

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. 10,894,503

Case No.: IPR2023-00328

**PATENT OWNER'S RESPONSE TO PETITION
FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.220**

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<i>In re Gordon</i> , 733 F.2d 900 (Fed. Cir. 1984)	22
<i>Intel v. PACT XPP Schwiez AG</i> , 61 F.4th 1373 (Fed. Cir. 2023)	21, 22
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List of Exhibits

Exhibit No.	Description
2001	Declaration of Matthew A. Turk, PhD
2002	Curriculum Vitae of Matthew A. Turk, PhD
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. 10,894,503, <i>Volkswagen Group of America, Inc. v. Yechezkal Evan Spero</i> , IPR2023-00197, Paper 1, November 30, 2022
2005	Petition challenging U.S. Patent No. 10,894,503, <i>Volkswagen Group of America, Inc. v. Yechezkal Evan Spero</i> , IPR2023-00328, Paper 2, December 16, 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. Torchlight Technologies LLC</i> , IPR2023-01586
2008	Petition challenging U.S. Patent No. 9,995,551, <i>Volkswagen Group of America, Inc. v. Torchlight Technologies LLC</i> IPR2023-00318, Paper 2, December 22, 2022
2009	Declaration of Dr. Jiao, <i>Volkswagen Group of America, Inc. v. Torchlight Technologies LLC</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 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/)

Exhibit No.	Description
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-papers/content/2005-01-0861/)
2014	Intentionally left blank
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, <i>Volkswagen Group of America, Inc. v. Torchlight Technologies LLC</i> , IPR2023-00315, IPR2023-00318.
2019	Intentionally left blank
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.)

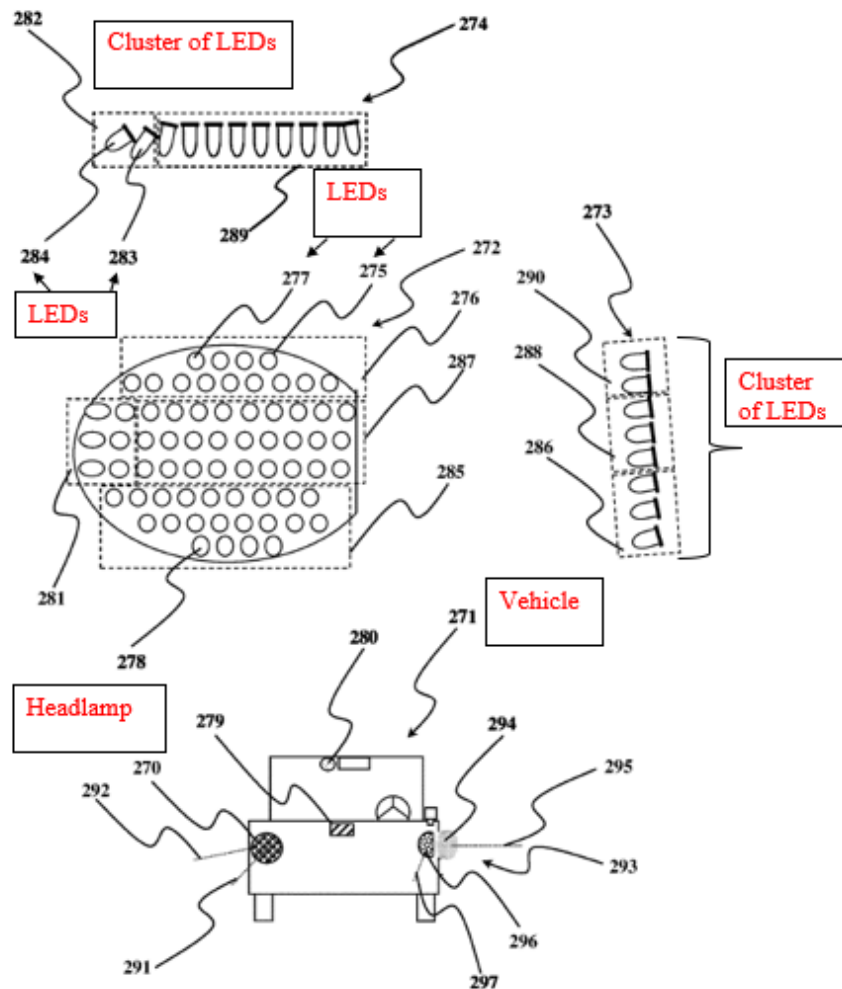
Exhibit No.	Description
2023	Intentionally left blank.
2024	Intentionally left blank.
2025	Transcript of Deposition of Jianzhong Jiao, PhD taken on October 3, 2023, <i>Volkswagen Group of America, Inc. v. Torchlight Technologies</i> , IPR2023-00197, -00325, -00335

I. Introduction

Patent Owner submits the following (“Response”) to the Petition (“Paper 2) for *Inter Partes Review* of claims 26-36 and 65-70 (“Challenged Claims”) of U.S. Patent No. 10,894,503 (“the ’503 Patent) filed by Volkswagen Group of America, Inc., (“VW” or “Petitioner”), and the Board’s Decision of Institution (“DI”, Paper 12).

II. Overview of the ’503 Patent

The ’503 Patent is directed to “a novel multi-light source approach to the design and construction of solid-state lighting fixtures ... which is termed a ‘Digital Lighting Fixture’, due to the control of individual lighting element ‘digits’ to provide the ‘correct’ lighting solution for the situation at hand.” (Ex.1001, 11:11-16.) The ’503 Patent further explains that “[t]he terminology ‘digital’ as used herein refers to the discrete nature of the multiple LED lamps provided in the luminaire, whereby, ‘digital’ control results from the individual control of the discrete, i.e., ‘digital’ lighting elements, the LEDs, in the luminaire.” (*Id.*, 2:67-3:5; Ex.2006, ¶47.)



(Ex.1001, FIG 15, Annotated)

The '503 Patent describes using a digital light fixture (DLF) to provide multiple functions, for example “[i]n a DLF it is possible to combine a task light having a very narrow ‘spot’ beam at the correct aiming with a general area lighting ‘flood’ beam into one fixture.” (Ex.1001, 22:18-20.)

