it is "capable of precisely determining the direction and the intensity of the detected light." Pet. 63 (quoting Ex. 1010, 12:19–22) (emphasis omitted). Petitioner reasons that Karlsson's disclosure would lead skilled artisans to "underst[and] that images received by the camera, and the direction data associated with them, are 'coordinate-specific information about the illuminated area' as claimed because the direction is stored in a format (as coordinates)." *Id.* (citing Ex. 1003 ¶¶ 256–257).

Patent Owner contends that "Karlsson does not disclose storing the direction of the detected light 11 in a format as coordinates." PO Resp. 48. Patent Owner points to Karlsson's description of its Figure 14 embodiment operating without a controller by associating each sensor with a light source and using the sensor to directly control the light source. *Id.* at 48–49. That description, however, does not bear on Petitioner's combination. As described, the combination does not rely on sensors distributed among the light sources, but instead relies on Karlsson's sensor 23. Pet. 62–64. Thus, Patent Owner's reliance on Karlsson's Figure 14 embodiment is inapposite.

Patent Owner does not propose a construction for "coordinate-specific information" that would require something more than Karlsson discloses. We agree with Petitioner's contentions because Karlsson's camera enables Karlsson's system to determine the direction of incoming light sources.

Petitioner further asserts that it would have been obvious "to modify Karlsson's system to map the image with coordinates, as taught by Nakamura, to provide the algorithmic detail implicit in Karlsson." Pet. 63. Patent Owner does not address whether Nakamura discloses the claimed "coordinate-specific information" and instead challenges whether skilled artisans would have had reason to combine the two references' teachings. *See* PO Resp. 54–61. We address that argument below. For the reasons explained by Petitioner, we find that Nakamura discloses the claimed "coordinate-specific information," in that the combined system would both include coordinates associated with detected images and also determine which coordinates in a sensed image correspond to a vehicle. *See* Pet. 54–58, 63, 67.

3. Motivation to combine (claims 24, 32, 40, 48)

As summarized above, Petitioner recognizes that "Karlsson does not expressly disclose how the direction of the target light sources is stored and processed to determine which LEDs to be dimmed to avoid glare," and contends that skilled artisans had reason "to modify Karlsson's system to include the coordinates of the pixels, and the corresponding vehicle recognition process, as taught by Nakamura." Pet. 55–56. Petitioner reasons that the modification "would have expressly provided the algorithm details that are already implicit in Karlsson's system, therefore allowing the coordinates of the traffic ahead to be determined based on the video sensor data." *Id.* at 56 (citing Ex. 1003 ¶¶ 235, 239); *accord id.* at 57 ("The combination would have had the predictable result of providing the algorithm details implicit in Karlsson's system through Nakamura's known technique of mapping pixels in an image."). Petitioner notes the benefits of ensuring the system "accurately identifies traffic ahead and dims its headlights appropriately, improving illumination quality and safety for drivers." *Id.* As to the

modification's challenge, Petitioner asserts that skilled artisans need only have modified Karlsson's software "to include the pixel coordinates and corresponding algorithm in Nakamura" and that Nakamura "explains how to implement the coordinate mapping of the pixels received by a camera." *Id.* at 57–58 (citing Ex. 1013 ¶¶ 25–27, 36–44; Ex. 1003 ¶¶ 243).

Patent Owner asserts that Petitioner's combination is deficient because Karlsson uses a lamp-located sensor whereas Nakamura uses a central-top-windshield sensor. PO Resp. 55. Patent Owner points to Karlsson disclosing advantages of locating the sensor with the illumination system. *Id.* at 56 (citing Ex. 1010, 2:10–18, 3:27–37). Further, Patent Owner emphasizes the changed perspective between a "camera at the center of the windshield near the driver's eyeline," as in Nakamura, and Karlsson's collocated camera–illuminator. *Id.* at 57–59. In Patent Owner's view, Petitioner needs to have accounted for how skilled artisans would have mapped Nakamura's coordinates to Karlsson's LEDs. *Id.* at 59.

As to the advantages of Karlsson's lamp-located sensor, nothing about that arrangement would have changed in the proposed combination. As described, Petitioner proposes using aspects of Nakamura's processing in combination with Karlsson's physical system. *See* Pet. 54–58. Thus, the combination preserves any advantages Karlsson obtains by locating a sensor with each illumination system.

As to a change of perspective, the record does not support that Nakamura's processing relies on a single, unchangeable perspective. Rather, Nakamura discloses identifying relevant image regions through reference markers such as "white lines of the lane" and adjustments such as "correction amount α" to accommodate the reference markers. Ex. 1013 ¶¶ 36–46; *see* Pet. Reply 58 ("Nakamura explains how to implement the coordinate mapping of the pixels

received by a camera."). Thus, Nakamura's approach is already suitable to a changed perspective and Petitioner did not have to explain further details of the required adaption. *See also* Ex. 1052 ¶¶ 125 ("Wherever the camera is located on the vehicle, a simple calibration for camera location versus driver's viewpoint would be conducted to carry on the image processing."), 168 (noting that the same reasoning applies to the Karlsson–Nakamura combination as the Beam–Satonaka combination). Additionally, Patent Owner has not persuasively supported its assertion that the changed perspective—locating sensors at the headlamps rather than centered at the top of the windshield—would impair the system's ability to detect other vehicles. *See* PO Resp. 57–59. Patent Owner's expert could not testify as to the camera locations used to generate the images that form the basis for Patent Owner's argument, as he was not present at the test that generated those images. Ex. 1053, 104:22–105:14, 106:16–107:6, 109:17–110:4.

