

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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VOLKSWAGEN GROUP OF AMERICA, INC.,  
Petitioner,

v.

YECHEZKAL EVAN SPERO,  
Patent Owner.

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IPR2022-01586  
Patent 11,208,029 B2

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

MELVIN, *Administrative Patent Judge*.

DECISION  
Granting Institution of *Inter Partes* Review  
35 U.S.C. § 314

## I. INTRODUCTION

Volkswagen Group of America, Inc. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–33 of U.S. Patent No. 11,208,029 B2 (Ex. 1001, “the ’029 patent”). Yechezkal Evan Spero (“Patent Owner”) filed a Preliminary Response. (Paper 6, “Prelim. Resp.”). Pursuant to 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a), we have authority to determine whether to institute review.

An *inter partes* review may not be instituted unless “the information presented in the petition . . . and any response . . . shows that 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 set forth below, we conclude that Petitioner has shown a reasonable likelihood it will prevail in establishing the unpatentability of at least one challenged claim, and we institute *inter partes* review.

### A. REAL PARTIES IN INTEREST

Petitioner identifies itself as the real party in interest. Pet. 95. Patent Owner also identifies itself as the real party in interest, noting that Torchlight Technologies LLC is the exclusive licensee of the ’029 patent. Paper 4, 1 (Patent Owner’s Mandatory Notices).

### B. RELATED MATTERS

The parties identify the following related litigation: *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). See Pet. 95;

Paper 4, 1. They also identify *Unified Patents, LLC v. Torchlight Technologies LLC*, IPR2022-01500 (PTAB Sept. 22, 2022). *See* Pet. 95; Paper 4, 1.<sup>1</sup>

### C. THE '029 PATENT

The '029 patent is titled “Adaptive Headlight System” and relates to motor vehicle headlamps with LED light sources and a processor to control the headlamp light pattern. Ex. 1001, codes (54, 57). The specification more 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 18:29–33.

The specification further describes transportation vehicle applications. *Id.* at 50:49–57:35. One such application involves a DLF headlamp device that includes a cluster of LEDs to illuminate around a curve. *Id.* at 51:54–63, 54:8–15. With LEDs having a variety of aims, the headlamp’s light distribution pattern may be controlled based on a number of factors, including location data from a GPS system, providing information about upcoming curves in the road. *See id.* at 51:54–67, 54:15–22.

### D. CHALLENGED CLAIMS

Petitioner challenges all thirty-three claims of the '029 patent. Pet. 4. Claim 1 is independent and is reproduced below:

1. A system, for a motor vehicle, comprising:  
a plurality of headlamps, each comprising a plurality of LED light sources;

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<sup>1</sup> Patent Owner further lists matters involving two different patents related to the '029 patent, including several IPRs, a pending reissue, and a completed *ex parte* reexamination. Paper 4, 2.

one or more processors; and

a memory storing instructions that, when executed by one or more of the one or more processors, enable the one or more processors to:

receive first data, including at least map data, indicating a road curvature upcoming along a road on which the motor vehicle is traveling;

[<sup>2</sup>] determine a light change, the change adapting a light pattern of the headlamps in at least one of color, intensity or spatial distribution to increase light in a direction of the road curvature ahead of the motor vehicle and shaping light based at least in part on the road curvature; and

[<sup>3</sup>] control at least a first plurality of the LED light sources to provide light based at least in part on the determined light change and prior to the motor vehicle reaching the road curvature.

Ex. 1001, 95:56–96:8. Claims 2–11 depend, directly or indirectly, from claim 1. *Id.* at 96:9–97:44. Claim 12 is independent and recites limitations similar to claim 1’s. *Id.* at 97:45–62. Claims 13–22 depend, directly or indirectly, from claim 12. *Id.* at 97:63–99:27. Claim 23 is independent and recites limitations similar to claim 1’s. *Id.* at 99:28–43. Claims 24–33 depend, directly or indirectly, from claim 23. *Id.* at 99:44–100:66.

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<sup>2</sup> Patent Owner refers to these limitations as the “predictive curve illumination limitations.” Prelim. Resp. 7.