The '503 Patent describes methods of using a multi-LED light source to deliver varied, optimized illumination to the different areas within a field of view

based on the presence of a detected object therein, “covering a wide scope of applications”, including transportation. (Ex.1001, 11:18-21, 4:20-24, 50:40-41; 52:58-53:2, 53:3-8; Ex.2006, ¶49.)

The claimed invention of the ’503 Patent is thus directed to multi-LED headlight systems that precisely determine anti-glaring illumination output to optimize illumination for the vehicle operator under a myriad of driving situations, whilst reducing glaring illumination for detected oncoming vehicles and handling other areas of the field of view warranting different situational output.

III. Level of ordinary skill

Patent Owner does not dispute the Board’s proposed level of ordinary skill.
(*See* DI at 8.)

IV. Prior Art

A. Beam

In an effort to maximize operator vision while preventing headlight glare, Beam operates the headlights “at maximum intensity at all times” and blanks areas of otherwise-maximum headlamp illumination to create regions of diminished headlamp glare. (Ex.1005, 4:32-38, 4:57-59; 5:45-53; 6:11-12, 6:19-27.) “[T]he resulting beam is at full intensity except in areas that would dazzle a driver ahead.” (*Id.*, 4:58-59.) By providing a “far brighter headlamp beam” (over the prior art), Beam’s system enables the driver to see more clearly while “protecting drivers in

front from dangerous glare.” (*Id.*, 3:12-15, 3:37-40.)

The glare-prevention region is determined by detecting a pair of light sources, and then defining an area slightly wider than the sources and approximately six feet high, whose bottom edge is centered on the light sources. (*Id.*, 6:20-27.) The determined area encompasses a portion of the vehicle above the headlamps, but not the portion of the vehicle below the region. (*Id.*, Fig. 1C, 1D.) Beam’s then blanks emission directed to the determined area, leaving maximal emission aimed at a second area outside the determined area. (*Id.*, 5:46-53.)

Beam uses two distinct embodiments, either a lamp source and spatial light modulator, or an array source 401. (*Id.*, 4:36-38; 5:3-5, 5:17-20; 5:28-30.) Since the array source is both a source and allows control of individual beams, “the lamp 202 **and** SLM 203 are **replaced by** an array of light sources 401,” whose output is “projected through the optical system 106.” (*Id.*, 3:65-67, 4:1-2, 5:3-5, 5:15-16.) A controller 108 controls **either** the array 401 **or** the SLM 203 to blank appropriate emission within the otherwise maximally emitted beam. (*Id.*, 5:13-15, 5:52-53.)

B. Karlsson

Karlsson discloses a “Lighting Device Having a Controllable Lighting Pattern,” wherein “spotlight sensors” are interspersed with the LED “spotlight beams” to detect light from oncoming traffic and automatically adjust the lighting pattern and intensity to provide anti-blinding functionality. (Ex.1010, Abstract,

Figs. 13-14.) Through selective control of its lamp emission (either by direct control of LEDs or using a modulator to block transmission), Karlsson seeks to suppress glare while “retaining an optimum lighting effect for the driver of the vehicle himself.” (Ex.1010, 2:8-9.)

Karlsson “optimally adapts” its emission intensity situationally, to address glare while accommodating driver desires such as continual use of the main (high-intensity) beam “optimized for long-range illumination.” (*Id.*, 1:20-24, 4:19-21.) Karlsson notes that “constant” use of the main beam “contributes towards increased road safety and driving comfort.” (*Id.*, 1:23-24.)

Generally, the point of Karlsson is to use enough of the lamp (in light of ambient illumination) to allow the driver to see anything they would need to see – hence “optimum” illumination. Any usage that did not accommodate something the driver might need to see would definitionally be “sub-optimal.” (Ex.2006, ¶¶87-102.)

Recognizing that optimal usage from a driver perspective may not be optimal for other vehicles, Karlsson also reduces glare using at least one of an LED array or a modulator to create spotlight beams. (Ex.1010, 4:25-29, 14:1-15.) Both the LEDs and modulator appear to essentially perform the same control, which is to switch off beams through power control (LEDs) or prevent some or all light from passing through (modulator). (*Id.*, 14:10-14, 14:26-29.) This, again, allows

for prevention of glare in response to light detected by the spotlight sensors while allowing the rest of the array to be utilized for “optimum” effect, such as the preferred “constant” use of the main beam for “increased road safety and driving comfort.” (*Id.*, 1:20-24; 2:2-9.)

V. Claim Construction

Patent Owner agrees that, within the context of the ’503 Patent, the plain meaning of light source is “any system that is capable of receiving an electrical signal and producing light in response to the signal.” (DI at 8; Ex.2006, ¶59.)

VI. Petitioner Asserts At Least Sixty-One Petition Sub-Grounds

While Patent Owner’s Preliminary Response and Request for Director Review noted multiple “lumped” grounds, hereinafter “sub-grounds”, within each of Petitioner’s enumerated “Grounds.” Patent Owner apologizes for not fully appreciating the extent of the problem until attempting to respond to all purported grounds for all claims.

As the Institution Decision was based on Beam or Karlsson alone, two grounds not expressly listed as separate grounds, Patent Owner needed to more carefully parse Petitioner’s language to avoid overlooking a ground Petitioner might later contend was present within the numerous permutations.

As noted by the Board in *Adaptics*, “The statutory requirement for particularity in a petition for IPR takes on heightened importance when considered

in conjunction with *SAS*'s "all-or-nothing" approach." (*Adaptics Ltd. v. Perfect Co.*, IPR2018-01596, Paper 20 at 17, PTAB March 6, 2019.) Closer review of Petitioner's chosen language reveals that the problem mirrors, if not exceeds, the "voluminous and excessive" grounds issue in *Adaptics*, resulting in a minimum of **sixty-one** grounds in the instant Petition (one of three). In *Adaptics*, the Board considered that even 17 grounds was "unduly burdensome." (*Id.*, 19.) Patent Owner has attempted to be conservative below and still discovers at least **sixty-one** grounds.

