

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLKSWAGEN GROUP OF AMERICA, INC.,
Petitioner,

v.

YECHEZKAL EVAN SPERO
Patent Owner.

U.S. Patent No. 9,955,551 to Spero

Case No.: IPR2023-00315

**PATENT OWNER'S SUR REPLY TO PETITIONER'S REPLY TO
PATENT OWNER RESPONSE**

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List of Exhibits

Exhibit No.	Description
2001	Declaration of Matthew A. Turk, Ph.D.
2002	Curriculum Vitae of Matthew A. Turk, Ph.D.
2003	Best Practices and FAQs for Filing Requests for Reexamination Compliant with 37 CFR 1.510 and 1.915, PTAB, May 2010
2004	Petition challenging U.S. Patent No. 9,955,551, <i>Volkswagen Group of America, Inc. v. Yechezkal Evan Spero</i> , IPR2023-00318, Paper 1, December 22, 2022
2005	Petition challenging U.S. Patent No. 9,955,551, <i>Volkswagen Group of America, Inc. v. Yechezkal Evan Spero</i> , IPR2023-00336, Paper 1, December 22, 2022
2006	Second Declaration of Matthew A. Turk, PhD
2007	Transcript of Deposition of Jianzhong Jiao, Ph.D. taken on August 2, 2023, <i>Volkswagen Group of America, Inc. v. Yechezkal Evan Spero</i> , IPR2022-01586
2008	<i>Intentionally left blank</i>
2009	<i>Intentionally left blank</i>
2010	Jianzhong Jiao and Ben Wang, “Etendue Concern for Automotive Headlamp Using LEDs,” SPIE Proceedings Vol. 5187, (January 2004) (Available at https://www.spiedigitallibrary.org/conference-proceedings-of-spie/5187/0000/Etendue-concerns-for-automotive-headlamps-using-white-LEDs/10.1117/12.504363.short)
2011	Michael Bass, <i>Handbook of Optics</i> 3 RD Edition Volume II, (McGraw-Hill, 2010) (Available at https://www.worldcat.org/title/555545456)
2012	Ben Wang and Jianzhong Jiao “Studies for Headlamp Optical Design Using LEDs,” SAE Technical Paper Series 2004-01-0434, (March 2004) (Available at https://www.sae.org/publications/technical-papers/content/2004-01-0434/)
2013	Ben Wang and Jianzhong Jiao “Optical Transform Limitations in Headlamp Photometric Performance,” SAE Technical Paper Series 2005-01-0861, (April 2005) (Available at https://www.sae.org/publications/technical-

Exhibit No.	Description
	papers/content/2005-01-0861/)
2014	<i>Intentionally left blank</i>
2015	Jianzhong Jiao and Ben Wang “High-Efficiency Reflector Optics for LED Forward Lighting,” SPIE Proceedings Vol. 6670, (September 2007) (Available at https://www.spiedigitallibrary.org/conference-proceedings-of-spie/6670/66700M/High-efficiency-reflector-optics-for-LED-automotive-forward-lighting/10.1117/12.730524.short)
2016	Navigant Consulting “Energy Saving Estimates of Light Emitting Diodes in Niche Lighting Applications” Building Technologies Program Office of Energy Efficiency and Renewable Energy U.S. Department of Energy (September 2008) (Available at Energy Savings Estimates of Light Emitting Diodes in Niche Lighting Applications (Technical Report) OSTI.GOV.)
2017	PCT Publication No. WO 86/05147 to Flaaten
2018	Transcript of Deposition of Jianzhong Jiao, Ph.D. taken on August 23, 2023
2019	Alliance for Automotive Innovation website retrieved September 11, 2023 https://www.autosinnovate.org/about/our-members
2020	Michael Bass, <i>Handbook of Optics</i> 3 RD Edition Volume V, (McGraw-Hill, 2010) (Available at https://www.worldcat.org/title/557121959 .)
2021	Texas Instruments/Digikey “How DLP Technology Works,” (Available at https://www.digikey.com/en/product-highlight/t/texas-instruments/dlp-technology .) (Accessed September 12, 2023.)
2022	Texas Instruments “Introduction to +/- 12 Degree Orthogonal Digital Micromirror Devices (DMDs)” (Available at https://www.ti.com/lit/an/dlpa008b/dlpa008b.pdf?HQS=dis-dk-null-digikeymode-dsf-pf-null-ww&DCM=yes&distId=10) (Accessed September 12, 2023.)
2023	Certified File Wrapper of Reexamination Application 90/014815 dated January 11, 2023
2024	<i>Intentionally left blank</i>

Exhibit No.	Description
2025	Condensed Transcript of Deposition of Jianzhong, Ph.D. taken on January 9, 2024 <i>Volkswagen Group of America, Inc. v. Yechezkal Evan Spero</i> IPR2023-00315, IPR2023-00318

I. Introduction

Petitioner's failed and/or missing arguments cannot be cured at this late hour – either by fresh argument or casting aspersions on Dr. Turk. Dr. Jiao's latest, modified positions are in express contradiction with his earlier statements and are removed from even simple logic – such as a wholly-unpowered light source “creating a beam,” or “replaced” meaning “combined.” To support their extreme position that Dr. Turk is not a POSA, Petitioner disputes positions taken by Dr. Turk that are demonstrably equivalent to those originally stated by Dr. Jiao and ignores inconvenient aspects of their original POSA standard. Petitioner's entire argument and expert “evidence” must be viewed through a lens of aggressive skepticism considering its willingness to contradict itself to advance proofs.