<sup>3</sup> Patent Owner refers to these limitations as the “control limitations.” Prelim. Resp. 7.

E. PRIOR ART AND ASSERTED GROUNDS

Petitioner asserts the following unpatentability grounds:

Claims Challenged	35 U.S.C. §	References/Basis
1–33	103	Beam, <sup>4</sup> Kobayashi <sup>5</sup>
1–33	103	Gotou, <sup>6</sup> Karlsson <sup>7</sup>

Pet. 4–5. Petitioner also relies on the Declaration of Dr. Jianzhong Jiao. Ex. 1003.

II. ANALYSIS

A. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner asserts that an ordinarily skilled artisan “would have had a bachelor’s degree (B.S.) in mechanical engineering, electrical engineering, optical

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<sup>4</sup> U.S. Patent No. 6,144,158, issued Nov. 7, 2000. Ex. 1005, code (45). Beam qualifies a prior art to the ’029 patent at least under pre-AIA § 102(b) because it “was patented or described in a printed publication . . . more than one year prior to the date of the application for [the ’029] patent in the United States.” 35 U.S.C. § 102(b) (2006). Beam would also qualify as prior art at least under AIA § 102(a)(1) as a patent available before the earliest possible effective filing date of the ’029 patent. 35 U.S.C. § 102(a)(1) (2018).

<sup>5</sup> U.S. Patent No. 6,049,749, issued Apr. 11, 2000. Ex. 1008, code (45). Kobayashi qualifies a prior art to the ’029 patent at least under pre-AIA § 102(b) because it “was patented or described in a printed publication . . . more than one year prior to the date of the application for [the ’029] patent in the United States.” 35 U.S.C. § 102(b) (2006). Kobayashi would also qualify as prior art at least under AIA § 102(a)(1) as a patent available before the earliest possible effective filing date of the ’029 patent. 35 U.S.C. § 102(a)(1) (2018).

<sup>6</sup> U.S. Patent No. 5,588,733, issued Dec. 31, 1996. Ex. 1012, code (45). Gotou qualifies as prior art for the same reasons as Beam and Kobayashi noted above.

<sup>7</sup> WIPO Patent Publication No. 98/54030, published December 3, 1998. Ex. 1010, code (43). Karlsson qualifies a prior art to the ’029 patent at least under pre-AIA § 102(b) because it “described in a printed publication . . . more than one year prior to the date of the application for [the ’029] patent in the United States.” 35 U.S.C. § 102(b) (2006). Karlsson would also qualify as prior art at least under AIA § 102(a)(1) as a printed publication available before the earliest possible effective filing date of the ’029 patent. 35 U.S.C. § 102(a)(1) (2018).

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” and “may work as part of a team” listing an example. Pet. 10 (citing Ex. 1003 ¶¶ 41–43). Patent Owner presents a different description, proposing that a person of the level of ordinary skill in the art:

would have had a Master’s of Science Degree (or a similar technical Master’s Degree, or higher degree) in an academic area emphasizing electrical engineering, computer engineering, or computer science with experience or education in optics and imaging systems or, alternatively, a Bachelor’s Degree (or higher degree) in an academic area emphasizing electrical, computer engineering or computer science and having two or more years of experience in the field of optical and imaging systems.

Prelim. Resp. 8 (citing Ex. 2001 ¶¶ 28–30). Patent Owner, however, does not explain the significance of the differing levels of ordinary skill proposed. To the extent Patent Owner believes the level of ordinary skill affects this proceeding, it should explain that in the instituted trial.

## B. CLAIM CONSTRUCTION

The parties agree that no express claim construction is required at this stage. Pet. 10–11; Prelim. Resp. 9. We therefore do not construe the claims for this decision. *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)).

To the extent the scope of a particular claim term impacts a party’s argument during trial, the party should propose an express construction and show how the record supports it.

C. OBVIOUSNESS OVER GOTOU AND KARLSSON

Petitioner asserts that claims 1–33 are unpatentable as obvious over Gotou and Karlsson. Because we find that Petitioner shows a reasonable likelihood that it will prevail as to at least claims 1, 12, and 23, we institute review.

