

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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U.S. Patent No. 11,208,029 to Spero

Case No.: IPR2022-01586

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

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**List of Exhibits**

| <b>Exhibit No.</b> | <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| 2001               | Declaration of Matthew A. Turk, PhD                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 2002               | Curriculum Vitae of Matthew A. Turk, PhD                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2003               | Petition challenging U.S. Patent No. 11,208,029, <i>Unified Patents, LLC v. Torchlight Technologies LLC</i> IPR2022-01500, Paper 1, September 22, 2022                                                                                                                                                                                                                                                                                                                                    |
| 2004               | U.S. 6,406,172 to Harbers                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2005               | Comparison of Harbers (Ex. 1011) to Harbers '172 (Ex. 2004)                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2006               | Supplemental Declaration of Matthew A. Turk, PhD                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2007               | Transcript of Deposition of Jianzhong Jiao, Ph.D. taken on August 2, 2023                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2008               | Petition challenging U.S. Patent No. 9,995,551, <i>Volkswagen Group of America, Inc. v. Yechezkal Evan Spero</i> IPR2023-00318, Paper 2, December 22, 2022                                                                                                                                                                                                                                                                                                                                |
| 2009               | Declaration of Dr. Jiao, <i>Volkswagen Group of America, Inc. v. Yechezkal Evan Spero</i> IPR2023-00318, Exhibit 1003.                                                                                                                                                                                                                                                                                                                                                                    |
| 2010               | Jianzhong Jiao and Ben Wang, "Etendue Concern for Automotive Headlamp Using LEDs," SPIE Proceedings Vol. 5187, (January 2004) (Available at <a href="https://www.spiedigitallibrary.org/conference-proceedings-of-spie/5187/0000/Etendue-concerns-for-automotive-headlamps-using-white-LEDs/10.1117/12.504363.short">https://www.spiedigitallibrary.org/conference-proceedings-of-spie/5187/0000/Etendue-concerns-for-automotive-headlamps-using-white-LEDs/10.1117/12.504363.short</a> ) |
| 2011               | Michael Bass, <i>Handbook of Optics</i> 3 <sup>RD</sup> Edition Volume II, (McGraw-Hill, 2010) (Available at <a href="https://www.worldcat.org/title/555545456">https://www.worldcat.org/title/555545456</a> )                                                                                                                                                                                                                                                                            |
| 2012               | Ben Wang and Jianzhong Jiao "Studies for Headlamp Optical Design Using LEDs," SAE Technical Paper Series 2004-01-0434, (March 2004) (Available at <a href="https://www.sae.org/publications/technical-papers/content/2004-01-0434/">https://www.sae.org/publications/technical-papers/content/2004-01-0434/</a> )                                                                                                                                                                         |
| 2013               | Ben Wang and Jianzhong Jiao "Optical Transform Limitations in Headlamp Photometric Performance," SAE Technical Paper Series 2005-01-0861, (April 2005) (Available at <a href="https://www.sae.org/publications/technical-papers/content/2005-01-0861/">https://www.sae.org/publications/technical-papers/content/2005-01-0861/</a> )                                                                                                                                                      |
| 2014               | LEDs Magazine "Major contributors in LED and lighting                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Exhibit No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | standards have led the SSL revolution,” Jianzhong Jiao February 2018. (Available at <a href="https://www.ledsmagazine.com/manufacturing-services-testing/standards/article/16695802/major-contributors-in-led-and-lighting-standards-have-led-the-ssl-revolution-magazine">https://www.ledsmagazine.com/manufacturing-services-testing/standards/article/16695802/major-contributors-in-led-and-lighting-standards-have-led-the-ssl-revolution-magazine</a> )                                                             |
| 2015        | Jianzhong Jiao and Ben Wang “High-Efficiency Reflector Optics for LED Forward Lighting,” SPIE Proceedings Vol. 6670, (September 2007) (Available at <a href="https://www.spiedigitallibrary.org/conference-proceedings-of-spie/6670/66700M/High-efficiency-reflector-optics-for-LED-automotive-forward-lighting/10.1117/12.730524.short">https://www.spiedigitallibrary.org/conference-proceedings-of-spie/6670/66700M/High-efficiency-reflector-optics-for-LED-automotive-forward-lighting/10.1117/12.730524.short</a> ) |
| 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 <a href="#">Energy Savings Estimates of Light Emitting Diodes in Niche Lighting Applications (Technical Report)   OSTI.GOV.</a> )                                                                                                                                           |
| 2017        | PCT Publication No. WO 86/05147 to Flaaten                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2018        | Condensed Transcript of Deposition of Jianzhong Jiao, Ph.D. taken on December 11, 2023                                                                                                                                                                                                                                                                                                                                                                                                                                    |

In its Reply, Petitioner continues its revisionist approach to the prior art, the POSA standard, the state of the art and its own prior assertions. For limitations missing from its art or argument, Petitioner obfuscates the issues, distorts the art, or imbues the POSA with unsupported, hindsight-driven “industry” knowledge. The combination of these shortcomings leaves Petitioner well short of satisfying its proofs.