II. Dr. Turk Qualifies as a POSA under the full definition while Dr. Jiao's original positions undermine his latest positions

To maintain the artifice that Dr. Turk is not even a POSA, Petitioner/Dr. Jiao ignore inconvenient aspects of their POSA standard, namely the inclusion of a sliding scale for higher levels of education and the relevance of lighting control experience (Ex.1003, ¶45), dismissing the impact of Dr. Turk's Ph.D., sensing experience, and three years of experience designing an autonomous vehicle system where vehicle lighting and lighting control systems played “an important part.” (Ex.1054, 54:7-8.) Under the Petition's *full* POSA definition, Dr. Turk is

unquestionably a POSA.

PO contests Petitioner's efforts to winnow its POSA definition on Reply and skirt the issue of whether the POSA must possess sensing experience. Notwithstanding the undisputed role of sensing in the '551 claims, Dr. Jiao steadfastly refused to address whether the POSA and/or the "team of computer engineers" that the POSA relies on "to integrate, program, etc. controllers and various control inputs," would possess imaging/sensing experience. (Ex.1003, ¶¶44-46; Ex.2025, 71:10-90:7.) Despite establishing that all the '551 claims involve the use of sensor data to control light, during 45+ minutes of questioning Dr. Jiao refused to answer the simple question of whether "lighting control experience" would include experience with cameras or other sensors and use of sensor data. (Ex.2025, 71:10-90:7.) Dr. Jiao either could not or would not say whether or how "cameras/sensing" related to "lighting control systems," (Id., 83:13-86:6) and instead repeatedly gave circular answers: "a lighting control system is known for a POSA, is to providing control using input, control the light or light sources." (Ex.2025, 85:18-86:6.)

Given Petitioner's latest position, PO submits that the POSA standard from POs preliminary response more closely comports with the Federal Circuit's POSA determination factors, specifically the "patent's purpose" and the "patent teachings as a whole." *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir.

2007); *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1362–63 (Fed. Cir. 2006); *Best Medical International, Inc. v. Elekta Inc.*, No. 2021-2099, (Fed Cir. 2022). In its preliminary response, PO explained that a skilled artisan developing a lighting system utilizing LEDs and corresponding controls would have encountered new challenges with respect to both optics and LED controls. Accordingly, a POSITA would have had “experience in the field of optical and imaging systems.” (POPR, 9.) Per the ’551 Patent, the purpose is to use LED lighting “to effect the provision of lighting that is in concert with the actual illumination needs at a given time... a camera serves as a sensor, and the device uses computer vision technology to recognize... the surroundings... to provide the lighting requirements needed.” (Ex.1001, 14:59:66.) Accordingly, a POSA level that factors in experience with optics and imaging closely aligns with the purpose of the ’551 Patent.

Dr. Turk’s Ph.D. and 20+ years of experience in optics, imaging and its use in autonomous vehicle applications qualifies him as both a POSA and an expert in the fields relevant to the ’551 Patent. As Dr. Turk explained “vehicle lighting is fundamentally about the physics and engineering aspects of optics and I’m an expert on those things.” (Ex.1054, 57:6-8.) Because the ’551 Patent involves multiple fields — optics, headlamps, lighting controls, and imaging/image-processing, Dr. Turk’s experience is unquestionably relevant to the technical fields

at issue, qualifying him as a POSA. PTAB Consolidated Trial Practice Guide November 2019 at 34 (“There is ... no requirement of a perfect match between the expert's experience and the relevant field.”). Were a perfect match needed, Dr. Jiao’s complete lack of imaging/image-processing experience would equally disqualify him as a POSA.

To fill missing limitations, Dr. Jiao’s latest positions not only attack Dr. Turk’s knowledge base but use his “expertise” to redefine easily-understandable terminology in ways that are demonstrably contradictory with his prior positions.

For example, Dr. Jiao contends “Dr. Turk appears not to understand what the term ‘intensity’ means” when Dr. Turk equates “reduce intensity” to “change from one level of illumination to a lower level of illumination.” (Ex.1052, ¶13.) This statement is in marked contrast to Dr. Jiao’s own previous assertion that Beam “reduces the illumination of the LEDs in the selected group, which a POSA would have understood as reducing ‘intensity’ of the LEDs as claimed.” (Ex.1003, ¶147.)

Next, Dr. Jiao advances a belated construction: “‘intensity’ refers to luminous intensity measured ... *It is not*, contrary to Dr. Turk’s misunderstanding, *an illumination brightness level or similar to or synonymous with brightness.*” (Ex.1052, ¶15.)