1. 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  $\theta$ .” *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.

2. Karlsson

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 “[w]hen taking a bend there is also the problem that the road ahead of the vehicle is insufficiently lit, because the light beam is generally optimized for straight movement (rather than turning movement) of the vehicle.” *Id.* at 1:27–2:1. Karlsson describes using a direction sensor “for determining when the car 56 is taking a bend, so that the light beam 7 can be adapted to prevent the traffic on the other side of the road from being blinded as much as possible.” *Id.* at 20:29–32.

3. Claims 1, 12, and 23

Petitioner groups independent claims 1, 12, and 23 together because they “recite substantially similar elements and concepts; thus, the same prior art disclosures map to corresponding elements.” Pet. 8. Petitioner summarizes the similarities and supplements this analysis with a claim chart corresponding the claims’ limitations. *Id.* at 8–9, Appendix A. Patent Owner similarly asserts that these independent claims “each require the Predictive Curve Limitation and the Control Limitation” and that “Claim 1 is representative.” Prelim. Resp. 27–28, 60–66. Although Patent Owner challenges Petitioner’s grouping on procedural grounds, Patent Owner does not presently dispute that the grouping is accurate or counter Petitioner’s proposition that “[m]inor phrasing differences do not affect the substantive application of the prior art.” *Id.* at 60–66; *see, e.g.*, Pet. 9. Based on the record before us, we proceed with Petitioner’s groupings for purposes of institution.

Petitioner asserts that Gotou discloses a system for a motor vehicle comprising a plurality of headlamps, one or more processors, and the claimed memory storing instructions. Pet. 65–79. Petitioner points out how Gotou concerns



“adaptive vehicle headlamp[s]” and that Gotou’s control ECU has the claimed processor<sup>8</sup> and memory storing instructions that enable the processor to receive map data indicating upcoming road curvature and, before the vehicle reaches the curve, determine the desired optical axis to increase light in the direction of road curvature. *Id.* at 68–78 (citing, e.g., Ex. 1012, 3:52–67, 4:23–25, 8:23–27, 4:36–40). Petitioner submits that “headlamps with LED arrays were well-known,” which is why it would have been obvious “to substitute Karlsson’s known controllable LED arrays to control the headlight shape and/or intensity for Gotou’s” light source. *Id.* at 67 (citing Ex. 1010, 13:24–14:4, 2:30–35, 9:18–26). The asserted combination substitutes “Gotou’s moving parts” with “Karlsson’s controllable LEDs.” *Id.* at 60. Petitioner explains how the combination teaches the “control” limitation because it teaches adjusting the LEDs based on the map data and before reaching a road curvature. *Id.* at 78–79.

Patent Owner contests whether Gotou and Karlsson teach the “control limitations.” Prelim. Resp. 7, 57–58. Patent Owner identifies the following claim language as the “control limitations”: “control at least a first plurality of the LED light sources to provide light based at least in part on the determined light change and prior to the motor vehicle reaching the road curvature.” *Id.* at 7. According to Patent Owner, the combination eliminates “Gotou’s ability to swing the lamps prior to a turn, i.e., in a direction that is different from a current steering angle.” *Id.* Patent Owner purports that the inability to swing means that the combination does not teach the “control” limitation. *Id.* We do not agree. It is undisputed that

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<sup>8</sup> In the alternative, Petitioner further argues that a person of ordinary skill would have found it obvious to include a processor or Karlsson’s “control means.” Pet. 69–70. Petitioner provides additional alternative arguments throughout the Petition. *See, e.g., id.* at 72, 75, 77.