Patent Owner lists below the alternative sub-grounds described by Petitioner. Petitioner's Expert Declaration also utilized phrases such as "additionally or alternatively" when describing many of these combinations, but because Petitioner excluded those phrases from its Petition, those alternatives are not presented¹. Based solely on the combinations seemingly described within the Petition, Patent Owner finds at least **sixty-one** grounds resulting from the proffered

¹ Patent Owner notes that if the combinations of "additionally and alternatively" in the Expert Declaration are also relied on by Petitioner, in its Reply, as creating further possible combinations, then the total number of grounds spirals to **well over one-hundred**, given the exponential compounding effect resulting from using these combinatorial phrases in sequence.

combinations and alternatives proffered by Petitioner to address **seventeen claims**.

A. Ground 1

Petitioner argues Beam discloses every feature in claims 26-27/30-31, presenting two separate embodiments, Figs. 2/5's Beam SLM+Lamp and Figs. 4/6's array. (Petition, 8, 23-24; Ex.1003, ¶¶116-118.)

1A	Beam_Lamp+SLM
1B	Beam_LED

Petitioner presents Thominet's directional beam regions implemented through “software or hardware.” (Petition, 10.)

Petitioner describes Thominet's software as implemented using “Beam's controller 108/illuminator 109 (including SLM 203).” (*Id.*, 11, 13.) Petitioner contemporaneously presents annotated Figs. 2 and 5, with the lamp 202 and SLM 203 both highlighted, and never mentions the array, thus presenting the software in combination with the Lamp+SLM(1A).

1A	Beam_Lamp+SLM	
1B	Beam_LED	
1C	Beam_Lamp+SLM	Thominet Software

As a hardware alternative, Petitioner states “...incorporate known components... of Thominet's... light sources... into Beam's system (with flat array of light sources).” (*Id.*, 14.) Petitioner explains hardware to play a role “comparable to” the software, for this hardware alternative. (*Id.*, 10, 14-16.)

Petitioner then argues **two** hardware configurations; replacing Beam’s array with Thominet’s as “a substitution,” **or** “simply modifying the flat surface of Beam’s array... with Thominet’s curved surface.” (*Id.*, 16.) All hardware is presented as being combined with Beam’s LED array (either through replacement by Thominet or curved substrate), restricting the hardware combination of Thominet to Beam’s LED embodiment 1B, resulting in **five total** sub-grounds for Ground 1.

1A	Beam Lamp+SLM		
1B	Beam LED		
1C	Beam Lamp+SLM	Thominet Software	
1D	Beam Control		Thominet LED
1E	Beam LED		Thominet Curve

If additional sub-grounds are later advanced by Petitioner, Patent Owner posits such grounds were not stated with sufficient particularity. Even the sub-grounds identified in this response were not stated with sufficient particularity, but rather were those that Patent Owner could best extract.

B. Ground 2

Ground 2 amplifies the problem. Petitioner argues “Beam/Beam-Thominet discloses every feature...” (*Id.*, 38.) Because Petitioner does not say **which** “Beam” **or** “Beam-Thominet” combination, this implicates all sub-grounds 1A-1E. Then,

Petitioner argues “Beam-Thominet is combined with Stam,” again failing to identify **which** Beam-Thominet sub-ground is combined with Stam, combining Stam with each of grounds 1C-1E. (*Id.*) This creates **eight** additional sub-grounds for a total of **thirteen**.

2A	Beam_Lamp+SLM			
2B	Beam_LED			
2C	Beam_Lamp+SLM	Thominet Software		
2D	Beam_Control		Thominet_LEDs	
2E	Beam_LEDs		Thominet_Curve	
2F	Beam_Lamp+SLM	Thominet Software		Stam
2G	Beam_Control		Thominet_LEDs	Stam
2H	Beam_LEDs		Thominet_Curve	Stam

C. Ground 3

Ground 3 states “modify Beam-Thominet,” without specifying which Beam-Thominet sub-ground is being combined with Kobayashi. (*Id.*, 53.) This Ground includes Kobayashi’s technique of using map data including road curvature as well as additional software/hardware from Kobayashi, integrated via an “and/or” clause, creating **three** possible sub-combinations (*Id.*, 54, 65; *see Adaptics*, 18 – noting impact of “and/or” clauses). Thus, Petitioner created combinations combining:

- 1) Each of Grounds 1C-1E with Map-Data and Profile Means 2;
- 2) Each of Grounds 1C-1E with Map-Data and Profile Means 2 “**and**” Advancing Direction Means 3;

3) “**or**” Each of Grounds 1C-1E with Map-Data and Advancing Direction
Means 3.

This creates **nine** more sub-grounds, bringing the total to **twenty-two**.

3A	Beam_Lamp+SLM	Thominet Software		Map-Data	Means 2	
3B	Beam_Control		Thominet_LEDs	Map-Data	Means 2	
3C	Beam_LEDs		Thominet_Curve	Map-Data	Means 2	
3D	Beam_Lamp+SLM	Thominet Software		Map-Data		Means 3
3E	Beam_Control		Thominet_LEDs	Map-Data		Means 3
3F	Beam_LEDs		Thominet_Curve	Map-Data		Means 3
3G	Beam_Lamp+SLM	Thominet Software		Map-Data	Means 2	Means 3
3H	Beam_Control		Thominet_LEDs	Map-Data	Means 2	Means 3
3I	Beam_LEDs		Thominet_Curve	Map-Data	Means 2	Means 3

The effect of Ground 1 in multiplying later grounds because of Petitioner’s chosen language should be apparent. If other combinations or variations are advanced in the Reply, that would increase the Ground 1 combinations and exponentially amplify the combinations later presented through statements like “Beam/Beam-Thominet” or “combined with Beam-Thominet.” This would further erode the particularity of any given ground, as well as magnify the already-

excessive burdens on the Board and Petitioner.

D. Ground 4

Ground 4 states “combine Kobayashi with Beam-Thominet-Stam.” (Petition, 62.) This combines each of grounds 2F-2H with the three “and/or” combinations explained for Kobayashi – Petitioner’s basis for the combination. (*Id.*) That creates **nine** more sub-grounds, bringing the total to **forty-one**.