It is inapposite that "Nakamura does not contemplate LEDs and therefore does not control light in a similar fashion" as Patent Owner argues (PO Resp. 60), because Nakamura's teachings relate to identifying regions in the illuminated field that should be dimmed. Ex. 1013 ¶ 45. Such a determination aligns with Karlsson's own similar determination, and would be implemented by Karlsson's system. *See, e.g.*, Ex. 1010, 9:18–26.

Having considered the full record, we find that skilled artisans would have had reason to modify Karlsson's system with Nakamura's teachings regarding capturing and using image coordinates as summarized above.

4. *Camera "positioned to capture an image of at least one target" (claim 32)*

Independent claim 32, like claim 24, recites "one or more sensors, including one or more cameras" and, unlike claim 24, requires that the claimed camera is

"positioned to capture an image of at least one target." *Compare* Ex. 1035, 2:56–62, *with id.* at 1:35–40. For claim 32, Petitioner relies on the same contentions as for claim 24. Pet. 62–64.

Patent Owner notes that Petitioner's Claim Listing appendix does not include the "positioned" limitation. PO Resp. 11–12 (quoting Pet. App'x B., Element 32.5). Thus, Patent Owner contends that Petitioner fails to make the required showing against claim 32. *Id.* Petitioner, on the other hand, contends that it adequately addressed the claim language by contenting that Karlsson's cameras are "capable of precisely determining the direction and the intensity of the detected light 11." Pet. Reply 24–25 (quoting Pet. 63 (quoting Ex. 1010, 12:19–22, 9:18–22)).

We agree with Petitioner that because it showed Karlsson's camera can determine the light coming from oncoming vehicles, it showed the camera is positioned to capture an image of a target, as claimed. Moreover, Petitioner asserted that Karlsson's camera "has a field of view that coincides with the illuminated area of the headlight, which is an area that can include many vehicles." Pet. 64 (citing Ex. 1010, 8:19–23). That contention also speaks to the "positioned" limitation and demonstrates that the claim language reads on Karlsson's system.

5. *Second cluster of LEDs illuminating a second other vehicle (claim 40)*

Independent claim 40 requires a system programmed to determine a first LED cluster illuminating a first other vehicle and also determine a second LED cluster illuminating a second other vehicle. Ex. 1035, 4:59–63 ("determine a second, different cluster of the LEDs illuminating at least a second portion of a second other vehicle based at least in part on the data indicating a second position associated with the second other vehicle"). Petitioner contends that "Karlsson

accommodates multiple vehicles" and that "a second vehicle would result in the claimed 'second, different cluster of [] LEDs' as Karlsson would repeat its dimming process for all detected vehicles." Pet. 76. Petitioner additionally reasons that Nakamura discloses detecting and accommodating multiple vehicles and that it would have been obvious to modify Karlsson's programming as taught by Nakamura "because this would improve safety and system performance when multiple other vehicles are present." Pet. 70–71, 76.

Patent Owner argues that instead of selecting two distinct LED clusters, "Karlsson could alternatively form a large dark box encompassing all detected lights." PO Resp. 51. Patent Owner does not challenge Petitioner's contentions based on modifying Karlsson in light of Nakamura. *Id.* As an initial matter, we determine that Petitioner has proven claim 40's second-cluster limitation would have been obvious over Karlsson and Nakamura, in light of Petitioner's unchallenged contentions. Pet. 70–71, 76; Ex. 1003 ¶ 303; Ex. 1052 ¶ 154.

Further, Petitioner's expert has the more persuasive view on Karlsson's operation when detecting multiple vehicles. We agree that, in light of Karlsson's disclosure that it protects "traffic" from glare (Ex. 1010, 9:18–26) and that it can "determine precisely the direction from which light is being detected, so that subsequently a precise adjustment of the pattern of the light beam can be carried out" (*id.* at 5:29–31), Karlsson would select a distinct LED cluster for each identified other vehicle.

6. "classifying the object" (claim 48)

Independent claim 48 requires that, to determine the "first light directed towards a first area," the controller must make the determination "based at least in part on classifying the object based at least in part on the data" from a camera.