Karlsson’s LED array can produce different patterns of light or shift light in different directions. Pet. 77–78; Prelim. Resp. 41 (citing Ex. 1010, 19:29–33). Petitioner’s combination replaces “Gotou’s moving parts” with “Karlsson’s controllable LEDs,” and we find that Karlsson’s LEDs effectuate a similar ability to change the lighting in a way that falls within the challenged claims. The claims require a “change adapting a light pattern of the headlamps in at least one of color, intensity or spatial distribution to increase light in a direction of the road curvature.” Karlsson includes “a direction sensor 54, which is for example connected to the steering wheel,” and used “so that the light beam 7 can be adapted to prevent the traffic on the other side of the road from being blinded as much as possible.” Ex. 1010, 20:23–24, 20:29–32. Further, while Patent Owner asserts that Karlsson’s LED array would only shift the light beam left or right, rather than change its direction (PO Resp. 58), that argument ignores that Karlsson discloses an optical system that projects light from the array. *Id.*, Fig. 1. Laterally displacing the illuminated area on the LED array would result in a change in angle for the projected light. Additionally, the claims do not require a particular degree of increase or manner of achieving the increase, so even Patent Owner’s contention regarding Karlsson’s operation appears to satisfy the claim language, in that a lateral shift of the light beam would increase light in the direction of road curvature.

To the extent that Patent Owner believes the claims require more than what Karlsson discloses, Patent Owner should present and support such a claim construction during the instituted trial.

#### 4. Reason to Combine

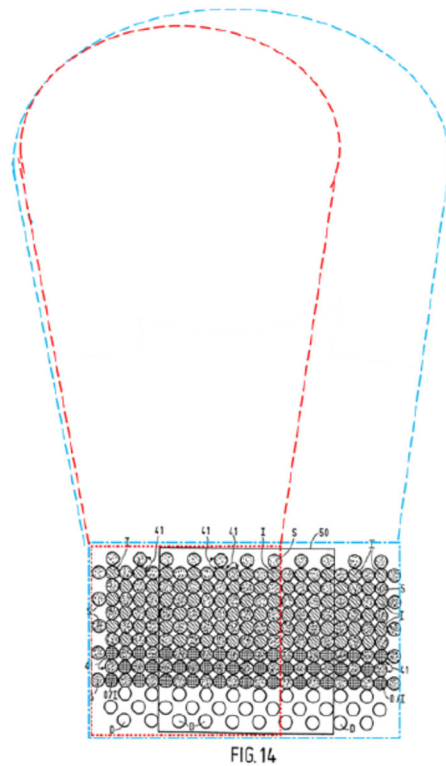
Petitioner asserts that a person of ordinary skill “would have been motivated to combine Gotou’s adaptive vehicle headlamp that uses map data as a control

input to predict and adjust illumination direction with Karlsson’s controllable LEDs as a light source.” Pet. 55. According to Petitioner, an ordinary artisan would have done so at least because of the “well-known benefits of LEDs.” *Id.* at 55–59 (listing examples of benefits, including reliability and integration ease). Petitioner contends that replacing Gotou’s lights with Karlsson’s LEDs would have reduced the number of Gotou’s moving parts, creating a less complex but improved system. *Id.* at 55, 60–65 (explaining that the combination would have been a mere substitution with a reasonable expectation of success).

Patent Owner generally suggests that “improving driver safety” is too broad of a rationale to constitute the required “rational underpinning to support the legal conclusion of obviousness.” Prelim. Resp. 28 (citing *KSR Int’l v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)). Patent Owner counters that Petitioner failed to meet its burden for institution because Petitioner’s combination is flawed for at least four reasons. Prelim. Resp. 27. We address each of Patent Owner’s arguments below.

*a. Inoperable or Unsatisfactory for Intended Purpose*

First, Patent Owner contends that “removing Gotou’s moving parts would render Gotou inoperable relative to swinging about the optical axis.” Prelim. Resp. 39–42. The argument is not that the combination would be inoperable, but that the modification “would render Gotou unsatisfactory for its intended purpose of ‘varying the optical axis . . . before the steering wheel is actually turned.’” *Id.* at 42 (citing Ex. 1012, 6:40–44). Under Patent Owner’s reading, Karlsson discloses only “forward illumination” in front of a vehicle. *Id.* at 40. Patent Owner annotates Karlsson’s Figure 14, reproduced below.