**I. Under any reasonable standard, Turk is a POSA**

Petitioner’s unfounded attack of Dr. Turk is a desperate effort to undermine Patent Owner’s (“PO”) expert and remove impediments to its own contorted arguments. Petitioner’s Reply misrepresents its proffered POSA standard — ignoring Dr. Jiao’s proposal that a “higher level of education” can “make up for less experience,” and that relevant experience involves “lighting-control systems.” (Reply, 2-5, Ex.1036, ¶4, Ex.1003, ¶42.) Remarkably, Petitioner seeks to exclude Dr. Turk’s testimony in its entirety, simply on the basis of Dr. Jiao’s conclusion that Dr. Turk is neither a POSA nor an expert; completely skirting the relevant legal inquiry and heavy burden. (Reply, 5.) *Ascend Performance Materials Operations LLC v. Samsung SDI Co., Ltd.*, IPR2020-00349, Paper 53 at 11 (PTAB July 15, 2021) (“the wholesale exclusion of a witness’s declarations is rarely called for in a proceeding before the Board”).

In its preliminary response, PO explained – “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, 8; Ex.2001, ¶¶28-30.) PO's standard comports with the relevant factors laid out by the Federal Circuit to guide the analysis, the "patent's purpose" and "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).

Regarding the *Daiichi* factors, the inventor of the '029 Patent had a bachelor's engineering degree and industry experience with optics but not automotive lighting at the relevant time (<https://www.linkedin.com/in/evanspero/>) and per the '029 Patent, the "purpose" is to use LED lighting to provide the "correct lighting solution" that "will radiate photons where needed, exactly in the correct amounts to accomplish the visual task application," "to not cause glare" in "real-time." (Ex.1001, 4:64-5:11, 11:5-13.) A POSA standard factoring in optics/imaging-experience closely aligns with the purpose of the '029 Patent and the inventor's own experience.

Dr. Turk's PhD and 20+ years of experience in optics, imaging and its use in autonomous vehicle applications qualifies him as both a POSA and expert in the

relevant fields. 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.1037, 57:6-8.)

Because the ’029 Patent and claims involve multiple fields — optics, headlamps, lighting controls, and imaging/image-processing, Dr. Turk’s experience is unquestionably relevant, qualifying him as a POSA. *See also* PTAB Trial Practice Guide August 2018 at 3 (“There is ... no requirement of a perfect match between the expert's experience and the relevant field.”). Indeed, were a perfect match needed, Dr. Jiao’s lack of imaging/image-processing experience would equally disqualify him as a POSA – and Dr. Turk’s experience in these relevant fields is inestimably superior to Dr. Jiao’s.

Even under Petitioner’s revised standard, however, Dr. Turk is a POSA. Dr. Turk worked for 3 years designing an autonomous vehicle system involving “computer vision work” and “various aspects of sensing and imaging,” including vehicle lighting and lighting control systems. (Ex.1037, 21:10-12, 53:9-12.) As Dr. Turk confirmed in deposition: vehicle forward “illumination was an important part” of determining how the vehicle would drive at dusk and at night. (*Id.*, 54:7-8.)

And, Dr. Turk is indisputably a POSA under Petitioner’s original standard, which includes lighting control experience and adjusted experience requirements

for a “higher level of education or skill.” (Ex.1003, ¶¶41-43.) Dr. Turk is substantially qualified as an expert, is unquestionably a POSA, and has relevant technical expertise that outstrips Dr. Jiao’s in many of the aspects necessary to understand the art and claims.

**A. Petitioner continually rewrites and impermissibly bolsters the art through its POSA**

Petitioner’s reply repeatedly mischaracterizes the record to perpetuate the fiction that Dr. Turk lacks knowledge of basic lighting terminology a POSA would possess, and then stands up a self-serving argument through alleged, unfounded knowledge of a “real” POSA to either backfill missing limitations and/or to “understand” teachings in ways that are inconsistent with the actual teachings of the art. (Reply, 2-5, 7-8, 26-27, 29-30.)