Ex. 1035, 6:24–7:28. That limitation is part of what Petitioner identifies as 48.9a. *See* Pet. App'x B. Petitioner's contentions for 48.9a do not address claim 48's "classifying" requirement. Pet. 77–78; PO Resp. 12–13.[10]

In its argument against the Beam–Satonaka combination, Patent Owner asserts that the "ability to distinguish between types of light sources" is "a necessary predicate for object classification." PO Resp. 21. Petitioner responds that the proper construction requires only "placing the detected objects into categories or classes." Pet. Reply 8 (citing Ex. 1052 ¶ 96). Regardless of the construction for "classifying," however, the Petition never expressly addresses how the claim language reads on Karlsson's teachings. Nor do Petitioner's contentions implicitly address the claim language.

In the Reply, Petitioner contends that "the substantive discussion addresses the relevant claim elements" and further points to its expert's declaration. Pet. Reply 25 (citing Ex. 1003 ¶¶ 185–192, 318–325). The contentions and expert declaration assert that "the vehicle" recited in claims 24 is "an object." Pet. 78; Ex. 1003 ¶ 318. They do not, however, address how the prior art determines that a detected object is a vehicle, or how it determines that the vehicle (which Petitioner asserts is the claimed object) is placed into a category. Accordingly, we conclude that Petitioner fails to show that claim 48 is unpatentable.

7. "wherein the data includes image data" (claims 33, 41, 49)

Claim 33 depends from claim 32 and recites that "the data [from one or more of the cameras] includes image data." Ex. 1035, 3:31, 3:16–17. Claims 41

[10] As Petitioner points out in the Reply, the Petition mistakenly refers to limitation 48.8a rather than 48.9a. Pet. Reply 25. We do not rely on any aspect of the limitation designation, but instead on the substance of Petitioner's contentions.

and 49 recite parallel limitations, with different dependency. Petitioner asserts that other than unrelated limitations, the "elements of claim 33 are patentably indistinct from the elements of claim 25." Pet. 75.

Patent Owner asserts that Petitioner fails to address the "image data" requirement, rendering the Petition deficient. PO Resp. 10–11. In our view, however, Petitioner's contentions show without question that Karlsson's data from its cameras includes image data. The Petition asserts that Karlsson's sensor is a camera because it is "a photo-sensitive plate as used in modern video cameras" (Pet. 62 (citing Ex. 1010, 12:19–24) (emphasis omitted)) and that Karlsson's system receives images from the camera (*id.* at 63; *accord id.* at 63–64 (asserting the sensor is "positioned to capture an image of at least two other vehicles")). Those contentions are consistent with Karlsson's disclosures and Patent Owner does not dispute them. Thus, Petitioner has established that Karlsson's system involves a camera sending video images to its controller. Claim 33 requires nothing more, and thus Petitioner's contentions for the independent claims satisfy that aspect of claim 33, and the other claims that recite similar language.

8. Cluster including non-contiguous LEDs (claims 25, 33, 41, 49)

As noted above, claim 24 requires capability to "determine coordinates corresponding to an other vehicle" and "select a cluster of the LEDs that emit light toward at least a portion of the other vehicle." Claim 25 depends from claim 24 and further requires "the cluster includes a plurality of the LEDs and the cluster includes non-contiguous LEDs." Ex. 1035, 1:64–2:2; Ex. 1002, 1011. Claims 33, 41, and 49 recite parallel limitations, with different dependency.

Petitioner asserts that "Karlsson's cluster can be selected 'for forming random patterns of the light beam' to 'provide a desired lighting pattern.'" Pet. 69–

70 (quoting Ex. 1010, 13:24–29, 14:26–30). Petitioner reasons that claim 25's non-contiguous limitation is obvious because "non-contiguous patterns fall under the broader category of any random pattern," and skilled artisans would know "that one of the desired patterns would be non-contiguous." *Id.* at 70. Petitioner supports the latter assertion based on Karlsson's ability to dim its LEDs "[w]hen there are two or more separated vehicle targets." *Id.* (citing Ex. 1010, 9:18–26; Ex. 1003 ¶ 276).

Patent Owner challenges that assertion, arguing that forming random patterns does not alone satisfy the claim language and that handling multiple vehicles involves "separate clusters for each vehicle," whereas the claim requires a "single cluster for the single vehicle including non-contiguous lights." PO Resp. 52–53. We agree.

First, disclosing a genus (random patterns) does not render obvious all species of that genus (here, a non-contiguous cluster). Additionally, relying on a particular pattern produced by Karlsson's lights does not resolve the arrangement of LEDs used to create that pattern because a cluster of LEDs is distinct from the pattern it produces. Depending on the LED aimings and optical system, a non-contiguous cluster could produce a uniform, contiguous pattern (and a contiguous cluster could produce a non-contiguous pattern). Thus, for multiple reasons, Karlsson's ability to create random patterns does not mean that it selects a non-contiguous cluster of LEDs.