4A	Beam_Lamp+SLM	Thominet Software		Stam	Map-Data	Means 2	
4B	Beam_Control		Thominet LEDs	Stam	Map-Data	Means 2	
4C	Beam_LEDs		Thominet Curve	Stam	Map-Data	Means 2	
4D	Beam_Lamp+SLM	Thominet Software		Stam	Map-Data		Means 3
4E	Beam_Control		Thominet LEDs	Stam	Map-Data		Means 3
4F	Beam_LEDs		Thominet Curve	Stam	Map-Data		Means 3
4G	Beam_Lamp+SLM	Thominet Software		Stam	Map-Data	Means 2	Means 3
4H	Beam_Control		Thominet LEDs	Stam	Map-Data	Means 2	Means 3
4I	Beam_LEDs		Thominet Curve	Stam	Map-Data	Means 2	Means 3

E. Ground 5

Ground 5 states “modify Beam-Thominet-Stam... as in Braun.” Here, Petitioner argues that Braun would have been implemented with Beam’s “controller 108/illuminator 109 (**including SLM 203**).” (*Id.*, 64.) This restricts the

sub-ground to the 2F combination of Beam-Thominet-Stam including the Lamp+SLM, bringing the total to **forty-two**.

5	Beam_Lamp+SLM	Thominet_Software	Stam	Braun
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F. Ground 6

Ground 6 states “modify Beam-Thominet... as in Harbers.” (*Id.*, 67.) This ground is confusing with regards to the combinations. For example, there is an explanation about including Harbers’ software that states “Thominet discloses ‘light beams of different colors is possible.’” (*Id.*, 68.) That implies Thominet’s array is the hardware (sub-ground 1D). But at the same time, Petitioner shows Beam’s SLM and Lamp, making it unclear if Petitioner proposes that Thominet’s software with Beam’s Lamp and SLM (sub-ground 1C) can achieve coloration, or if Thominet’s array (from 1D) is required. (*Id.*) Thus, both grounds 1C and 1D are implicated by Petitioner’s argument, each in combination with Harbers’ software.

Petitioner then argues implementing Harbers’ hardware as an alternative ground; using Harbers’ illuminator instead of Beam-Thominet’s. (*Id.*, 70-71.) Again, Petitioner makes statement a “substitution” (Beam’s array of sources and Harbers’ substrate/sources) and alternative statements about “modifying the flat surface of Beam’s array of light sources 401 with Harbers’ curved substrate...” (*Id.*, 72-73.) Since there is only **one argued** Ground 1 embodiment of Beam-

Thominet that even has Beam's array (sub-ground 1E), this argument is limited to modification of that originally-advanced combination, now changed twice - once by array 401 replacement and once by curving the substrate of array 401. (*Id.*) This section thus adds **four** additional sub-grounds, bringing the total to **forty-six**.

6A	Beam_Lamp+SLM	Thominet Software		Harbers_Software
6B	Beam_Control		Thominet_LEDs	Harbers_Software
6C	Beam_Control		Thominet_Curve	Harbers_LEDs
6D	Beam_LEDs		Thominet_Curve	Harbers_Curve

Creating further confusion – in Ground 1 for Beam-Thominet, the Beam LED array was either replaced by Thominet's or curved like Thominet's. Here, that same Beam array 401 (with no mention of Thominet) is now either replaced by Harbers array or curved like Harbers, making it unclear what aspect of Beam-Thominet's hardware (as opposed to just Beam's hardware) is being modified in the combination including Beam+Thominet(hardware) modified by Harbers(hardware). Harbers' hardware is being used in the exact same manner Thominet's hardware was used in Ground 1, but Harbers' hardware is not being used **on** Thominet's already-existent changes. Nothing from Thominet (sub-grounds 1D or 1E) seems to remain in the Harbers(hardware) combinations. The preceding four sub-grounds were the best guess Patent Owner could extract – the lack of particularity is plain.

G. Ground 7

Ground 7 combines “Harbers with Beam-Thominet-Stam.” Beam-Thominet-Stam had two embodiments 2F and 2H, that met the parameters explained above for Ground 6 (Petitioner’s combination basis.) (*Id.*, 77.) This creates **four** additional sub-grounds, for a total of **fifty**.

7A	Beam_Lamp+ SLM	Thominet Software		Stam	Harbers_Software
7B	Beam_Control		Thominet_LED	Stam	Harbers_Software
7C	Beam_Control		Thominet_Curve	Stam	Harbers_LEDs
7D	Beam_LED		Thominet_Curve	Stam	Harbers_Curve

H. Ground 8

Ground 8 states “Karlsson discloses every feature recited in claims 26...” (*Id.*, 78.) Karlsson is also described as including “LEDs... and **may** also be made up of... light modulator means.” (*Id.*) It’s unclear (based on “may”) if Petitioner is including, or merely optionally including, the modulator 3, setting up two Karlsson-only embodiments. Moreover, the Board found that Beam’s LEDs alone met the “directional clusters” requirement. (DI, 13.) Because the LEDs alone are an advanced possibility from the above Karlsson section as present, both alternatives are sub-grounds.

Petitioner then presents combinations implementing Harbers’ beam segments “through **either** software **or** hardware...” (Petition, 81.)

For the software variant, Petitioner argues Harbers’ use of “multiple beam segments for different functions” would be implemented with Karlsson’s spotlight beams 34 (including modulator 3.) (*Id.*, 84.) This limits the software combination to the LEDs+Modulator combination 8B.

Petitioner argues it would alternatively have been known to incorporate Harbers’ opto-electronic elements 11-14 into Karlsson’s system “with lighting means 2, 3.” (*Id.*, 84-85.) Petitioner asserts it would have been possible to “substitute” Karlsson’s lighting means 2, 3 and Harbers’ opto-electronic elements on a curved substrate, setting up a first hardware combination where **both** the LEDS 2 **and** modulator 3 of Karlsson are replaced by Harbers’ LEDs. (*Id.*, 86.) Petitioner alternatively argues that it would have been reasonable to “simply modify flat substrate of Karlsson’s lighting means 2, 3 with Harbers’ curved substrate...” (*Id.*)

This results in **five** sub-grounds for Ground 8, bringing the total to **fifty-five**.