For example, Dr. Turk took a rational approach about the meanings of “intensity” and “brightness” and noted that these terms can be different “in different contexts,” noting the words can be applied technically or colloquially. (Ex.1037, 6:18-25, 84:7-9.) Dr. Jiao uses this as a scathing indictment of Dr. Turk’s credentials, claiming that Dr. Turk “does not understand” that “intensity is not synonymous with brightness.” (Reply, 4.) Oddly, Dr. Jiao himself originally contended that “the pattern and intensity of a light beam 33 can be effected by switching one or more LEDs on or off, or by adjusting the intensity of the light

emitted by an individual LED,” obviously a statement about brightness. (Ex.1003, ¶¶262-263.)

In addition to the conveniently-omitted fact that Dr. Turk said “[intensity and brightness] can have different implications at times” (Ex.1037, 84:20-21) – Dr. Turk also understands that context matters. Such as Beam stating his invention “produces a beam of high intensity light that enables the driver to see more clearly,” explaining the purpose of his invention as “providing a brighter headlight beam...” and noting the invention “needs no intervention to... restore the bright light mode...” (Ex.1005, 3:12-14, 3:30-31, 3:38-40.) This demonstrates that Beam considers “intensity” control to equate to “brightness” control.

Dr. Jiao excoriates Dr Turk for disagreeing with Dr. Jiao’s new opinion that a POSA would universally interpret “intensity” to mean “luminous intensity” — a measure of the power (candelas) emitted by a light source in a particular direction. (Ex.1036, ¶¶6-7.) Dr Jiao takes this position despite Beam and Karlsson never referencing “luminous intensity” and these references’ clear and repeated use of the word “intensity” to mean “brightness.” (Ex.1005, 3:12-14, 3:30-31, 3:38-40; Ex.1010, 12:25-27, 13:33-35, 21:27-29.). This is done to maintain the fiction that all prior-art references to “intensity” must necessarily include an element of directionality. (Ex.1036, ¶15, ¶¶109-118.)

This is a consistent tactic, where Petitioner and Dr. Jiao repeatedly proffer

conclusory analysis that disregards prior-art context and instead leverages unrelated “industry” definitions to advance special term meanings without meeting the requisite burden. (Reply, 2, 10, 12, 25-26.)

Relatedly, to fill missing limitations, Petitioner uses Dr. Jiao’s “industry” knowledge as the “general knowledge” of a POSA in 2002. Save conclusory statements and unspecific testimony, Petitioner’s “general knowledge” arguments lack a reasoned, supported explanation. (Reply, 7, 12, 14, 18, 21, 24, 26, 28.)

Illustrative of Petitioner’s unsubstantiated assertions, Petitioner relies exclusively on Dr. Jiao’s expert testimony to argue that a POSA would necessarily limit the Karlsson reference to creation of four “desired” conventional beam patterns — even though Karlsson lacks any such disclosure and, moreover, is expressly capable of “permitting a light intensity which is generally higher than that of conventional dipped headlights.” (*Id.*, 7-8; Ex.1010, Abstract.)

Additionally, Dr. Jiao takes a new, post-institution position that Beam’s “microbeam” is a lighting system<sup>1</sup>, i.e., “a microbeam consists of an emitting device, light-emitting device and spatial light modulator,” adding physical

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<sup>1</sup> Dr. Jiao presents a similar new argument for Karlsson that the term “spotlight beam” “refers to a lighting system that includes the light-emitting device and a spatial light modulator”. (Ex.2018, 64:10-14.)

structure to a “beam.” (Ex.2018, 24:12-14.)

This does not comport with Claim 4 of Beam, upon which Petitioner places so much reliance and which clearly distinguishes between a microbeam (emission) and a microbeam source (emitter). (Ex.1005, 8:5-12.) This position also directly contradicts Dr. Jiao’s own pre-institution explanation that “microbeams emanate from a microbeam source, such as individual, controllable LEDs.” (Ex.1003, 47.) Further, Dr. Jiao’s new opinion does not agree with Dr. Jiao’s terminology usage in his industry and as a teacher. (Ex.2018, 26:15-27:8; 28:18-30:14; 65:1-11.)

Finally, Petitioner contends that “Beam’s LED array does not render its ‘spatial light modulator...superfluous’” – despite Beam explicitly calling for the SLM to be “replaced” by the LED. (Reply, 29; Ex.1005, 5:2-6.) While claim 4 includes an SLM (of one of three types) combined with an emitter (of one of four types), Petitioner never chose which SLM would be combined with the LED array, rendering this another half-proof lacking the requisite particularity. (*Id.*, 8:5-12.) And, in claim 4, all of the SLMs have the express function of “reducing intensity” and none has a function of “angular control.” (Ex.1005, 8:5-12.) Further, Dr. Jiao admits that Beam provides scant support, outside of claim 4 itself, for many of the limitations of claim 4. (Ex.2018, 36:15-41:1.)

Instead of dealing with “replaced,” Dr. Jiao elects to continue the disingenuous evolution of his argument, choosing to read “replaced” as

“combined,” in complete contravention of the explanation in the art and the plain meaning of “replaced.” (Ex.2018, 35:10-36:14.)