Second, and more significantly, Petitioner's assertion that Karlsson would select a non-contiguous pattern is based on multiple detected vehicles. Pet. Reply 20. The claim language, however, requires selecting "a cluster of the LEDs" illuminating a detected vehicle where "the cluster includes non-contiguous LEDs." That unambiguously requires that the cluster illuminating a single detected vehicle

includes non-contiguous LEDs. Petitioner asserts that Patent Owner "relies on a flawed understanding of these claims." Pet. Reply 20. To that end, Petitioner argues "the plain language does not require a cluster be assigned to a single vehicle" because it requires only "that the cluster include LEDs that emit light toward at least a portion of the other vehicle" and "[t]here is no restriction on the cluster having additional LEDs pointed at a second vehicle." *Id.* at 11–12. That interpretation is not persuasive. We agree that the claimed headlight may select a cluster of LEDs including some that do not emit light toward a detected vehicle (for example, LEDs pointed at a second vehicle), but such LEDs would not be part of the claimed "cluster," which the claim language defines as "LEDs that emit light toward at least a portion of the other vehicle." That claimed cluster must include non-contiguous LEDs, so other LEDs emitting light elsewhere are not relevant to the claimed cluster. We conclude that Petitioner's assertions do not address the unambiguous claim language and thus fail to show unpatentability.

Petitioner asserts additionally that Nakamura discloses detecting multiple vehicles and that it would have been obvious to modify Karlsson's system to "detect[] and adjust[] light based on multiple vehicles . . . because this would improve safety and system performance when multiple other vehicles are present." Pet. 70–71. That suffers from the same problem as Petitioner's Karlsson-based contention, and fails to show unpatentability for the same reason.

9. Objective indicia of nonobviousness

Patent Owner submits that the '551 patent satisfied a long-felt need for "glare-free adaptive beam technology" and received industry praise for doing so. PO Resp. 68–71. To that end, Patent Owner relies on statements made in a reexamination declaration by Mr. Joseph Stam. Ex. 2023, 683–742. Patent Owner,

however, has not presented Mr. Stam's declaration as a declaration in this case, instead relying on its expert, Dr. Turk, who "reviewed the objective evidence statements in the Stam declaration." PO Resp. 68 (citing Ex. 2006 ¶¶ 215–216). Dr. Turk, however, was not able to recall the meaning of multiple terms he used in his declaration (Ex. 1053, 124:5–135:18) and asserted that he determined that ADB technology falls within the claims by looking at the Stam declaration, without independently verifying statements in the Stam declaration or reviewing the documents upon which those statements were based (*id.* at 135:19–137:16). Dr. Turk's declaration addressing secondary considerations is not credible as to the substance of the asserted secondary considerations, and Patent Owner's asserted secondary considerations are not persuasive for that reason alone.

Additionally, Petitioner asserts that Patent Owner has not shown any evidence that is "the direct result of the unique characteristics of the claimed invention." Pet. Reply 25 (quoting *Fox Factory, Inc. v. Sram, LLC*, 944 F.3d 1366, 1373–74 (Fed. Cir. 2019) (internal quotations omitted)). In particular, Petitioner asserts that all the elements of the claimed invention were known in the prior art, and thus that Patent Owner cannot show a nexus between any long-felt need or industry praise and the challenged claims. *Id.* at 25–26.

As to independent claims 24 and 32, Patent Owner does not assert any "unique characteristics that are novel and nonobvious over the asserted art." *See* PO Resp. 70–71. Patent Owner asserts that claim 40 includes "adapting light emission to provide at least two dark zones with 'light in-between'" and that the Stam declaration correlates that characteristic with the objective evidence. *Id.* The Stam declaration addresses claim language reciting illumination "that preserves a first level of illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle" and asserts that an article discussing that a

commercial product's "[i]ndividually controlled LEDs also provide two or more dark zones with 'light in-between,' allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience." Ex. 2023, 734 (Stam declaration ¶ 117) (quoting Ex. 2023, 182) (emphasis omitted). Patent Owner does not explain and we do not understand the connection between the claim language recited in the declaration and that of claim 40. But even accepting that the reexamination exhibit shows industry praise for a system with claim 40's feature, Patent Owner has not shown that the feature was novel. As discussed above, we conclude that Karlsson discloses that aspect of claim 40 without modification. *See supra* at 16 (§ II.B.5). Accordingly, even viewing Patent Owner's evidence as credible and appropriate, we conclude that it would not establish the required nexus for claim 40. To be clear, Patent Owner's asserted evidence would not establish nexus for any aspect of the independent claims, because each element is found in the prior art and the only elements for which Petitioner asserts a combination of prior-art teachings—those relating to image coordinates—are not those that Patent Owner relies on for a unique characteristic of the claimed invention.

Patent Owner asserts further that industry praise was directed at the "Predictive Curve Illumination feature" recited by dependent claims that require the ability to "accommodate the upcoming road curvature" by adapting the light. PO Resp. 8, 70–71. Patent Owner relies on a report of a new lighting system used by BMW that states, "[t]he benefit of a glare-free function is not only to shadow out other cars but also to provide visibility for upcoming curves and dangerous situations; there is a clear safety gain by illuminating this curve in front of the driver." Ex. 2023, 727 (quoting Ex. 2023, 177) (emphasis omitted). That statement does not itself establish a nexus to the "Predictive Curve Illumination" claims.