8A	Karlsson_LEDs		
8B	Karlsson_LEDs+Mod		
8C	Karlsson_LEDs+Mod	Harbers_Software	
8D	Karlsson_Control		Harbers_Array
8E	Karlsson_LEDs+Mod		Harbers_Curve

I. Ground 9

Petitioner proposes “modify[ing] Karlsson-Harbers... as in Gotou.” (*Id.*,

125.) Thus, all **three** sub-grounds 9A-9C that include Karlsson-Harbers are each individually combined with Gotou, for a total of **fifty-eight** grounds.

9A	Karlsson_LEDs+Mod	Harbers_Software		Gotou
9B	Karlsson_Control		Harbers_Array	Gotou
9C	Karlsson_LEDs+Mod		Harbers_Curve	Gotou

J. Ground 10

Petitioner proposes to “modify Karlsson-Harbers... as in Braun.” (*Id.*, 134.)

This combines each of **three** Karlsson-Harbers grounds (8C-8E) with Braun, for a **final total of sixty-one grounds**.

10A	Karlsson_LEDs+Mod	Harbers_Software		Braun
10B	Karlsson_Control		Harbers_Array	Braun
10C	Karlsson_LEDs+Mod		Harbers_Curve	Braun

Patent Owner attempted to be conservative and rational in deriving these grounds, but Petitioner’s choices of language were inescapable in many instances. Merely even identifying these possible grounds took an excessive amount of time, let alone the time spent addressing all of them.

K. Lack of Particularity

A Petition must identify “with particularity” the challenged claims, the grounds, and the supporting evidence. 35 U.S.C. § 312(a)(3); *see also Harmonic Inc. v Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016).

Petitioner chose the words it utilized and understands the implications of those words, being “master of its complaint,” (*SAS Inst.*, 138 S. Ct. at 1355.) Petitioner’s alternative/lumped arguments within each ground are contrary to USPTO policy: “**Do NOT ‘suggest’** other proposed rejections in... ‘disclaimer-type’ language” and “**Do NOT lump** together multiple proposed rejections based on different grounds.” (Ex.2003 at 3.)

Such arguments multiply the challenges and “place[] an undue burden on Patent Owner and undercuts its ability to effectively respond...” *EnergySource Minerals, LLC. v. TerraLithium LLC*, IPR2019-01607, Paper 10 at 14 (PTAB May 4, 2020).

This [lack of particularity] require[s]... Patent Owner to scour the Petition to discern Petitioner’s evidence as to each of [the arguments]. [A] Petition that requires... Patent Owner to do so lacks particularity and is tantamount to impermissibly shifting Petitioner’s burden under 35 U.S.C. § 312(a)(3).

InVue Sec. Prods., Inc. v. Mobile Tech., Inc., No. IPR2019-00078, Paper 7 at 15 (PTAB May 1, 2019); *see also Adaptics Ltd.*, at 24 (“[T]he lack of particularity results in voluminous and excessive grounds,” and “in the interests of efficient administration... and integrity of the patent system and as a matter of procedural fairness to Patent Owner, the entire petition should [have been] denied under 35

U.S.C § 314(a).”)

This lack of particularity is compounded by Petitioner’s other two petitions challenging the ’503 Patent – Petitions that similarly implicate massive numbers of sub-grounds and comparably lacking particularity,—resulting in **Petitioner asserting at least 149 sub-grounds**. (See Patent Owner’s Responses in IPR2023-00197, IPR2023-00328, IPR2023-00335.)

However, "one petition should be sufficient... [while t]wo or more petitions filed against the same patent . . . may place a substantial and unnecessary burden on the Board and the patent owner and could raise fairness... and efficiency concerns." Consolidated Trial Practice Guide (“CTPG”) at 59 . “[T]he Board finds it unlikely that circumstances will arise where three or more petitions by a petitioner with respect to a particular patent will be appropriate.” (*Id.*)

It is readily apparent that Petitioner’s stated “need” for three Petitions arose far more from its choice to use two discrete combinations along with combinatorial language, than from the total number of claims, many of which Petitioner alleges are “patentably indistinct” and addresses referentially or in groups. (*compare with Adaptics*, 21-22.) Petitioner’s methodology results in no fewer than six sub-grounds advanced for **each** of all but two claims, and Petitioner’s failure to extract the best argument (or even a several) impermissibly shifts the entire burden to the Board and Patent Owner. Petitioner could have consolidated the three petitions into

two, if not one, by identifying the best arguments for each ground and by eschewing advancement of an entire discrete second set of grounds (to which it is not “entitled”) for every single claim.

Patent Owner was substantially and unnecessarily prejudiced in having to identify the sub-grounds hidden within each enumerated ground and then address the grounds on multiple fronts - because the actual arguments make it unclear upon which of the multiple sub-grounds Petitioner is relying. This lack of particularity cannot be fixed on reply. *Microsoft Corp. v. IPA Techs. Inc.*, No. 2021-1412, 2022 WL 989403, at *6 (Fed. Cir. Apr. 1, 2022) (Affirming Board’s post-institution lack of particularity finding and refusal to consider Petitioner’s reply arguments to the contrary.)

At least all of Petitioner’s combinatorial grounds should be rejected based on finding lack of required statutory particularity, for at least the reasons that they are unclearly presented and further unclearly relied upon in the proofs – i.e., Petitioner fails to particularly identify which of the possible combinations is being advanced for the each proof, many of which are based on elements that are purported to exist in a plurality of the sub-grounds.

VII. The Challenged Claims are Patentable

A number of the sixty-one grounds are confusingly stated and most are not presented with requisite particularity. In some situations, the motivation to

combine is obviated by grounds that lack the secondary element providing the alleged impetus to combine (e.g., removing software when only software enables the motivating feature). Often, conflicting control strategies are not explained and, when there are multiple control strategies and multiple controllable systems (e.g., LED array **and** modulators), no explanation is ever provided as to **which** strategy is controlling which system.