Repeatedly, Petitioner and Dr. Jiao, inject a hindsight-driven “industry” definition, allegedly known to a POSA, to alter the plain meaning of a term within a given reference 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).

Even with terms slightly more technical than “replaced,” the art is usually self-explanatory – such as when Beam: 1) provides a beam at “full intensity except in areas that would dazzle a driver” (Ex.1005, 4:57-59); 2) explains its output as “producing a beam of high-intensity light that enables the driver to see more clearly” (*Id.*, 3:37-41); and 3) generally describes its AABH headlights as “operat[ing] at maximum intensity at all times.” (*Id.*, 6:11-12.)

Despite Dr. Jiao’s attempt to pigeonhole “intensity” into something “that includes directionality,” under the guise of how Petitioner’s POSA *would* read this, Dr. Turk’s understanding and testimony are fully supported by the record. (Reply, 2, 27.) Namely, the full/high/maximum intensity light is about the brightness of the

lamp that creates better visibility. (Ex.1005, 3:37-31, 4:57-59, 6:11-12.) Even Beam’s description of Fig. 7, the actual control function, supports Dr. Turk’s contextual understanding of “intensity” – where blanking of pixels (e.g., a change of brightness to zero) is described as “reduced in intensity,” again with no remote reference to control over directionality. (*Id.*, 5:52-54.)

**B. Weight accorded to Dr. Jiao’s testimony**

Dr. Jiao’s credentials notwithstanding, the Reply highlights a troubling pattern – Dr. Jiao has repeatedly: 1) taken positions that are directly contradictory to a prior art reference; 2) blatantly misrepresented Dr. Turk’s testimony; and 3) contradicted his own prior declaration and use of terms, e.g., “beams” in industry and as a teacher. (§I.A, *supra.*)

Because Dr. Jiao’s testimony is demonstrably hindsight-driven, markedly inconsistent within itself, often devoid of foundation in the record, and at times beyond rational comprehension (such as a “beam” being “an emitter and modulator,”), Dr. Jiao’s testimony should be given little weight. *See RayVio Corp. v. Nitride Semiconductors Co., Ltd.*, IPR2018-01141, Paper 39 (PTAB Dec. 2, 2019) “[W]e determine that Dr. Doolittle’s testimony is entitled to less weight than Dr. Fitzgerald’s because Dr. Doolittle’s testimony contradicts Ozaki’s express disclosure.”

**II. Petitioner’s reply arguments alter Beam’s teachings, are inconsistent with prior arguments and underscore shortfalls in the proofs**

**A. Petitioner’s rewrite of Beam is demonstrably incorrect, Beam does not disclose controlling its angular distribution**

On reply, as part of its unsupported argument that the term “intensity” includes directionality, Petitioner disingenuously “quotes” Beam’s Abstract at least eight times in the following way: “The system ‘us[es] that information to control the intensity, and/or the angular position, of one or more’ LEDs.” (Petition, 26, 27, 36, 38, 40, 41, 43, 45-46, 49, 50; Ex.1036, ¶113.) The actual quote is “to control the intensity, and/or the angular position, of one or more narrow-angle microbeams.” (not “LEDs.”) (Ex.1005, Abstract.) Petitioner offers no explanation for the altered quote other than its new position that a “microbeam” “includes the emitter and SLM.” (Ex.2018, 24:12-14.)

LEDs (emitters/microbeam sources) and microbeams (emission) are different. (Ex.1005, 7:25-26; 8:5-6.) Petitioner’s entire argument that the light from the LED is “aimable” relies on two premises: 1) that the LED array and SLM are used together; and 2) that Beams’s discussion of “angular position” means that light from the LED array could be re-aimed wherever needed. (Reply, 26-28.)

Petitioner relies on claim 4 for the first point – but the SLM in that claim, even if one believes it “teaches” combination with an LED array, has the expressly

stated function of “controlling intensity.” (Ex.1005, 8:8-12). Petitioner provides no selection of which of the listed SLMs it would use (a failing in particularity) as well as no evidence that the SLMs of this claim could do anything beyond “control[ing] intensity” as stated. (*Id.*)

On the second point, “intensity” and “angular position” are expressly distinguished by Beam’s Abstract “...intensity and/or angular position of microbeams” – meaning Beam understands that intensity does not require directional control. (Ex.1005, Abstract.)