Patent Owner asserts that the reexamination declaration correlated objective evidence with the "Predictive Curve Illumination" claims (PO Resp. 70–71), but cited portion of the declaration does not address that claim feature (*see* Ex. 2023, 728–34). Accordingly, Patent Owner has not established a nexus with the dependent claims.

That the praised characteristics were found in the prior art is consistent with Patent Owner's asserted evidence, which largely pertains to efforts to change U.S. regulations to permit the use of adaptive headlight technology. *See* Pet. Reply 28; Ex. 1053 ¶¶ 198–199. Thus, Patent Owner's evidence does not support nonobviousness.

10. Conclusion

As discussed above, Petitioner has not proven the unpatentability of any of claims 25, 33, 41, and 49. *See supra* at 19 (§ II.B.8). Additionally, Petitioner has not proven the unpatentability of claim 48. *See supra* at 17 (§ II.B.6). Thus, Petitioner has also failed to prove unpatentability of claims 49, 54, and 55, which depend from claim 48.

Other than as discussed, Patent Owner does not contest Petitioner's assertions regarding obviousness of the challenged claims over Karlsson and Nakamura. *See* PO Resp. 10–14, 43–61. We have considered the full record, including evidence and arguments presented by Petitioner and Patent Owner on whether Karlsson and Nakamura disclose each limitation, whether skilled artisans had reason to combine the teachings as asserted, and whether objective indicia support nonobviousness. Based on the full record, we conclude that Petitioner has proven that the subject matters of independent claims 24, 32, and 40, and dependent claims 30, 31, 38, 39, 46, and 47 would have been obvious for the

reasons provided in the Petition, Reply, and as discussed above. Pet. 54–77; Pet. Reply 19–28.

C. OBVIOUSNESS OVER KARLSSON, NAKAMURA, AND GOTOU

Gotou is titled "Head Lamp Device for Vehicle" and is directed to a vehicle headlamp with a left-right adjustable lighting region. Ex. 1012, codes (54), (57). Gotou's device may adjust the lighting region based on a number of factors, including "direction indicating signal, steering angle signal, map information and information of the present position." *Id.* at 2:5–7. Gotou describes a "light distributing control ECU 10" that receives information from a variety of sensors and "processes the information[] and signals to determine a requisite optical axis angle θ." *Id.* at 3:52–63. Gotou's system uses the optical axis angle to control a motor driver that aims the lamp unit. *Id.* at 3:24–45, 3:63–67. Gotou describes that its controller generates "a curve pre-noticing signal" from map information and adjusts the optical axis angle "when the vehicle reaches the predetermined distance S before the curve entrance and the light distribution is deflected leftward at a proper timing before the curve." *Id.* at 7:32–43.

Petitioner asserts that skilled artisans would have had reason "to modify Karlsson's system to adjust light based on map data, as in Gotou, to further control Karlsson's directional LEDs to illuminate roadway curves, thereby improving driver safety—an express purpose of Karlsson." Pet. 79 (citing Ex. 1003 ¶ 332; Ex. 1010, 1:16–26, 4:17–21, 9:18–26). Petitioner notes that Karlsson already includes the ability to detect steering-wheel angle "for determining when the car 56 is taking a bend, so that the light beam 7 can be adapted." *Id.* (quoting Ex. 1010, 20:22–32). Petitioner reasons that using Gotou's map data would improve

Karlsson's system "because it allows the system to predict turns farther in advance." *Id.* at 80.

1. Accommodate upcoming road curvature by adaptation of a light pattern (claims 26, 34, 42, 50)

Claim 26 depends from claim 24 and requires the controller be able to "identify an upcoming road curvature along a road on which the motor vehicle is traveling; and accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the . . . headlamps." Ex. 1035, 2:3–12. Petitioner relies on Gotou for claim 26's additional limitations. Other claims depending from other independent claims recite similar limitations (claims 34, 42, and 50). Petitioner's contentions collectively address claims 26, 34, 42, and 50. Pet. 79–82.

Patent Owner disputes Karlsson's ability to accommodate curves because, in Patent Owner's view, Karlsson discloses a default pattern of full illumination, only reducing its beam where oncoming traffic is detected. PO Resp. 61–67. Thus, according to Patent Owner, Karlsson lacks "remaining unlit LEDs with which to achieve the adaptation." *Id.* at 67. We do not agree.

Most significantly, Karlsson discloses operating a light-source array by illuminating a subset of spotlight sources smaller than the full array. Karlsson's Figure 14 is reproduced below:

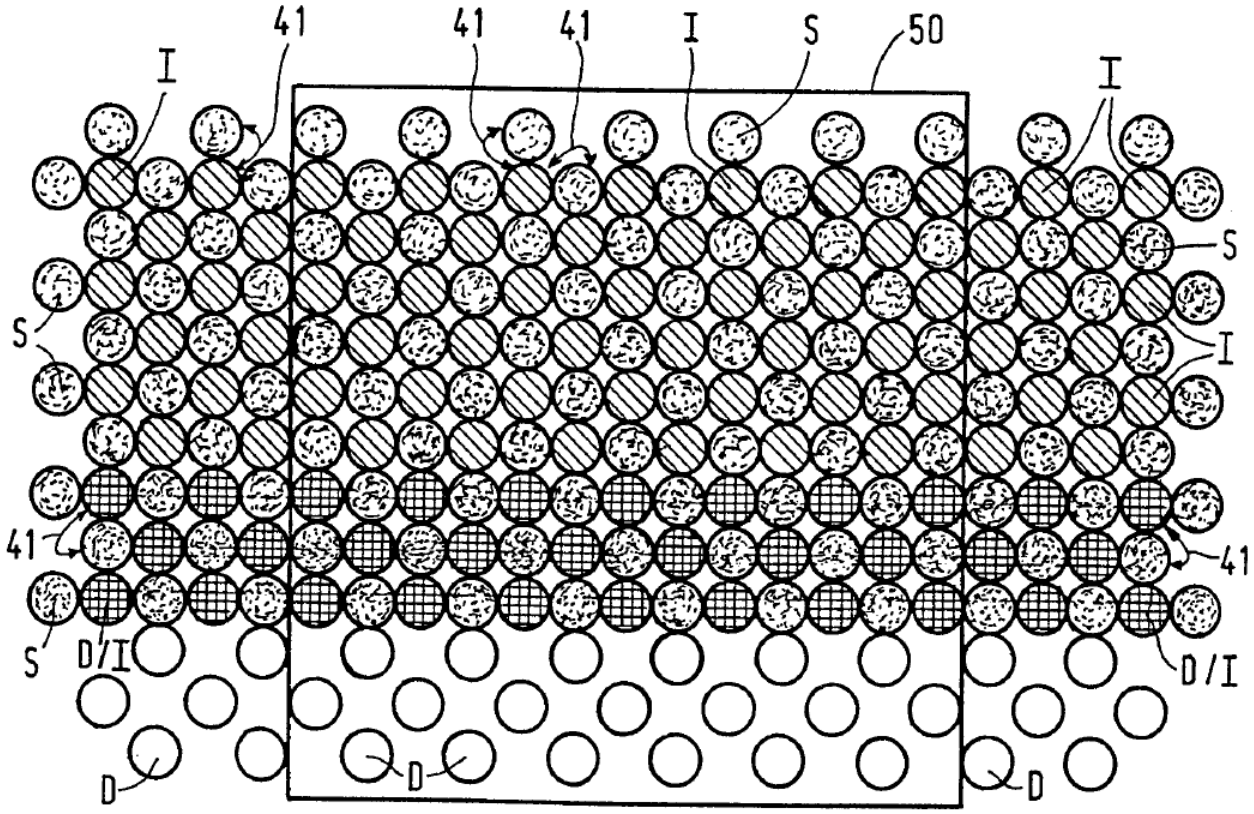

FIG. 14

Figure 14 depicts an array of spotlight sensors "S" interspersed with spotlight sources including those indicated with "D" providing "dipped light function," those indicated with "I" providing main-beam function, and those indicated with "D/I" operative as both dipped and main-beam light. Ex. 1010, 19:18–28. Figure 14 further depicts a window 50 representing the emitted light beam, and Karlsson discloses that the window "can shift in the plane of the drawings from the left to the right and from the top to the bottom." Ex. 1010, 19:29–30.

Based on Karlsson's description of a shifting window of illuminated spotlight sources, we find that Karlsson suggests operating with fewer than all sources active as a default state. Karlsson does not link its windowed operation to instances when a detected vehicle has caused nonwindowed portions to be

dimmed. And understanding Karlsson's windowed operation as a possible default is consistent with Karlsson's disclosure of adapting its light beam "when the car 56 is taking a bend." *Id.* at 20:22–32.

We credit Petitioner's expert testimony, which recognizes that Karlsson's moving window would create a number of light patterns, including "bending light" away from the vehicle's center line. Ex. 1052 ¶¶ 173–174. That testimony is consistent with Karlsson's disclosures described above. Patent Owner's expert agreed that, with the shifting window, Karlsson describes variation including beam direction. Ex. 1053, 33:18–34:25. Although in his declaration, Patent Owner's expert asserts that Karlsson's window 50 is created by blanking portions of the overall beam only "to reduce potential glare" and that, in any situation, "the resulting beam would be less (for the duration of the event) than the full normal beam" (Ex. 2006 ¶¶ 206–208), those assertions are not as consistent with Karlsson's disclosures and we do not find them persuasive.