For both these procedural reasons, as well as the substantive reasons provided below, Patent Owner will demonstrate how Petitioner has failed to prove obviousness of a single claim.

A. Petitioner Failed to Address, Explain or Solve Any of The Multitude of Problems Arising from The Proposed Combinations

In *Intel v. PACT XPP Schwiez AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2023), the Federal Circuit seemingly espoused a “suitable option” requirement for combinations of prior art. (*Intel*, 61 F.4th at 1381.) Nonetheless, the litany of demonstrable problems with the combinations, at least as proposed, indicates clear **unsuitability**. Petitioner never addresses nor solves the conflicts and incompatibilities identified herein, rendering their combinations unmotivated and unsuitable, even under *Intel*.

In many combinations, conflicts in control arise, which render the primary references inoperable for even predictable, normal illumination, let alone their

respective goals of “maximum” illumination (Beam) or “optimum illumination” (Ex.1005, 6:10-11; Ex.1010, 2:2-9.) If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984). Moreover, given the state of the art, suitable versions of the proposed combinations would be beyond the skill of a POSA. (See Ex.2006, ¶26-44; Exs.2011-2013, 2015-2016, 2020-2022.)

**1. Failings of Petitioner Relating to All Combinations
in Grounds 1-7 Including “Beam-Thominet”**

Petitioner proposes to combine Beam with Thominet to achieve “multiple directional beam regions . . . for different functions.” (Petition, 10.) In all instances, the stated motivation is that sources create “regions 22, 24, 26, 28 for different driving situations.” (Petition, 13.) Petitioner contends that Thominet “*automatically* provide[s] different spatial distributions for improved visibility in different situations.” (*Id.*, 10-11.) At the same time, Petitioner notes that Beam teaches controllable headlamps that “provide greatly improved safety” and “a brighter headlight beam ... increases safety” by “enabling the driver to see more clearly at night.” (*Id.*, 12.) These benefits of Beam are based on teachings of maximum illumination, except where glare-reduction occurs. (Ex.1005, 6:10-11.) Accordingly, to achieve all Petitioner’s proposed combination benefits, both

Thominet's segmentation **and** Beam's maximum illumination (two conflicting concepts) are required. Further, Thominet's segmentation must also accommodate Beam's selective blanking (Ex.2006, ¶116.)

Beam and Thominet solve the generalized problem, of “how” to provide increased visibility, in a conflicting and incompatible manner. Beam solves the problem by addressing every possible situation with maximum illumination (using all light), while Thominet solves the problem by choosing different subsets of light for each situation. (Ex.1005, 6:11-12; Ex.1006, [0026].) Equally important is the fact that Beam teaches selectively blanking emission, based on detected illumination, and Thominet does not contemplate, and therefore accommodate, such selective anti-glare functionality. (Ex.2006, ¶117.)

Thominet's segmented beam regions, all using **less** than the full LED array, are in direct conflict with Beam's “maximum intensity at all times.” (Ex.1005, 6:11-1.9.) Thominet's segments create conflicting results when utilized with Beam's selective blanking. (Ex.2006, ¶118.) Petitioner never even notes either issue, let alone explains how a POSA would have integrated these disparate control strategies to combine these systems. Nor does Petitioner explain why Thominet's segmenting still preserves the primary purpose of Beam, maximum illumination. All of this undercuts Petitioner's proposition that a POSA would have been motivated to combine these systems at all, let alone with any expectation of

success.

Petitioner makes at least three different combinations of Beam/Thominet. The “software” combination uses both Thominet’s (segmentation) and Beam’s (selective control) software with Beam’s Lamp+SLM (see §VI.A, *supra*; Petition, 13.) The “hardware” alternatives use either Thominet’s LED array “substituted” for Beam’s (also with Beam’s selective control), or a “modification” of Beam’s flat array surface 401 with a “curved substrate” from Thominet. (*Id.*, 12-16.)

A POSA would have recognized that combining Thominet’s functional segments with Beam’s maximum-illumination/blanking was unsuitable and unpredictable because: a) Beam solved the problem already, albeit differently; b) Beam’s “maximum illumination” solution is in direct conflict with Thominet’s segmented illumination; and c) Beam’s blanking further reduces the already less-than-maximum illumination of Thominet’s function-based segments, and does so unpredictably. (Ex.2006, ¶120.)

a. Petitioner fails to explain how Thominet’s automated functions would not conflict with Beam’s benefits in software combinations

Thominet discloses minimal “automation” of selecting LEDs for different functions. (Ex.1006, [0026].) The disclosure is limited to “a control device” that performs “switchover” depending on “speed and/or steering wheel position, or wiper, or recognizing counter traffic.” (Ex.1006, [0026].) Thominet thus solves

Petitioner's generalized problem of "improving visibility" by situationally using different segments. (*Id.*, [0004].) Beam solves the same problem by simply illuminating everything, maximally, always. (Ex.1005, 6:10-11.) Petitioner never explains how or why a POSA would have combined the markedly different approaches for solving the same problem. (Ex.2006, ¶122.)

Any Thominet "automatic" segmentation immediately conflicts with Beam's maximum illumination goal. Thominet's speed-based adjustments switch between high-intensity beams (high-speeds) and wide beams (low-speeds), neither using the full array as Beam would. (Ex.1006, [0023]-[0024].) Counter-traffic control is never described in detail, but implies automatic switching to lower-intensity beams – i.e., conventional automatic dimming – recreating a problem Beam was trying to solve. (Ex.2006, ¶123.)

The two contradictory control systems, both present in Petitioner's "software" combinations, are unsuitable in virtually every situation, expressly because they solve "improving visibility" differently. (Ex.2006, ¶124.) Petitioner never addresses these contradictions in teachings, and instead simply suggests that Beam's software would have been modified "to organize Beam's array... into multiple directional beam regions for different functions." (Petition, 14.) What those "functions" are, how or when that organization would occur (what SLM portions would be used, when they would be used) and how all of the noted

conflicting Thominet “functions” will comport with Beam’s primary strategy is never explained, which further contributes to the lack of the requisite particularity for sub-ground 1C. (Ex.2006, ¶124.)