There is only one other statement in Beam relating specifically to “angular position of a microbeam,” and it is in relation to the single light-source 202 embodiment. The light from a single source 202 is either reflected through the optical system or deflected to an absorbing surface (hence a change in “angular position”). (*Id.*, 4:35-40, Ex.1037, 91-94.) Beam neither discusses nor describes any other angular control, certainly not with regards to emission from the lamp. In the context of the single lamp 202, Beam merely explains how the light can be **deflected** to an absorbing surface to blank the light as an alternative to the reflection through the system to emit the light. (*Id.*)

Thus, Petitioner’s premises fail, because even if there is a combination of some type of SLM in claim 4 with an LED array, that SLM has the function of reducing intensity. Moreover, it is not clear that any embodiment of Beam, even

the single source Fig. 2 embodiment, provides any angular control over emission, other than to either have the SLM reflect light through the optical system or reflect (i.e., redirect) the light to an absorbent surface.

The argument about intensity only meaning “luminous intensity,” and therefore requiring directionality, is both a new argument and patently false – not one reference to “luminous intensity” is found anywhere in the original explanation of Beam by Dr. Jiao, and Beam plainly utilizes “intensity” to mean “brightness.”

Other new arguments from Petitioner are equally unconvincing – such as the contention that “the microbeams must be able to constantly change directions in order to follow the moving targets” (Ex.1036, ¶117). In Beam, without any “changing directions” of the LEDs, blanked areas are adjusted as the target moves by reselection of which LED elements to blank and which to light. The actual control function of Beam makes this clear. (Ex.1005, 5:33-54.) Incidentally, this also achieves the “dynamic variance in position and size” without aiming a single beam – blanking different quantities of LEDs changes the size, blanking LEDs at different locations varies the position. (*Id.*)

The inconsistencies between Dr. Jiao’s testimony and the art are impossible to reconcile, providing the Board with substantial evidence to reject Petitioner’s arguments outright. *TalexMedical, LLC v. Becon Med. Ltd.*, No. 2021-2069, 2022 WL 2898934 (Fed. Cir. July 22, 2022).

**B. The impact of Beam’s “maximum intensity” mantra is unchanged by Petitioner’s fresh insertion of low and high beam teachings**

Petitioner advances another new argument, that a POSA would necessarily read Beam to include low and high beam teachings and that Beam’s microbeams “*must* be able to change direction in order to achieve high and low beam functions.” (Ex.1036, ¶111.) Assuming *arguendo* that the Board permits this new argument, these high and low beams (if differently aimed) could be achieved by fixed positioning of LEDs or fixed optics, certainly not “requiring” “changing” direction. (Reply, 26.) This is all notwithstanding the fact that Beam does not even discuss: 1) high and low beams; 2) portions of the beam creating such distinct patterns; and 3) changing the direction of emitted microbeams.

Further, again for the sake of argument only, even if producing such beams, the LEDs providing the low and high beams would still be operating at their respective maximum intensities because that is literally what Beam says they do. (Ex.1005, 6:11-12.)

There is absolutely no evidence that Beam’s LED emission “must be able to change direction” to achieve low and high beams or that such beams were even contemplated. The blatant disregard for what Beam actually says and the illogic of these points results in Petitioner’s entire new argument being unsubstantiated conjecture.

### **III. Petitioner’s reply conflicts with the Karlsson reference and its prior arguments; underscoring shortfalls in the proofs**

Regarding Karlsson, Petitioner’s reply repeats a now-familiar pattern: proofs built around one sentence taken out of context and contrary to the totality of Karlsson’s teachings, whilst contradicting its own prior statements-of-record.

#### **A. Petitioner’s reply arguments on Fig. 14 conflict with its own statements-of-record interpreting Karlsson**

Petitioner’s reply arguments interpreting Fig. 14 expressly contradict its own Positions of record in IPR2023-00318 (Ex.2008) – positions that agree with PO’s view on how Karlsson operates.

The following support PO’s conclusion that, when not reducing glare in a particular region for a particular reason, Karlsson would use all available LEDs:

- 1) utilizing as many LEDs as possible helps achieve Karlsson’s increased “road safety and driving comfort” (Ex.1010, 1:22-24);
- 2) Karlsson’s entire strategy is one of emission reduction to reduce glare – whether it is selective reduction for oncoming vehicles or a reduction in a particular direction based on turning or pitching (*Id.*, 5:28-32, 20:22-32);
- 3) In Fig. 14, Karlsson describes an illustrative example of how to achieve a reduced beam to control glare and then immediately outlines possible situations that require such reduced beam output (*Id.*, 19:22-20:32); and

- 4) Petitioner literally takes the exact same interpretation as PO in another of its Petitions.

Dr. Jiao attacks PO's comment that Karlsson uses all LEDs for "normal output" as "a gross mischaracterization," and expressly states "Karlsson does not disclose full or maximum intensity." (Ex.1036, ¶52.)