This construction is inconsistent with Dr. Jiao’s original Declaration, which frequently used “intensity” in the context of “brightness” and/or described intensity

separately from directionality/aiming. (Petition, 35, 43, 73; Ex.1003, ¶¶145, 146, 147, 148, 149, 161, 167, 182-185, 191, 197.); *See also*: Jiao Declaration statements equating “adjusting emission” with “intensity control.” (Ex.1003, ¶¶60, 65); Jiao Declaration statements differently using “intensity” and “direction.” (*Id.*, ¶¶54, 70, 72, 74, 86, 90); Declaration statements supporting intensity as a characteristic of illumination/emission (without direction). (*Id.*, ¶¶75, 149, 155, 157, 164, 178, 191, 233, 237, 273, 283, 285, 323, 324, 326, 328.)

III. Dr. Jiao continually contradicts himself

Not only does Dr. Jiao inject new and self-contradictory meaning into terms like “intensity,” he seeks to use his “understanding as a POSA” to contradictorily construe terminology, such as “microbeam” or “replaced:”

Dr. Jiao — then (Ex.1003)	Dr. Jiao now — Reply Declaration (Ex.1052) and Deposition Transcript (Ex. 2025)
“lamp 202 and spatial light modulator 203 are replaced by an array of light sources 401... This means that [SLM] 203 is replaced with the circuitry for ‘controlled powering of the LEDs,’ ... this circuitry takes the place of spatial light modulator 203 ...” (¶120.)	“A replacement is a combination of a light-emitting element and optical-control elements ... The replacement is combining the two ...” (Ex.2025, 94:21-95:9.)
“control Beam’s directional LEDs ...” (¶205 - <i>using a combination where the SLM was intentionally removed.</i>) “ Beam’s LEDs are therefore	“an SLM ... provides the benefit of having directional control over the light emitted from the LEDs, instead of only having control of the brightness of that light.” (¶53.)

controllable in direction, pattern, intensity, etc.” (§72.)	“A POSA would have understood the emitter element , without optical elements, cannot be directional ... ” (Ex.2025, 100:5-7.)
“Beam uses the term ‘ microbeam ,’ as light emitted from a ‘microbeam source,’ which includes ... LEDs. ” (§71.)	“A microbeam and microbeam source, a POSA would understand ... these are two things ... either one is hardware, another one's result of hardware or you can alternatively say that's the same thing.” (Ex.2025, 96:21-97:9.)

To summarize, Dr. Jiao now, *in direct contradiction with his original Declaration*, wants “replaced” to mean “combined,” “microbeam” and “microbeam source” to be usable interchangeably, and SLMs (not used in the Petition combinations) to be *necessary* for directional control.

IV. Dr. Jiao’s testimony should be accorded reduced weight

Petitioner and Dr. Jiao repeatedly latch onto hindsight-driven “industry” definitions, allegedly known to a POSA, to alter the plain meaning of a term within a given reference, e.g., “intensity,” “microbeam” and “replace” without establishing that Dr. Jiao’s understanding constitutes the general knowledge of a POSA in 2002. Per the Federal Circuit ruling in *Arendi*, absent a “coherent analysis” regarding why the alleged POSA knowledge would be “common sense,” Petitioner’s attempt fails. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed.

Cir. 2016); *DSS Technology Management v. Apple Inc.*, 885 F.3d 1367 (Fed. Cir. 2018).

Moreover, Dr. Jiao was repeatedly unable to explain how the theoretical POSA perspective differed from his own; impermissibly commingling the two and calling into question whether expert knowledge formed the basis for his obviousness analyses. (Ex.2025, 13:19-23:18.) Dr. Jiao continually referred to himself as “a POSA” (*Id.*, 14:6, 14:19, 16:4) and was unable to explain any distinction he made between POSA and expert. (*Id.*, 14:11-15, 15:21-16:14, 17:1-8.)

The law clearly contrasts a POSA with one of “expert skill” and establishes that it improper to “determine the challenged claims’ patentability from an expert’s perspective rather than the POSA’s perspective.” *McCoy v. Heal Systems, LLC*, 850 Fed. Appx. 785, 788 (Fed. Cir. 2021).

For these reasons, PO requests the Board assess whether Dr. Jiao’s testimony should be entitled to less weight than Dr. Turk’s more balanced approach, as it is demonstrably hindsight-driven, markedly inconsistent and contradictorily changing over time and often devoid of record and legal foundation. *RayVio Corp. v. Nitride Semiconductors Co., Ltd.*, IPR2018-01141, Paper 39 (PTAB Dec. 2, 2019) (Expert testimony contradicting express disclosure afforded less weight.)

V. Petitioner’s missed proofs for claims 32, 33, 41 and 48-49

Petitioner did not address all limitations of claims 32, 33, 41 and 48-49 in the Petition. (POR, 10-14.) Now, Petitioner presents new arguments and cites previously-uncited analysis of *different* claim limitations to backfill its deficient Petition. (Reply, 23-24.) Under 37 C.F.R. § 42.104(b)(4), because the Petition was required to contain detailed identification of ‘where each element of the claim is found in the prior art,’ the PTAB has repeatedly declined to consider arguments “that amount to rewriting the Petition after institution.” *Apple, Inc. v. UUSI, LLC*, IPR2019-00358 (PTAB Aug. 4, 2020 (*aff’d Apple Inc. v. UUSI, LLC*, No. 2021-1035, 2023 WL 3071643 (Fed. Cir. Apr. 25, 2023)). *See also Microsoft Corp. v. Ipa Techs., Inc.*, IPR2019-00812 (PTAB Oct. 15, 2020).