*Id.* at 41 (annotating Ex. 1010, Fig. 14). Karlsson’s Figure 14 illustrates a number of dots, symbolizing individual LEDs, aligned in rows and columns to create a headlight. Ex. 1010, 19:18–33. The top three-fourths of the rows are shaded in a gradient of grey while the remaining bottom fourth is not shaded. *Id.* The different dot shades indicate which LEDs are being used for different lighting levels. *Id.* An outline of a box, labeled “50,” surrounds a number of the middle rows and columns of the LEDs, which represents “[t]he emitted light beam.” *Id.* Patent Owner’s annotations attempt to illustrate a bird’s-eye view of what the emitted light beam would look like when cast on a road. Prelim. Resp. 41. A red broken-line box surrounds the left half of the LEDs and predicts the scope of the emitted light beam from this half of LEDs with a red broken-line conical shape. *Id.* The annotations also include a blue broken-line box that surround all of the LEDs and forecasts, with a blue broken-line conical shape, that the beam emitted from these LEDs would be larger than the red prediction. *Id.* Patent Owner contends that if

Karlsson's lights replaced Gotou's, then the combination would not be able to "swing" or turn toward a road's curve to illuminate the curve—rather the conical shape would merely shift. *Id.* at 41–42.

Based on the evidence before us, we do not agree that Petitioner's combination would render Gotou inoperable or unsatisfactory for its intended purpose. Patent Owner's annotated Karlsson Figure 14 demonstrates that Karlsson's LEDs can "shift" to illuminate different areas based on which LEDs are active. These annotations lack an explanation of how Patent Owner (or Dr. Turk's declaration with similar language and detail) determines the shape of the projected light beam. *Id.*; *see also* Ex. 2001 ¶¶ 83–86. Karlsson's description of Figure 14 notes that its light beam 50 "can shift . . . which may vary as regards its shape and dimension in dependence on the desired pattern and direction of the beam." Ex. 1010, 19:29–33; Pet. 60, 75–77. And as Petitioner points out, Karlsson contemplates adjusting its LEDs "when the car [] is taking a bend." Pet. 75. Further, as discussed above regarding the "control" limitations, those descriptions are consistent with Karlsson's disclosure that light from an LED array is projected through an optical system to reach the road.

Based on the present record, we conclude that the Gotou-Karlsson combination would not render Gotou inoperable or unsatisfactory for its intended purpose.

*b. Teaching Away*

Patent Owner asserts that Gotou teaches away from Petitioner's proposed combination. Prelim. Resp. 44–45. Patent Owner quotes portions of Gotou that emphasize shifting the light direction before the steering wheel turns. *Id.* (citing Ex. 1012, 1:21–29, 6:40–44). Then, Patent Owner contends that the combination

would be “unable to control the LED array of Karlsson to swing the optical axis of illumination as taught by Gotou before the steering wheel is turned.” *Id.*

Patent Owner’s arguments are conclusory and its evidence insufficient to establish that Gotou teaches away from Petitioner’s combination. “A reference does not teach away . . . if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (citing *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)). Patent Owner’s evidence does not “criticize, discredit, or otherwise discourage investigation into the invention claimed,” it at most identifies a preference expressed in the prior art. Moreover, the asserted combination satisfies Gotou’s preference for adjusting illumination before the steering wheel turns because it relies on Gotou for the control and determination aspects—we see no reason why using Karlsson’s light beams would adversely impact this. Thus, Patent Owner has not shown that the asserted combinations would have proceeded counter to the references’ disclosures.

*c. Lack of Explanation*

Next, Patent Owner asserts that Petitioner did not explain how the Gotou-Karlsson combination would operate. Prelim. Resp. 48–50. Patent Owner contends that the Petition insufficiently details what Karlsson elements are being added to Gotou and what Gotou elements are being removed. *Id.* at 48, 50. We disagree.