In making such a statement, Dr. Jiao is issuing an indictment of his own prior testimony of record, testimony that explains Karlsson exactly as PO understands it.

In the '318 Petition, Petitioner/Dr. Jiao stated: "Karlsson's light ... [is] 'controlled in such a manner that no light at all or light having a low intensity is emitted ... directions from which light is detected ... The remaining areas of light beam 7 are left at full intensity ...'" (Ex.2008, 66.) Then, Dr. Jiao explained what this means: "A POSA would also have understood that positioning the main beam (full intensity) LEDs all around the reduced illumination area provides the "optimum lighting effect" for the driver because doing so maximizes the area that is fully illuminated." (*Id.*, 67.)

Dr. Jiao further clarified that the "maximized area that is fully illuminated" is achieved by "surrounding the reduced illumination area with full illumination to the greatest extent possible." (*Id.*)

Petitioner now tries to excuse these admissions through a transparently false

argument:

[I]llumination *around* the reduced illumination area can be maximized around a vehicle that Karlsson wishes to avoid providing glare to, while also allowing Karlsson's driver to fully see the area *around* the reduced illumination area. EX2008, 67. This does not suggest that Karlsson defaults to all LEDs on and does *not* suggest that Karlsson's maximized area *around the glare control region* means that all of Karlsson's LEDs are illuminated, much less illuminated to their highest degree.

(Reply, 9.)

This statement, via its emphasis on “around,” proposes that the operation of Karlsson would be to create some kind of bright halo “around” the glare-reduction areas. This is an explanation and outcome that makes no particular sense – Petitioner does not explain what is so important about an area immediately adjacent the vehicle that is not equally important elsewhere on the road. It is also a convenient interpretation that once again completely ignores the actual statements of record by Petitioner.

Petitioner stated: “[P]ositioning the main beam (full intensity) LEDs all around the reduced illumination area provides the ‘optimum lighting effect’ for the driver because doing so maximizes the area that is fully illuminated.” (Ex.2008, 67.)

“Maximizing the area that is fully illuminated” means that all LEDs are illuminated, because that would definitionally be the “maximum area.” (*Id.*) Moreover, that area being “fully illuminated,” achieved by the LEDs being “left on full intensity” (Petitioner’s words, not PO’s) means that the LEDs are illuminated to their highest degree, because that is what “full intensity” means. (*Id.*) “Surrounding the reduced illumination area to the greatest extent possible,” resolves any debate about what “around” or even “maximize[d] area” might encompass. (*Id.*)

Petitioner plainly stated its case for the functioning of Karlsson in the contemporaneous Petition and cannot now escape that admission because it has become a problem for Petitioner’s argument in this Petition (Ex.2008, 66-67).

**1. Petitioner’s misplaces reliance on a single, misinterpreted sentence**

On reply, Petitioner continually relies on a single sentence of Karlsson:

The emitted light beam 50 is represented as a window which can shift in the plane of the drawings from the left to the right and from the top to the bottom, if desired, and vice versa, and which may vary as regards its shape and dimension in dependence on the desired pattern and direction of the beam.

(Ex.1010, 19:29-34.)

That sentence does not, as Petitioner would have the Board believe,

characterize “beam 50” as being representative of “beam 7.” “Beam 7” is the beam Karlsson uses for describing illumination prior to adaptation – i.e., it is the beam that will be adapted by reduction. (*Id.*, 9:3-8; 9:18-22; 10:19-22; 10:35-37; 11:4-6; 12:15-19; 20:26-31.) “Beam 50” is a notional beam shown to illustrate how to achieve the beam reduction concepts immediately described in the paragraphs following Fig. 14 — namely, dealing with curves and pitching of the vehicle. (*Id.*, 20:22-32.)

While Karlsson does describe an adaptable beam through an illustration of what a version of beam adaptation would look like, there is a clear distinction between the “emitted beam 50” (used once in Karlsson) of Fig. 14 and “beam 7” (used twenty different times). Karlsson merely presents Fig. 14 as an example of a method for achieving various situational control. Even Dr. Jiao’s deposition characterizes Fig. 14 as an example, provided for explanation, and not an express teaching of how to emit a usable driving beam – “Figure 14 is an illustration, not to tell the readers which specific one to do which is an example of these variable windows means the selection of group of beam contributors ...” (Ex.2018, 51:6-9.)

This explanation also comports with PO’s correct understanding of Karlsson, namely, that the LED array could and would be used to the fullest extent possible, except when attempting to reduce glare through adaptation of the adaptable beam.

Since Petitioner has already agreed, and actually advanced the argument that Karlsson would use the full array, at “full intensity” to “surround” any “area of reduced illumination,” “to the greatest extent possible” and in order to “maximize the area that is fully illuminated,” there is not actually any dispute on this point. (Ex.2008, 66-67.) In turn, this operational state of Karlsson that is already using all of its LEDs leaves nothing left to “increase” in the direction of the curve, similar to the problems with Beam.