A. Claims 33, 41 and 49: new “*image data*” arguments

As the “*wherein the data includes image data*” limitation of claims 33, 41 and 49 is absent from the Petition mapping, the Reply impermissibly cites disconnected portions of the Petition to rectify the shortfall. (Reply, 23-24.) Under 37 C.F.R. § 42.104(b)(4), Petitioner’s new arguments should not be considered.

B. Claim 48: New “*classifying*” arguments

As noted in the POR at pages 12 and 13, Petitioner did not address the “*the first light determined based at least in part on classifying the object...*” limitation of claim 48. Petitioner attempts to pass off this deficiency as a “typographical

error,” stating: “Petition addresses this element, referring to it as part of element [48.8].” (Reply, 25.) Petitioner does not specifically identify its prior *analysis* of the “classifying” limitation because there is none. Petitioner tries several tactics to “solve” this problem including: 1) Casting this argument as rooted in the interpretation of “classifying” so that it might present new evidence; 2) Presenting new argument related to Beam and Satonaka; and 3) Hiding the phrase in its secondary-considerations argument.

First, Petitioner casts this argument as rooted in the interpretation of “classifying” so that it might present new evidence. (Reply, 8-10.) PO's primary argument was that there was *no* argument at all, a position for which the meaning of “classifying” is irrelevant. (POR, 12-13.)

Petitioner also now contends Beam’s “algorithm differentiates between illuminated objects that are above and below a threshold.” (Reply, 9-10.) Beam makes no mention of “illuminated objects.” Petitioner’s citations to the Petition and Declaration do not even reference “thresholding,” making this plainly new argument. (*Id.*)

Petitioner’s statement that “Beam’s algorithm differentiates between illuminated objects that are above and below a threshold,” is also a technical misstatement suggesting that Beam detects and sorts objects, despite Beam’s whole teaching being limited to: “the spatial scene data is thresholded to eliminate weak

signals.” (Ex.1005, 5:34-36.) This sort of misleading characterization demonstrates the clear need for a POSA and an expert who understands sensing and processing sensor data. Petitioner’s position is not clarification of prior argument, as the disingenuous Petition cites suggest – it is a wholly-new argument introduced to deal with an incurable shortcoming of the Petition.

Petitioner also impermissibly tries to introduce Satonaka to satisfy this limitation. (Reply, 10.) Satonaka is not referenced once with respect to claim 48 in the Petition. (Petition, 45-46.) Further, Satonaka’s alleged “classification into oncoming or preceding” has no relevance to Beam, which would treat “oncoming or preceding” vehicles equally. Claim 48 requires “light is *determined based on* classifying the object,” so if the classification were “oncoming” vs. “preceding” then *that* classification would have to be shown to affect light-determination. Also, Petitioner elsewhere reiterates *exactly* what is taken from Satonaka – “Beam is modified with Satonaka’s teachings for the “coordinates of the pixels” in the image.” (Reply, 16-17.) Dr. Jiao confirms this is “only” what is taken. (Ex.1052, ¶130.)

Finally, Petitioner states in its secondary-considerations argument: “PO does not dispute that Karlsson discloses this element.” (Reply, 26; Ex.1052, ¶103.) This implies the absolute fiction that it was PO’s burden to address an unrepresented argument. Since Petitioner never mentioned “classifying,” never mapped any

evidence to “classifying,” and never explained why the recitation of “classifying” was immaterial, there was nothing for PO to “dispute.”

VI. Claims 24, 32 and 40 require positive illumination

A. “Emission” and a “beam” of light are not taught by wholly-blanked groups of LEDs

Petitioner argues that PO misinterprets these claims. (Reply, 5.) Claim 24 requires “*changing emission... relative to emission of other LEDs...*,” claim 32 requires “*creat[ion of] a beam of diminished illumination illuminating,*” and claim 40 requires “*decreased intensity of emission.*” Each claim includes an affirmative recitation of light that requires production of actual light.

“Non-emission” is definitionally not “emission.” PO further evinces the difference by using the term “non-emitting” when referring to non-emission in claim 25. Claim 32’s “beam of diminished illumination illuminating” is still a “beam.” A blank spot of non-illumination is neither a “beam” nor does it “illuminate” anything.

B. The claims “prohibit” zero light as the result from the *full cluster*

Despite Petitioner’s contrary argument (Reply, 5), the claims “prohibit” zero light as the result from the *full “cluster”* because they require the affirmative presence of light *from the “cluster.”* This does not preclude a given LED *of the cluster* from being non-emitting. Petitioner’s arguments on this point frequently

fail to appreciate the distinction between “the cluster” and “LEDs” that are part of the cluster.