Petitioner describes that it is substituting “Karlsson’s controllable LED arrays for Gotou’s non-LED headlamp system.” Pet. 55–65. Petitioner establishes that substituting Gotou’s light with LEDs would have been a known substitution at the time of invention of the ’029 patent. Pet. 67–68. We note that using Karlsson’s processor in the combination is an argument that Petitioner makes in the

alternative. Pet. 69–70. Based on the present record, Petitioner has sufficiently explained what elements are being substituted in the proposed combination.

Patent Owner further contends that the Petition lacks an explanation of how Karlsson’s LED array with “multiple optical axes” operates in Gotou’s single optical axis system. Prelim. Resp. 48–49. Patent Owner’s argument is insufficiently explained to establish how Karlsson’s LED array creates “multiple optical axes” or why that would create a problem in Petitioner’s combination. *See id.* While Gotou discloses a controller that determines the desired “optical axis,” that measure is necessarily a generalization applied to the overall light beam emitted. The same would be true regardless of whether one uses Gotou’s light assembly or Karlsson’s LED array. Patent Owner’s supporting declaration does not offer additional reasoning that would explain Patent Owner’s positions. *See* Ex. 2001 ¶¶ 96–98. Accordingly, we do not find Patent Owner’s argument persuasive.

Patent Owner also asserts that Petitioner does not resolve how the combination meshes disparate teachings because Karlsson uses its direction sensor to reduce light for oncoming traffic while the steering wheel is being turned, but Gotou would increase light. Prelim. Resp. 49. As we understand the combination, Petitioner does not include Karlsson’s direction sensor or control strategy as part of its combination. Pet. 73–75. Therefore, Petitioner did not have to explain any inconsistency between Karlsson’s control approach and Gotou’s.

*d. Hindsight*

Patent Owner argues that Petitioner’s Gotou-Karlsson combination involves hindsight bias. Prelim. Resp. 52–55. Patent Owner particularly contends that substituting Karlsson’s LEDs for Gotou’s light is based on hindsight because the substitution “redundantly perform[s] the functionality that it asserts is already

present in Gotou—namely providing predictive illumination of a curve.” *Id.* at 52. Patent Owner submits further that lack of explanation regarding the substitution of Gotou’s mechanical system with Karlsson’s digital system suggests hindsight. *Id.* 53–55. We disagree.

Petitioner demonstrates that LED headlamps existed in the art before the time of the invention. Pet. 67. Petitioner describes many known advantages to LEDs as well. *Id.* at 55–56. Moreover, Petitioner points out how the “building blocks of Gotou and Karlsson are the same.” *Id.* at 56 (comparing the inventions). That Gotou already included a particular feature does not cut against using an alternative structure in the prior art for providing that feature. *See Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2023) (noting that a challenger need not show the combination “was an ‘improvement’ in a categorical sense” but only that it “was a ‘suitable option’”).

The present record supports Petitioner’s asserted combination and we do not agree it is a result of hindsight.

#### 5. Conclusion

We have reviewed Petitioner’s contentions for claims 1, 12, and 23 based on Gotou and Karlsson, and Patent Owner’s arguments challenging the combination, and conclude that Petitioner’s contentions and evidence support institution. *See* Pet. 55–79.

#### 6. Dependent Claims

We have reviewed Petitioner’s contentions for the challenged dependent claim. Pet. 79–91. Patent Owner has not yet substantively addressed the challenges to the dependent claims. Because we find Petitioner to meet its burden for



institution as to the independent claims, we do not address the dependent claims at this time.

D. OBVIOUSNESS OVER BEAM AND KOBAYASHI

Petitioner asserts that claims 1–33 are unpatentable as obvious over Beam in view of Kobayashi.

1. Beam

Beam is titled “Adaptive/Anti-Blinding Headlights” and is directed to a system that automatically adjusts a vehicle’s headlights to avoid blinding oncoming drivers. Ex. 1005, code (54), 1:5–18. Beam describes how its adaptive/anti-blinding headlight (“AABH”) system contains an optical system 106, a sensor 107, a controller 108, and an illuminator 109. Oncoming light enters the system through the optical system. *Id.* at 4:9–25. The sensor detects the light and converts the light into data, which is sent to the controller. *Id.* The controller then uses the data to adjust the output of light from the illuminator so that “[t]he resulting beam is at full intensity except in areas that would dazzle a driver ahead.” *Id.* at 4:32–59.