Also, to the extent there is any question about what “to the greatest extent possible” means – Dr. Jiao clarified in his deposition that: “To form a high beam, Figure 14 you can use I, and the I can be any number of I, as long as they meet the function. ...can ... add D into I ...can have standing-alone high beam. ... can operate high beam on top of low beam.” (Ex.2018, 54.) Thus, Dr. Jiao admits that is it “possible” to use any number (up to all) of I and D, as well as “add[ing] D into I” to have “high beam on top of low beam” (*Id.*).

Put another way – Petitioner has never presented a legitimate reason not to understand Karlsson as using all LEDs (as there seems to be some ambiguity on this point), and there are plenty of evidentiary-supported reasons presented to understand it as precisely doing that – not the least of which is Petitioner’s own stated understanding that this is exactly how Karlsson functions.

**2. The insertion of unsupported beam patterns lacks foundation and is further irrelevant to the analysis**

Petitioner newly introduces a variety of annotated beam patterns it alleges Karlsson would produce — without any explanation of why a POSA would read these patterns into Karlsson — allegedly via the “shifting window” of Fig. 14. What Petitioner fails to explain, however, is why Karlsson would not simply utilize all lights of the array to create, for example, illumination of the width of B or D (D on both sides) combined with the length of A or even B. Especially given that Dr. Jiao admits that these are all possibilities. (Ex.2018, 54.)

Karlsson does not actually teach that it uses the concept discussed in Fig. 14 to produce any of these conventional headlamp patterns, and Petitioner did not even attempt to draw a pattern reflective of what is actually shown in Fig. 14 (which includes a combination of high beam and low beam LED usage). This creates a direct contradiction between Petitioner’s position that Fig. 14 represents functional state of the beam in operation and Dr. Jiao’s figures that allegedly represent what “a POSA would have understood Karlsson creates,” as none of those figures shows the pattern in Fig. 14. (Reply, 6-7.)

Nor did Petitioner explain, for any of its new annotated figures, what LEDs Dr. Jiao thinks that Karlsson is using to create each of these patterns. (Ex.2018, 50:5-57:6.).

#### **IV. The Reply Fails to Address Core Issues with the Dependent Claim Arguments**

##### **A. Dependent claims 5, 16, 27**

On reply, Petitioner continues to misread claims 5, 16 and 27, believing that the claims simply call for “the increase of lighting toward the curve,” “emitted at a level below high-beam light.” (Reply, 18.) Based on its misunderstanding, Petitioner relies on scenarios where “new” light is introduced. The claims however call for increasing, previously emitted light that is 1) at a level below high-beam light and 2) in the direction of the curvature — e.g., taking a dimly lit LED emitting in a direction of the road curvature and increasing light from that LED. (Response, 33.) This limitation is not achieved by turning on fresh light.

While the change from zero emission to some emission is an increase of lighting in general — this sort of increase fails to satisfy the claimed particular increase of light that was already there. To manufacture an “admission,” Petitioner points to Dr. Turk’s declaration that “Karlsson’s LEDs may be freshly lit,” without reference to his next sentence, which concludes that freshly lit LEDs fail to satisfy the claimed increase because they are not “increased in intensity,” having no prior intensity. (Ex.2006, ¶¶145-146.)

Further, as detailed *supra*, because Karlsson operates at maximum intensity, the LED array would be incapable of producing increased emission. (§III.A,

*supra.*)

**B. Dependent claims 6, 17, 28**

Regarding claims 6, 7 and 28, PO is pointing out the irrefutable fact that Petitioner did not meet its burden, or even bother to lodge an argument, that the claim limitations were met.

Iteration and usage of LEDs, in general, is insufficient proof that the particular claimed LEDs would be used as claimed. (Reply, 19.) Petitioner impermissibly wants the Board to use its framework to complete its proof by actually explaining the specifics of how the claimed situation would occur – something Petitioner did not bother to do.

To backfill their missing argument, Petitioner incorrectly points to the annotated figures provided by Dr. Turk — which show how Karlsson functions while in a curve, not how Karlsson functions prior to a curve, nor how Gotou-Karlsson would function. (Reply, 20.) The claims call for the specific situation of “prior to a curve,” which is not what is shown in Dr. Turk’s figures, or anywhere else in the Petition or Reply. The words “prior to” never once appear in any explanation of claim 6 presented by Petitioner in the Petition or Reply.

**C. Dependent claims 7, 18, 29**

As explained above, Gotou-Karlsson neither increases intensity of light directed towards the curve, nor expands a pattern. Petitioner’s arguments, yet

again, suffer from the same interpretation mistakes.