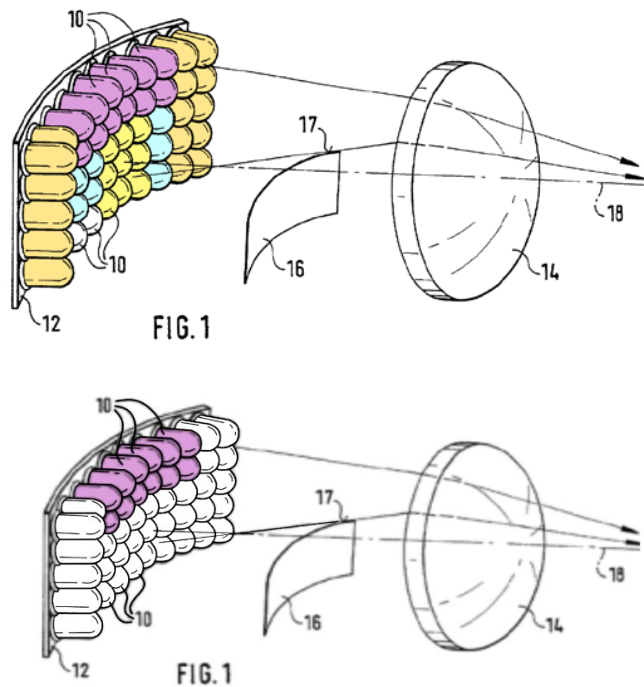
Recognizing the destructive nature Thominet’s controls would have on Beam’s maximum illumination, a POSA would not have been motivated to combine the two disparate control strategies as Petitioner proposes. (Ex.2006, ¶125.) Nor would a POSA have had a reasonable likelihood of success in combining them without at least first noting, and then either dispensing with, or solving, all the above problems — none of which Petitioner does at all, let alone with any particularity. (Ex.2006, ¶125.)

b. Petitioner fails to address issues created by combining Beam’s Software (maximum intensity/blanking) with Thominet’s Software (segmented automatic functionality)

Thominet relies on segmented (partial) operation of its array with different segments corresponding to different functions. (Ex.1006, [0026].) Chief among the concerns of Beam is that drivers have adequate illumination. (Ex.1005, 1:54-57, 3:8-14, 3:37-41.) In addition to Thominet’s segmented beams being generally unsuitable to accomplish Beam’s stated goal, once Beam’s anti-glare strategy selectively blanks any of Thominet’s segments (already an illumination subset), forward illumination is further reduced. (Ex.2006, ¶127.) Moreover, the number

and location of microbeams blanked by Beam's anti-glaring strategy is independent of the automatic control of functional segments, resulting in completely unpredictable illumination output and illumination changes. (Ex.2006, ¶128.)

For example, if Thominet's automatic segmented control were being utilized (via Beam's lamp/SLM, as Petitioner proposed) to create segment 10 noted below in Petitioner's annotated figure (Petition, 14), only approximately 1/3 of the SLM would be allowing light to pass through. (*See*, second annotated Fig. 1 below.) The light controlled in the proposed embodiment is controlled through an SLM 203, not the array, but the array is presented to show the function that Thominet's software is recreating using Beam's SLM. (Ex.2006, ¶128.)



(Ex.2006, FIG. 1, Annotated)

Then, Beam's software subsequently detecting illumination would blank (corresponding to detected illumination) some subset of the segmented emission using the SLM, resulting in further-reduced forward illumination. (Ex.2006, ¶129.) For example, if the center four LEDs of Thominet's segment (or Beam's SLM-equivalents) were blanked, the remaining illumination would be reduced significantly and less than even Thominet taught. Neither reference, nor Petitioner, explains how this would leave sufficient forward illumination in the scene. (Ex.2006, ¶130.)

Thominet clearly does not contemplate the results of blanking its limited illumination segments, such as opining on whether terminating half of such a

segment would leave the segment suitable for use. Thus, it is clearly unsuitable to use these segments with Beam's anti-glaring solution. Moreover, as the distance to the detected light decreases, the blanked region would grow larger, resulting in increasingly reduced forward illumination. (Ex.2006, ¶131.)

Similar issues would occur when **any** of Thominet's segments were used with Beam's selective blanking. Absent a recognizable solution with a reasonable likelihood of success, no POSA would have combined the segmented beams of Thominet with the selective blanking of Beam – particularly due to the continually variable and unpredictable location of detected light relative to the currently active segment(s). (Ex.2006, ¶132.)

c. Petitioner fails to explain how automated control or segmentation would be achieved without Thominet's software

Petitioner proposes an alternative combination in which it substitutes Thominet's array for Beam's (Petition, 14-16.) This system lacks Thominet's software to automatically identify segments and/or control segments by function. Without such knowledge, Thominet's array is simply an array of LEDs, much like Beam's, although optionally curved. (Ex.1006, [0018]; Ex.2006, ¶134.)

Petitioner makes no proof that this array would even be segmented, let alone automatically controlled. In the absence of both automatic control (Petitioner's primary motivation to combine) and segmentation, there is no motivation to use the

array from Thominet. Even if segmentation were possible, albeit unexplained, without Thominet's unincluded control software, Beam would simply use the entire array at all times, just as it uses its own array, because Beam alone does not disclose how or when to use segments. Accordingly, no POSA would have made such a combination. (Ex.2006, ¶135.)

d. Neither Petitioner nor Thominet suggest any reason/advantage of a curved LED array

Thominet notes its segmented automatic functionality can be achieved using either a flat or curved array, but provides no teachings relative to how or why to use one or the other. (Ex.1006, [0018].) Petitioner's third combination where "the flat surface of Beam's array 401 is modified with Thominet's **curved substrate**," relies on neither the LEDs nor software of Thominet (Petition, 16.) This combination thus also lacks both the segmentation and automatic controllability. As such, there is simply no reason a POSA would have curved the Beam array, as this optional feature is not even a "solution" to any noted problem. (Ex.2006, ¶137.)