For example, claim 32 requires the “*beam of diminished illumination*” to be “*illuminating* at least a portion of the target.” The beam also has to be “created” by the selected “cluster.” Even if Beam selects a “cluster,” Beam’s *control* function “blanks” that cluster, rendering Beam’s “terminated/turned-off” whole *cluster* incapable of creating a beam illuminating anything. (Ex.1005, 5:33-54; Petition, 47.)

C. The dependent claims do not change the meaning of the independent claims

Petitioner contends: “claims 25, 33 and 43 recite that the changed emission/illumination/intensity changes an LED to a ‘non-emitting state’” as evidence of non-emission meeting the independent claims. (Reply, 6.)

This explanation reads claim 25 without including the “cluster” limitation from base claim 24 and overlooks a common-sense understanding of how emission can be achieved by a *group* of LEDs. The claims require: 1) The cluster includes “a *plurality* of LEDs;” and 2) The change “includes a change to at least one LED of the cluster to a non-emitting state.”

If fewer than all LEDs change to non-emitting, *the cluster* still emits light. The independent claims recite the cluster emitting light, and the dependent claims

relate to *at least one of a “plurality” of LEDs* being changed to non-emitting. The combination of the two concepts permits *some*, but not all, of the LEDs *of the claimed emitting cluster*, to change to non-emitting, preserving claim 24’s requirements while allowing claim 25’s.

VII. Beam expressly “blanks” what Petitioner would deem the selected cluster and so cannot meet claims 24, 32 and 40

A. Petitioner defined “blanking”

Beam uses both definitive and relative terminology, for example, describing results as “reduced in intensity,” but also describes control as “blanking.” (Ex.1005, 5:44-54.) Dr. Jiao *already* resolved the disconnect – “When LEDs are used as the microbeam source, [blanking] means that the LEDs would be turned off ...” (Ex.1003, ¶193.) He described “blanked” as being “terminated/turned off.” (*Id.*) Petitioner cannot belatedly advance a contradictory meaning equating “blanking” with powered LEDs.

B. “Determining which microbeams must be reduced in intensity” is not actually the same as Beam’s control step

Petitioner quotes “determin[ing] which microbeams [LEDS] must be reduced in intensity to protect other drivers” as evidence of Beam having non-zero emission from sources controlled for glare. (Reply, 7.) This *determination*, however, is *not* the *control function utilized by Beam* to reduce said intensity. Beam explains *how* reduced intensity is *achieved* – “blanking,” which Dr. Jiao

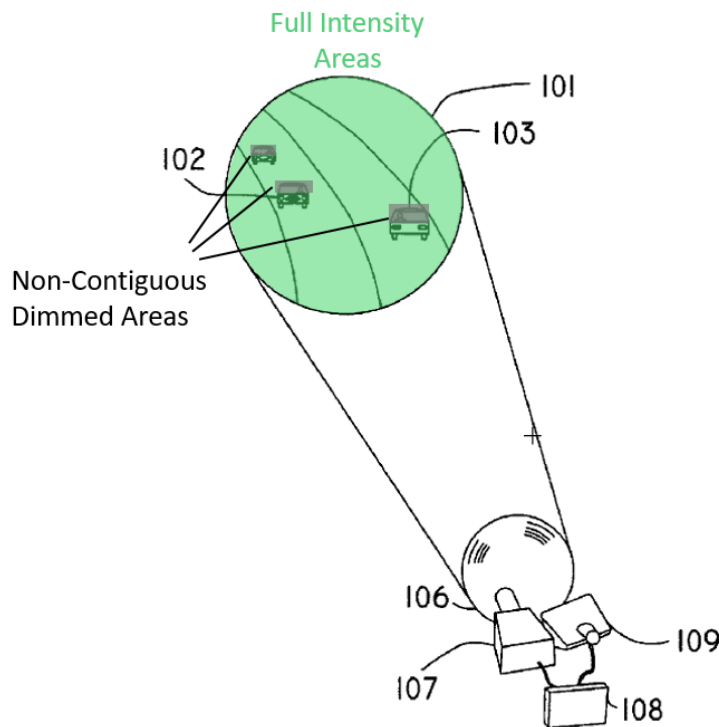
plainly admits means “terminated/turned off.” (Ex.1005, 5:44-54; Ex.1003, ¶193.)

VIII. Petitioner’s argument about “SLMs” for claims 30/38/46/54 distorts PO’s response

Petitioner argues that “PO is incorrect that Beam does not disclose a spatial light modulator with LEDs.” (Reply, 12.) PO’s argument is that Petitioner’s *combination* does not include the SLM, having expressly replaced it with LED control circuitry. (POR, 24.) Petitioner removed the SLM 203 intentionally – merely demonstrating its presence in Beam does not explain why it would be added to the combination. (Petition, 26.)