2. Kobayashi

Kobayashi is titled “Lighting Device for a Vehicle” and is directed “to a lighting device for vehicle use which conducts irradiation control of the lighting device in accordance with a road profile, vehicle operation and vehicle running condition.” Ex. 1008, code (54), 1:5–8. Irradiation is the area of space that light illuminates. *See* Pet. 14; Prelim. Resp. 15–16. Kobayashi discloses that its device includes:

a road profile calculating means 2, vehicle advancing direction predicting means 3, irradiation control means 4 and light device (e.g.,

headlamp) 5. The irradiating direction and irradiating range of the lighting device 5 are directly controlled by the irradiating control means 4 or indirectly controlled via the drive means 6.

Ex. 1008, 3:11–17. The road profile calculating means 2 can be a “navigation system” or “GPS” that includes details about “the position of the vehicle and road profile (including a taper and radius of curvature of the road).” *Id.* at 3:40–49. Based on how the vehicle is being operated, “the vehicle advancing direction predicting means 3 synthetically predicts a vehicle advancing direction at which the driver aims.” *Id.* at 4:6–8. “[T]he irradiation control means 4 compares the direction data of the road profile calculating means 2 with the direction data of the vehicle advancing direction predicting means 3”—which then changes the irradiation/the light produced from a headlight. *Id.* at 4:60–5:28.

### 3. Claims 1, 12, and 23

As with the Gotou-Karlsson combination, Petitioner similarly groups independent claims 1, 12, and 23 together. For the same reasons as above, we find that Petitioner’s groupings are sufficient for purposes of institution. *See supra* Section II.C.3. Because both parties agree claim 1 is representative, our analysis focuses on claim 1’s specific limitations. *See* Pet. 8–9; Prelim. Resp. 6–7, 27–28.

Petitioner asserts that Beam discloses a system for a motor vehicle that uses a processor to control “an array of individual, independently controllable [LEDs].” Pet. 30–32 (citing, *inter alia*, Ex. 1005, 4:10–59, 5:34–36, 8:4–12, claim 4). Because Beam’s processor contains “memory 1106,” Petitioner argues that “a POSA would have understood that the ‘instructions’ in the ’029 patent claims would have been the typical way the processor (system) operates.” *Id.* at 33 (citing Ex. 1005, 5:33–54; Ex. 1003 ¶¶ 127–28).

Petitioner acknowledges that Beam does not expressly teach “receive first data, including at least map data . . . .” *Id.* at 34. Based on Beam’s discussions of prior art, Petitioner contends that “a POSA would have modified Beam’s system to include Kobayashi’s map data functions to further control Beam’s directional LEDs, improving driver safety.” *Id.* at 34–36; *see also id.* at 24–30 (describing Petitioner’s full motivation to combine Beam and Kobayashi). Petitioner argues that Beam’s system that uses oncoming light information “to control the intensity, and/or the angular position, of one or more” discloses “determin[ing] a light change” in “intensity and spatial distribution.” *Id.* at 36–37 (citing Ex. 1005, 6:24–27, 5:46–54). As modified with Kobayashi’s map data above, Petitioner asserts that Beam’s determination disclosure would “‘increase light in a direction of the road curvature ahead of the motor vehicle,’ thus shaping light based in part on the road curvature.” *Id.* at 37–38 (citing Ex. 1008, 17:8–15, 1:21–29, 4:6–21, 15:15–28). Petitioner contends that the implementation of the Beam-Kobayashi determination results in the “control” limitation. *Id.* at 38–39.

Patent Owner contests Petitioner’s asserted reasons to combine Beam and Kobayashi, and argues that the combination does not teach the “control” limitations for similar reasons. Prelim. Resp. 29–39, 43–44, 46–47, 51–52, 56–57. Patent Owner argues that because “Beam is already putting maximum intensity light everywhere it could be needed, there would be no reason to provide the ability to change the direction of” Beam’s illumination. *Id.* at 32.