While Petitioner states that Gotou-Karlsson does one of the two things claimed in limitation 7.1 — increase the intensity of light directed in the direction of the curve or expand of the beam pattern — Petitioner fails to prove its assertion.

Of the only two Petition paragraphs explaining limitation 7.1, the first paragraph simply restates the claim and the second paragraph fails the particularity requirement because it merely points to Section VII.A — a section containing twenty-four pages of argument with no mention of limitation 7.1 or specific proofs tied to thereto.

On reply, Petitioner attempts to cure its failure to lodge an argument correlated to limitation 7.1, but the explanation comes too late and includes far more description than Petitioner included in its two-paragraph Petition explanation. *Apple, Inc. v. Uusi, LLC*, IPR2019-00358, Paper 26 (PTAB Aug. 4, 2020) (The Board agreed with PO, that the Petition was required to contain detailed identification of ‘where each element of the claim is found in the prior art’ under 37 C.F.R. § 42.104(b)(4) and that Petitioner’s reply explanations ‘amount to rewriting the Petition after institution.’)

Petitioner’s arguments for limitation 7.4, which relates to expansion of the beam, are impermissibly disconnected from the claim language. Once again Petitioner proffers new evidence and argument missing from the Petition, in an

attempt to cure. In addition to being new argument, the newly-introduced annotated Figures do not show an expanded pattern, they show a forward beam re-aimed to the right.

**D. Dependent claims 9, 20, 31**

Petitioner's reply still ignores and obfuscates how antecedent basis functions in a claim. Under the basic principle of antecedent basis, "the control" in claim 9 (which depends from claim 8) is "the control... to diminish glare to a driver of the other vehicle [indicated by camera data]." Petitioner has never explained how map data would be usable in this regard, as map data (especially in the art) is ignorant of the locations of other vehicles.

Then Petitioner argues that the control in claim 8 constitutes "control, *based at least in part...*," emphasizing "based at least in part on" as though it were dispositive – it is not. The point is, that while the claimed "control" is "based at least in part on" the determined position determined from camera data, that same control can be based on other things, but it is still control "to diminish glare" as claimed, regardless of what it is based on. This tracks with claim 9's basing the same control on additional, non-camera data.

Petitioner confusedly contends that the "additional control is not limited in its purpose," i.e., not limited to the control of claim 8. (Reply, 24.) That is simply false. Claim 9 does not claim "additional" control, it claims "the control," and "the

control” inherits the properties of “control” from the prior claim 8.

In a completely independent failure of proof, Petitioner fails to address limitation 9.6. The argument directed to limitation 9.6 is an argument about limitation 9.4. (Response, 37.) There is no curing this. That failing alone is sufficient to render Petitioner’s proofs for claim 9 inadequate, for failing to contain detailed identification of “where each element of the claim is found in the prior art” under 37 C.F.R. § 42.104(b)(4).

**E. Dependent claims 10, 21, 32**

On reply, Petitioner doesn’t address PO’s distinct arguments about claims 21 and 32 that note the differences from claim 10. (Reply, 24.) Claims 21 and 32 contain different recitations than claim 10. Claim 21 requires that a processor “utilize” optical control elements to control light, and claim 32 is a method including “utilizing optical control elements to control light.” Thus, it is insufficient to simply show optical control elements that exist in the art, Petitioner’s burden was to explain how these elements were utilized by a processor or utilized in the manner claimed.

Moreover, the language of claim 21 and 32 also requires at least one active optical control element either utilized by the processor (claim 21) or utilized to control light as in the method (claim 32) – which Petitioner fails to address on reply.

As with the Petition, in its Reply the Petitioner merely shows elements of the art indicating things that might be passive or active optical controls. It never bothers to actually connect those elements to the language of the claims – an express requirement of 35 U.S.C. § 312 and 37 C.F.R. § 42.104(b)(4). (*Id.*) Petitioner just provides a parts-list, expecting the Board to fill in the argument and explanation. A mere showing that both references include some number of optical elements is not sufficient to satisfy Petitioner’s legal burden.

## V. Conclusion

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

Dated: December 20, 2023

Respectfully submitted,

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**Certificate of Service**

The undersigned hereby certifies that on December 20, 2023, a complete and entire copy of **PATENT OWNER'S SUR REPLY TO PETITIONER'S REPLY TO PATENT OWNER RESPONSE**, was served via electronic mail to the attorneys listed below:

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**Certificate of Compliance Pursuant to 37 C.F.R. § 42.24**

This paper complies with the type-volume limitation of 37 C.F.R. § 42.24. The paper contains 5,585 words excluding the parts of the paper exempted by §42.24(c).

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