IX. Petitioner fails to rebut PO’s correct explanation of maximum illumination in Beam and how that defeats Petitioner’s curve illumination arguments in claims 26-29, 34-37, 42-45 or 50-53

Beam maximally illuminates the scene except where glare is accommodated. (POR, 42-43.) This leaves nothing for Beam to control to further accommodate curves as in claims 26-29, 34-37, 42-45 or 50-53. (*Id.*) Petitioner even provided an annotated figure demonstrating “full intensity” in the entire scene 101.



(Ex. 1005, Fig. 1 annotated; Petition, 38.)

Petitioner *now* asserts that “Beam does disclose changing direction of microbeams to form its beam patterns” based on its new argument that combines Beam’s LED and SLM. (Reply, 18; Ex.1052, ¶¶143-146.) Dr. Jiao *now requires an SLM* to change directionality of light – “...if a headlamp was only formed from LEDs, it could not control the directionality of its light beam...” (Ex.1052, ¶51.) Problematically for Petitioner, “a headlamp only formed from LEDs” is exactly what it has in the Petition, since it removed the SLM and chose to “control Beam’s directional LEDs.” (Petition, 26, 48.)

Any attempt to *now* explain that illumination could be “directed” using

SLMs is new argument defeated by the fact that Petitioner expressly removed the SLMs in its combination – “*spatial light modulator 203 is replaced with the circuitry for “controlled powering of the LEDs,” ... this circuitry takes the place of spatial light modulator 203*” (*Id.*, 26; Ex.1003, ¶120.) No SLM was ever referenced or re-added in the subsequent argument directed to claims 26-29, 34-37, 42-45 or 50-53.

X. The Karlsson-Nakamura Combination Does Not Teach all “camera” limitations of claims 24/32/40/48

Petitioner simply points to a camera and LEDs in different Karlsson embodiments. (Reply, 19.) Petitioner fails to explain how or why a POSA would have modified Karlsson’s Fig. 14 embodiment to include a camera/photo-plate instead of the disclosed photo-diodes. (POR, 43-51.)

XI. Petitioner concedes Karlsson operates with “all of its spotlight beams active” and fails to contextualize its prior admission, rendering Karlsson inoperable to provide the additional curve accommodations of claims 26-29, 34-37, 42-45, and 50-53

A. Petitioner concedes that Karlsson “operates with all of its spotlight beams active”

Petitioner admitted that Karlsson’s disclosure at 9:18-26 teaches that the “remaining areas of light beam 7 are left at full intensity (‘main-beam’ or ‘high beam’ in Karlsson’s terms), ‘permitting a light intensity which is generally higher than that of conventional dipped headlights.’) (Petition, 73-74.) Petitioner now

contends that “[n]othing suggests to a POSA that Karlsson operates with all of its LED spotlight beams active **except to implement glare control.**” (Reply, 22.) The last part of that phrase is telling – in that Petitioner *again admits* that Karlsson “operates with all of its LED spotlight beams active.” (*Id.*)

Petitioner attempts to situationally contextualize its admission, using new argument, as being limited to situations when glare control is occurring – a qualification never previously made. This is done under the unfounded guise that a POSA would have “understood” Petitioner’s prior statements to be different from what those statements plainly say. (Reply, 22.)

1. Petitioner’s *current* explanation ignores its *prior* explanation

Petitioner stated that “**the** optimum lighting effect” for the driver was obtained by “maximiz[ing] the area that is fully illuminated.” (Petition, 73-74). Dr. Jiao even noted “it would have been obvious to a POSA to configure Karlssons’ system to surround the reduced illumination area with **full illumination to the greatest extent possible** for the same reason ...” (Ex.1003, ¶285.)

Now Petitioner contends that “optimally” is situationally variable. (Reply, 22-23; Ex.1052, ¶177.) Petitioner, however, already defined “**the** optimum lighting effect” (not “**an** optimum lighting effect”) as “maximiz[ing] the area that is fully illuminated.” (Petition, 73-74.)

2. Multiple additional problems remain with Petitioner's impermissible amended explanation

Petitioner has numerous additional problems with its revised explanation. Since, by Petitioner's own contention, Fig. 14 is representative of a situation where glare control is *occurring*, Petitioner fails to explain how its new contextualization changes the problem for its argument. (Petition, 70-71.) If Fig. 14 is indicative of "multiple vehicle" glare-control, and Petitioner piggybacks off that explanation for the curve-illumination claims, Petitioner does not explain how Karlsson functions when glare control is *not* occurring.

Petitioner presents *new* annotated figures showing "conventional" beams allegedly derived from Fig. 14, despite Karlsson describing none of this and none of those figures show the "window 50" that encompasses high *and* low beams. (Ex.1052, ¶173.) Further, it presented Fig. 14 as an example of glare control for two vehicles, understandable only if the blanked areas on the left and right were to accommodate vehicles, which would only make sense if all the LEDs were already on. (Petition, 70.)

And if Fig. 14 is representative of glare control, this leaves Petitioner without an example *from Karlsson* showing how Karlsson would function when not controlling glare –other than its new and unsupported annotated figures. With regards to those figures, if Karlsson *can* use its LEDs to create (D), then

“maximizing the area that is fully illuminated” would also include creation of a symmetrical output on the other side, plus all the intervening illumination.