We do not understand the Petition to propose a combination or modification that limits Beam’s illumination until a controller determines the need to illuminate an upcoming road curvature. Because, as Patent Owner argues, Beam discloses illuminating as widely as possible, an approach that leaves Beam’s lateral-illumination capability available for road curvature (i.e., not used on a straight

road) would require some change to Beam’s described approach. *See* Ex. 1005, 6:11–12 (“These AABH headlights will operate at maximum intensity at all times.”), 6:53–56 (“[T]he AABH system enables the driver to have the equivalent of high beam headlights or brighter on at all times, greatly enhancing the ability to see at night.”).

We agree with Patent Owner that Beam’s disclosures cast doubt on Petitioner’s combination. While Beam does allow controlling its illumination, it does so according to a strategy that starts with the maximum illumination and reduces it where necessary to protect drivers of oncoming vehicles. Petitioner has not explained how that approach would allow Beam to implement a command to increase light in the direction of road curvature. While Petitioner notes that Beam discloses controlling “the angular position” of its LEDs (Pet. 26 (citing Ex. 1005, code (57)), 36–37 (same)), Beam’s control is within the context of providing maximum overall illumination, reduced in areas where necessary to prevent glare (*e.g.*, Ex. 1005, 1:1–4, 2:60–62, 6:11–12, 6:54–55).

We need not resolve the dispute at this stage, because we conclude above that Petitioner’s ground based on Gotou and Karlsson justifies institution. The parties may further develop the record at trial.

#### E. DISCRETIONARY DENIAL UNDER § 312(a)(3)

Patent Owner argues that we should deny institution because Petitioner fails to “identify ‘with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim.’” Prelim. Resp. 60 (citing 35 U.S.C. § 312(a)(3)). Patent Owner contends that the Petition does not specify where each claim limitation of certain claims is found in the prior art and that the use of claim identifiers demonstrates a lack of particularity. *Id.* at 62–64. While Petitioner’s use of claim

appendixes presents its challenges in a cumbersome manner, the Petition is sufficiently particular.

Patent Owner asserts also that the Petition fails to specify the differences between the prior art and the challenged claims. *Id.* at 64–65. We do not agree that Petitioner’s challenges lack particularity, because we understand Petitioner’s asserted combinations. Assertions that both references disclose a particular claim element do not undermine or overly cloud Petitioner’s asserted combinations.

Accordingly, we decline to deny the Petition under § 312(a)(3).

#### F. DISCRETIONARY DENIAL UNDER § 314(a)

Patent Owner argues we should exercise our discretion to decline institution under § 314(a) because of “significant overlap” between this Petition and the petition in IPR2022-01500, which also challenges the ’029 patent. Prelim. Resp. 66. The two petitions both assert Gotou as a primary reference. *Id.* Patent Owner otherwise acknowledges that the petitions assert different combinations of references and are brought by different parties. *Id.*; Pet. 94. Moreover, Patent Owner does not argue that a significant relationship exists between Petitioner and the petitioner in IPR2022-01500 that might support denying institution here. *See Valve Corp. v. Elec. Scripting Prods., Inc.*, IPR2019-00062, Paper 11 (PTAB Apr. 2, 2019) (precedential).

We have considered Patent Owner’s arguments for discretionary denial and decline to exercise our discretion as Patent Owner seeks.

### III. CONCLUSION

For the reasons discussed above, we conclude Petitioner has shown a reasonable likelihood of prevailing with respect to at least one claim. We have

evaluated all of the parties' submissions and determine that the record supports institution.

Our determination at this stage of the proceeding is based on the evidentiary record currently before us. This decision to institute trial is not a final decision as to patentability of any claim for which *inter partes* review has been instituted. Our final decision will be based on the full record developed during trial.

#### IV. ORDER

Accordingly, it is

ORDERED that, pursuant to 35 U.S.C. § 314(a), *inter partes* review of claims 1–33 of the '029 patent is instituted on the grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial commencing on the entry date of this decision.

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