Patent Owner argues the Petition asserted that, other than areas dimmed to prevent glare to oncoming vehicles, Karlsson maintains full intensity for the "remaining areas of light beam 7." PO Resp. 62 (quoting Pet. 72) (emphasis omitted). In Patent Owner's view, maintaining full intensity outside of the dimmed area would leave no ability to shift light towards road curvatures. *Id.* at 62–63. We do not agree that configuring light beam 7 "to maximize the area fully illuminated" necessarily means using all of Karlsson's light sources. Karlsson describes "desired emitted light beam 7" as the light that is projected on the target area. Ex. 1010, 8:15–17. Maximizing that beam may still be done within other bounds, such as those that leave margins for beam-direction. Karlsson's disclosure of using a window to define the emitted light beam 50 is consistent with a particular desired beam pattern. As discussed above, using a windowed portion of the light sources

allows Karlsson's system to accommodate changes in beam direction, and we find that maintaining full intensity for the maximum extent of a desired beam pattern—i.e., dimming the smallest area possible to prevent glare to oncoming vehicles—is still consistent with using a windowed portion of light sources as the default. Accordingly, we agree with Petitioner that Karlsson's system would be able to adjust light based on Gotou's map data as asserted. Pet. 79–82.

2. Cluster including non-contiguous LEDs (claims 27, 35, 43, 51)

Claim 27 depends from claim 26 and further requires that "the cluster includes non-contiguous LEDs." Ex. 1035, 2:13–26. Claims 35, 43, and 51 recite parallel limitations, with different dependency.

Patent Owner challenges Petitioner's showing for the same reason discussed above regarding claims 25, 33, 41, and 49. For the same reasons discussed, we reach the same conclusion for claims 27, 35, 43, and 51 that Petitioner has not proven unpatentability. *See supra* at 19 (§ II.B.8).

3. Conclusion

Petitioner has not proven the unpatentability of claim 48 (*see supra* at 17 (§ II.B.6)) and therefore has also not proven unpatentability for any of claims 50–53, which depend from claim 48. Petitioner provides additional contentions based on Gotou's disclosures for claims 28, 29, 36, 37, 44, and 45. Pet. 83–84. Other than as discussed, Patent Owner does not contest Petitioner's assertions regarding obviousness of those claims over Karlsson, Nakamura, and Gotou. *See* PO Resp. 10–14, 61–71. We have considered the full record, including evidence and arguments presented by Petitioner and Patent Owner on whether Karlsson, Nakamura, and Gotou disclose each limitation, whether skilled artisans had reason

to combine the teachings as asserted, and whether objective indicia support nonobviousness. Based on the full record, we conclude that Petitioner has proven that the subject matters of claims 26, 28, 29, 34, 36, 37, 42, 44, and 45 would have been obvious for the reasons provided in the Petition, Reply, and as discussed above. Pet. 79–84; Pet. Reply 19–28.

D. UNPATENTABILITY OVER BEAM AND SATONAKA

Petitioner additionally contends that the claims challenged based on Karlsson and Nakamura are unpatentable also over Beam and Satonaka. Pet. 17–48 (addressing claims 24, 25, 30–33, 38–41, 46–49, and 54–55). Because we above determine that Petitioner has demonstrated unpatentability of claims 24, 30–32, 38–40, 46, and 47 over Karlsson and Nakamura, we need not address Petitioner's contentions for those claims based on Beam and Satonaka. We above determine that Petitioner has not demonstrated unpatentability of claims 25, 33, 41, 48, 49, 54, and 55 over Karlsson and Nakamura, so we address Petitioner's contentions for those claims based on Beam and Satonaka.

1. "classifying the object" (claim 48)

As with the Karlsson–Nakamura ground discussed above (*see supra* at 17 (§ II.B.6)), we agree with Patent Owner that the Petition fails to address claim 48's "classifying" requirement. *See* Pet. 45. Although Petitioner argues that Patent Owner's construction for "classifying" is overly narrow (Pet. Reply 8–9), that does not impact our analysis because Petitioner failed to address the limitation even under its own construction (*see* Pet. 45). PO Sur-Reply 8–9.

We conclude that Petitioner has failed to prove the unpatentability of claim 48 over Beam and Satonaka. Because claims 49, 54, and 55 depend from

claim 48, Petitioner has also failed to prove the unpatentability of those claims over Beam and Satonaka.

2. *Cluster including non-contiguous LEDs (claims 25, 33, 41, 49)*

The parties' positions regarding claim 25's requirement for a cluster including non-contiguous LEDs follow those discussed above. *See supra* at 19 (§ II.B.8). Although Petitioner relies on Beam's disclosures rather than Karlsson's, Petitioner relies on Beam disclosing that it's "glare-reduction process 'can be done for any number of vehicles that fall in the headlight beam.'" Pet. 36 (quoting Ex. 1005, 2:62–63). Like its Karlsson-based contentions, Petitioner asserts that, "when there are two or more separated vehicle targets, . . . Beam's system would select a cluster of LEDs that are non-contiguous to cover all of the vehicle targets." *Id.* at 36–37.

As discussed above, the "non-contiguous LEDs" limitation does not necessarily read on multiple clusters selected for multiple vehicles, because the claim language requires a "cluster of LEDs that emit light toward at least a portion of the [first] other vehicle" and Petitioner has not shown that a second cluster selected for a second vehicle is "of LEDs that emit light" toward the first vehicle. *See supra* at 19 (§ II.B.8); PO Sur-Reply 20. Accordingly, we conclude that Petitioner has not proven claims 25, 33, 41, and 49 unpatentable.