Alternatively there is a simpler answer – reading PO’s and Petitioner’s original explanation, it follows that because Karlsson can accommodate glare, it has no stated reason to use fewer than all LEDs – and those LEDs would be used at “full intensity to the greatest extent possible” to provide what Petitioner calls “**the** optimum lighting effect.”

B. Petitioner’s combination does not include Karlsson’s SLM

All control using Karlsson is noted as control of the LEDs. (Petition, 60-64, 67-68, 73-74, 78.) The general contention of Petitioner is that “*control means 14 are arranged to selectively switch the individual small light sources, or a group of individual small light sources, on and off ... in response to a control signal from sensor means 23, so as to provide a desired lighting pattern.*” (*Id.*, 64.)

Even when addressing curve illumination claims, Petitioner merely contends “to further control Karlsson’s *directional LEDs* to illuminate roadway curves ...” (*Id.*, 79, 81, 82.)

XII. Petitioner’s argument related to “non-contiguous” LEDs retains the argument’s initial shortcomings

For “the cluster includes non-contiguous LEDs,” Petitioner argues “the plain language [of claim 24] only requires that the cluster *include* LEDs that emit light

towards at least a portion of the other vehicles.” (Reply, 11-12.) This argument recasts “of” as “include” in claim 24, which actually requires “select a cluster *of* LEDs that emit light toward at least a portion of the other vehicle.” The base claim language about “cluster” may vary by independent claim, but Petitioner argued all claims 27, 33, 35, 41, 43, 49, 51 with respect to claims 24/25.

PO was not arguing that Petitioner’s two groups of LEDs for dealing with two vehicles were not “non-contiguous” – PO was arguing that Petitioner’s proof failed to address the claim language of claim 24 for all the LEDs it included in its multi-vehicle cluster. Any LEDs that Petitioner wants to include to define “the cluster” for its proof, needed to be *shown* to “emit light toward at least a portion of the other vehicle,” and so Petitioner failed to show, and still fails to show, the applicable relevance of its multi-vehicle analysis to the language of claim 24. (POR, 22.)

Petitioner’s statement that “the plain language only requires that the cluster *includes* LEDs that emit light toward at least a portion of the other vehicle” is misleading in that it exchanges the words “includes” for “of.” (POR, 11-12.) Claim 24 requires select a cluster “*of LEDs* [having the claimed characteristics].” When Petitioner elected to define the “cluster” for its analysis as including LEDs that were expressly added to deal with a second vehicle, Petitioner still needed to *show* that those LEDs, in some manner, satisfied “emit light towards at least a portion of

the other vehicle” (i.e., the first vehicle), as claimed. (POR, 22.) Such a showing was never made, and the relevance and applicability of the argument failed. (*Id.*)

Because Petitioner used the same multiple-vehicle argument for both Beam and Karlsson (Reply, 11-12, 20), the failings are the same – both sets of analysis failed, and still fail, to show how secondary LEDs for dealing with a *different vehicle* have the claimed characteristics of the LEDs in claim 24. Petitioner cannot escape this shortcoming by rewriting “of” as “include” in claim 24.

XIII. Petitioner’s proposed operation of Karlsson is unsupported by evidence

Petitioner contends Karlsson “would repeat its dimming process for all detected vehicles.” (Petition, 76; Reply, 19.) Petitioner further alleges that “PO’s argument ... relies on an unsupported hypothetical operation, as opposed to the Petition’s explanation which is based on Karlsson’s existing dimming process.” (Reply, 19-20.) Problematically for Petitioner, it admitted 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.” (Petition, 55). By Petitioner’s own admission, Karlsson does not *have* a dimming *process*. It only has a dimming goal. This shortcoming applies to **all** claims involving Karlsson as noted in the POR. (POR, 60).

A. The general failings of Karlsson are not cured by the combination with Nakamura

It was the precise lack of a dimming process in Karlsson that motivated the combination with Nakamura – “search for known techniques detailing how sensor information ... is stored and *processed to determine which portions of the headlight beam need to be dimmed.*” (Petition, 55.) Compounding the problem, Nakamura is almost completely silent on the function for glare-reduction. “[W]hich portions of the headlight beam need to be dimmed” in Nakamura is largely found in paragraph (0045), as the reference is primarily concerned with winding roads. (Ex.1013, (0045), Abstract.) Paragraph 45 of Nakamura states that it is “possible to illuminate the *front* of the vehicle with light ...” (Ex.1013, (0045).)

Dr. Jiao, in his deposition, explained Nakamura’s control: “the cutoff can be moved vertically to create a gap so that glare ... will be prevented ... vertical motion disclosed by Nakamura, is where you can create a vertical change where you create the portion that lights, that hit other driver's eye, being prevented.” (Ex.2025, 123:5-21.)

However, Figure 5 shows the “cutline” and the whole region above this cutline is “not illuminated.” (Ex.1013, Fig. 5.) Nakamura’s solution is to aim the cutline “downward” vertically and have *no* illumination above that line. (Ex.1013, ¶¶21, 45). The control function of Nakamura would essentially result in the “large box,” (above the cutline and covering *all* vehicles above the cutline) that PO

posited. Petitioner thus never *explained* the control function or its incorporation (except to say that it happens) or *modified* this control function to create *multiple* such cutlines.

Accordingly, Petitioner never explained how Karlsson+Nakamura results in the admittedly-missing “how the direction of the target light sources is stored and *processed to determine which portions of the headlight beam need to be dimmed.*” (POR, 59-60.)

All contentions that Karlsson would achieve any of the specific glare-control techniques of the *claims* is pure conjecture, unmet by Karlsson’s general mention of “*in such a manner that* no light at all or light having a low intensity is emitted in those directions from which light is detected ...” Karlsson never teaches the “manner” and Petitioner never explained Nakamura’s control in the context of how the LEDs are to be dimmed (i.e., which portions of the beam to select). In the context of the claims, Karlsson is relied-upon as though it were *not* missing the control Petitioner admitted it was missing. At best, “no/low light ... in the directions from which light is detected” prevents glare *to the headlamps of the vehicle only* – leaving no explanation for how the teaching prevents glare to a driver’s eyes, which are not adjacent to the vehicle headlamps.

B. Petitioner’s argument about Karlsson’s dimmed or dark box is either new argument or fails to meet the claims

Petitioner is certainly not entitled to now contend “Karlsson would ... form[] its dimmed or dark box around each target source ...” because Petitioner admitted Karlsson *had no such strategy*. (Reply, 20; Petition, 55, POR, 60.) To the extent that Petitioner is contending that Karlsson would form the “box” around the “source,” then Petitioner has essentially admitted that Karlsson’s strategy is limited to preventing glare to “sources” (the literal lamps themselves), because no driver sits adjacent to the source.

XIV. The combination requiring Nakamura’s algorithm also requires modifications due to the change in camera placement; such modifications were never presented

PO performed a test to show that as a camera location changes, perspective of the road-edges, and any vehicles between the road-edges, changes. (POR, 54-61.) Since Nakamura expressly relies on the perceived slope of the road edges for its multi-step algorithm (Ex.1013, Fig. 10; POR, 51-57; Ex.2006, ¶¶97, 190), and since the *teaching* of Nakamura is about a perspective on those edges that is obtained by a camera Nakamura expressly places “near the driver’s eyepoint,” (Ex.1013, ¶12) it is reasonable to understand that the algorithm might have some issues functioning when it is trying to process Karlsson’s camera viewpoint from either headlamp that views the road-edges differently. (POR, 54-61.)

This is relevant because Petitioner’s Karlsson/Nakamura combination includes *both* the coordinates of Nakamura and the algorithm of Nakamura. For

example, Petitioner admits 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.” (Petition, 55.) Accordingly, Petitioner asserts that “it would have been obvious to a POSA to modify Karlsson’s system to include the coordinates of the pixels, **and the corresponding vehicle recognition process**, as taught by Nakamura.” (Petition, 56.) But Petitioner neither explains that the camera perspective change is an issue, nor how it would be resolved. Rather, Dr. Jiao contends that “a POSA would not even be able to verify that there actually is an effect” (Ex.1052, ¶¶124, 167) – an argument that ignores the *demonstrable and logical* effect of moving a camera vertically down from the window center and to the left or right headlamp location. As illustrated by Dr. Turk’s test, the perspective change is clear. (POR, 58-59; Ex.2006, ¶¶194-196.)

Moreover, it is telling that Dr. Jiao objects on multiple fronts to the simple test demonstrating the perspective change, requiring a litany of technical details so that a POSA could understand this simple example, but when it comes to *implementing* Nakamura’s algorithm with Karlsson’s different camera placement (markedly more difficult than understanding a demonstrative perspective change) his explanation is just that “involves no basic programming changes.” (Ex.1003, ¶240.) Petitioner calls it “simply modifying software ... to include the pixel coordinates *and corresponding algorithm* in Nakamura.” (Petition, 57.)

Nowhere in the explanation of the combination does Dr. Jiao address all the issues he now complains create such difficulty in understanding Dr. Turk's test. (Ex.1052, ¶¶117-134, 167-168.) Even Dr. Jiao's "simple calibration for camera location versus driver's viewpoint" was introduced post-institution and is further never actually shown to be "simple." (*Id.*, ¶125.) Petitioner has thus failed to satisfy its burden of explaining how and why a POSA would have modified or combined the prior art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2006) (requiring articulated reasoning with rationale underpinning as to how or why a person of ordinary skill in the art would have combined or modified the teachings of the prior art).

Petitioner's arguments for the Beam/Satonaka ground suffer from similar shortcomings to the extent that anything involving Satonaka's algorithm is implicated in those combinations.

XV. Conclusion

Patent Owner respectfully requests the Board find all challenged claims not unpatentable.

Dated: January 17, 2024

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Certificate of Service

The undersigned hereby certifies that on January 17, 2024, a complete and entire copy of **PATENT OWNER'S SUR REPLY TO PETITIONER'S REPLY TO PATENT OWNER RESPONSE AND EXHIBIT**, was served via electronic mail to the attorneys listed below:

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