3. *Conclusion*

As discussed, we conclude that Petitioner has not proven unpatentability over Beam and Satonaka as to any of claims 25, 33, 41, 48, 49, 54, and 55. Although Petitioner provides contentions for other challenged claims based on Beam and Satonaka (Pet. 17–48), we do not address those challenges because we

have already determined the claims are unpatentable over Karlsson and Nakamura (claims 24, 30–32, 38–40, 46, 47).

E. UNPATENTABILITY OVER BEAM, SATONAKA, AND KOBAYASHI

Petitioner asserts a combination of Beam, Satonaka, and Kobayashi, to address dependent claims including light adaptation based on road-curvature (claims 26–29, 34–37, 42–45, and 50–53). Pet. 48–53.

1. Cluster including non-contiguous LEDs (claims 27, 35, 43, 51)

Patent Owner challenges Petitioner's showing as to claims 27, 35, 43, and 51 for the same reason discussed above regarding claims 25, 33, 41, and 49. For the same reasons discussed, we reach the same conclusion for claims 27, 35, 43, and 51 that Petitioner has not proven unpatentability. *See supra* at 31 (§ II.D.2).

2. Conclusion

Although Petitioner provides contentions for other challenged claims based on Beam, Satonaka, and Kobayashi (Pet. 48–53), we do not address those challenges because we have already determined the claims are unpatentable over Karlsson, Nakamura, and Gotou (claims 26, 28, 29, 34, 36, 37, 42, 44, 45) or because those claims depend from claim 48, which Petitioner has not proven unpatentable (claims 50–53).

F. FAIRNESS, TIMING, AND EFFICIENCY UNDER § 316(b)

Patent Owner argues that Petitioner filed three IPR petitions against the '551 patent, but could have challenged the claims more concisely. PO Resp. 72–73. We determine that Petitioner's approach was reasonable because dividing multiple challenges to multiple claims among multiple petitions will always involve some choice as to how to divide those challenges, and there is no requirement for

Petitioners to choose the approach that Patent Owner favors. Patent Owner has not identified a basis on which we should determine Petitioner fails to prove unpatentability. Accordingly, the argument is not persuasive.

G. PETITIONER'S MOTION TO EXCLUDE

Petitioner seeks to exclude the testimony of Patent Owner's declarant, Dr. Turk (Exs. 2001, 2006), asserting that he does not meet the agreed level of ordinary skill in the art. Mtn. Exclude 1; *see supra* at 6 (§ I.F). In particular, Petitioner argues that the agreed level of skill requires "at least 2 years of industry experience in the area of automotive lighting and lighting-control systems" whereas Dr. Turk lacks such qualifications. Mtn. Exclude 4–6; *accord* Reply Mtn. Exclude 3–4 (arguing Dr. Turk "has no experience with a vehicle headlamp company, an LED (or any other light source) company, or lighting design, or awards/patents for a vehicle forward lighting system" (citing Opp. Mtn. Exclude 4–5)).

We determine that granting Petitioner's Motion to Exclude would not change the outcome here. For the claims on which Patent Owner has prevailed, our determination that Petitioner fails to meet its burden does not depend on Dr. Turk's testimony, but instead relies on the claim language as compared to Petitioner's assertions. *See supra* at 17 (§ II.B.6), 19 (§ II.B.8), 29 (§ II.C.2), 31 (§ II.D.2). For the claims on which Petitioner has prevailed, excluding Dr. Turk's testimony would not change the outcome. Thus, the motion is moot as to Dr. Turk's declarations. Accordingly, we dismiss Petitioner's motion.

III. CONCLUSION[11]

As discussed above, we conclude that Petitioner has proven claims 24, 26, 28–32, 34, 36–40, 42, and 44–47 unpatentable, but has not proven any of claims 25, 27, 33, 35, 41, 43, and 48–55 unpatentable. In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
24, 25, 30–33, 38–41, 46–49, 54, 55	103	Beam, Satonaka		25, 33, 41, 48, 49, 54, 55
26–29, 34–37, 42–45, 50–53	103	Beam, Satonaka, Kobayashi		27, 35, 43, 50–53
24, 25, 30–33, 38–41, 46–49, 54, 55	103	Karlsson, Nakamura	24, 30–32, 38–40, 46, 47	25, 33, 41, 48, 49, 54, 55
26–29, 34–37, 42–45, 50–53	103	Karlsson, Nakamura, Gotou	26, 28, 29, 34, 36, 37, 42, 44, 45	27, 35, 43, 50–53

[11] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
Overall Outcome			24, 26, 28–32, 34, 36–40, 42, 44–47	25, 27, 33, 35, 41, 43, 48–55

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 24, 26, 28–32, 34, 36–40, 42, 44–47 of the ’551 patent are unpatentable;

FURTHER ORDERED that Petitioner has not shown by a preponderance of the evidence that any of claims 25, 27, 33, 35, 41, 43, and 48–55 are unpatentable;

FURTHER ORDERED that Petitioner’s Motion to Exclude Evidence is dismissed as moot; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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