2. Failings of Petitioner Relating to All Combinations in Grounds 8-10 Including "Karlsson-Harbers"

Petitioner proposes to combine Karlsson with Harbers for the purpose of providing "directional light clusters/sources for different functions." (Petition, 81.) Harbers provision of "different spatial distributions for improved visibility in

different driving situations...” is the asserted primary motivation to combine. (*Id.*) Karlsson desires to “retain optimum lighting for the driver...,” which includes placing high intensity main-beam light wherever such light is not dimmed/terminated responsive to detected light sources (Ex.1010, 2:2-9; *see also*, *e.g.*, Petition, 80, 95.) Petitioner explains these examples as a Karlsson system that places main-beam high-intensity illumination everywhere that incoming light is not detected, in a manner similar to Beam. (*Id.*; Ex.2006, ¶139.)

As a reason to combine the teachings, Petitioner notes Karlsson “adjusts a pattern and/or intensity of light beam” responsive to detected traffic, and further that Harbers “uses multiple beam segments for different functions.” (Petition, 82.) Once again, though, Petitioner fails to recognize a fundamental conflict in the implementation of these disparate strategies. Karlsson modifies high-intensity main-beam illumination in regions where that illumination might glare, *e.g.*, when it uses such illumination for the full scene to provide “optimum illumination for the driver.” (Ex.1010, 2:2-9.) Harbers, on the other hand, selectively chooses illumination for different situations, such as selectively engaging or disengaging different beam segments based on velocity. (Ex.1011, 9:1-6; Ex.2006, ¶140.)

As with Beam’s high-intensity microbeams, Karlsson’s high-intensity illumination is designed to provide optimum forward illumination with some of the “spotlight beams” that correspond to detected light deactivated. (Ex.2006, ¶141.)

Similar to Thominet, Harbers does not contemplate dimming any portion of a chosen beam segment (a subset). When combining the systems, the conflicting solutions create similar issues as described with respect to the Beam-Thominet combination such that no POSA would have combined the systems as proposed, and no reasonable expectation of success for the combined system. (Ex.2006, ¶141.)

Petitioner makes at least three combinations using different Harbers components. The software combination uses both Harbers' and Karlsson's software and Karlsson's LED+SLM (*see* §VI.H, *supra*; Petition, 83-84.) The hardware combinations use either Harbers' LED array substituted for Karlsson's array with Karlsson's software (selective control), or a "modification" of Karlsson's flat substrate of lighting means 2, 3 with a "curved substrate" from Harbers. (*Id.*, 84-86; Ex.2006, ¶142.)

a. Petitioner never explains how to merge conflicting functionality of Harbers and Karlsson software

Harbers does provide for some form of apparent automatic control, based on velocity and steering (Ex.1011, 3:27-4:14.) In low-speed situations, wide light of decreased intensity is used. (*Id.*, 3:30-34.) As vehicle speed increases, fewer, but brighter, LEDs are used (*Id.*) When a steering-wheel is turned, the main beam is dimmed (*Id.*, 4:5-14.) Karlsson, on the other hand, prefers "optimum illumination"

and will utilize its full array when possible, as Petitioner shows fifteen times in its explanation for Ground 8 applied to claims 26 and 65. (*See, e.g.*, Petition, 91, 94, 95, 97, 99, 102, 103, 105, 107, 108, 110, 112, 114, 116, 118 – full array used in every Petitioner-annotation except where blanked for detected illumination; (Ex.2006, ¶143.)

Petitioner never explains how Harbers’ selective functions will not conflict with the “maximal illumination” shown in the fifteen examples. For example, if Harbers control were interposed on a Petitioner-example cited above, as would occur in the combination, and the emitting vehicle slowed, a conflict would arise. Harbers software would attempt to widen the beam and decrease central forward illumination (use the passing and side beam segments) at the same time as Karlsson would attempt to maintain dimming of the sides that Harbers is attempting to illuminate as well as maintain intense forward illumination that Harbers is attempting to dim. (Ex.2006, ¶144.)

Because both control functions are present in the software combinations, such conflicts would necessarily arise, and they are neither noted nor addressed by Petitioner. Without solutions to these conflicts, no POSA would have been motivated to utilize both sets of software as proposed by Petitioner, nor is it clear that such combination would function without solutions to the control conflicts. (Ex.2006, ¶145.)

b. Petitioner never explains how any segmentation would occur in the absence of Harbers' software

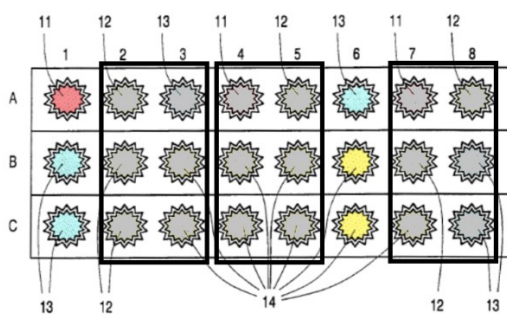
Petitioner contends that including Harbers hardware (as an **alternative to software**) into Karlsson's system would "have provided different spatial distributions for different driving situations." (Petition, 85; Ex.2006, ¶146.) Petitioner's argument that "elements 11-14... provide beam segments - 6'-6"-6", 7'-7"-7"-7", without having Harbers' software, is completely unfounded in the teachings of Harbers. (Petition, 85; Ex.2006, ¶147.) All of Harbers' described control functions are related to software controls. (Ex.1011, 3:27-4:14.) While the system would have included differently **colored** LEDs, there still would not be a single component of the combination that would have any idea how to segment the beams as Harbers suggests. Thus, no POSA would have made this combination, essentially placing an array with colored LEDs into Karlsson with no actual alleged benefit from segmentation carrying over and Karlsson's software, the only software present, having no idea how to handle colored LEDs. (Ex.2006, ¶147.)

c. Petitioner fails to address the problems that selective blanking creates in an array of colored LEDs

When Harbers array, that includes expressly colored LEDs, is utilized in replacement of Karlsson's, problems occur with the selective blanking implemented by Karlsson (the only control software remaining). It is not known

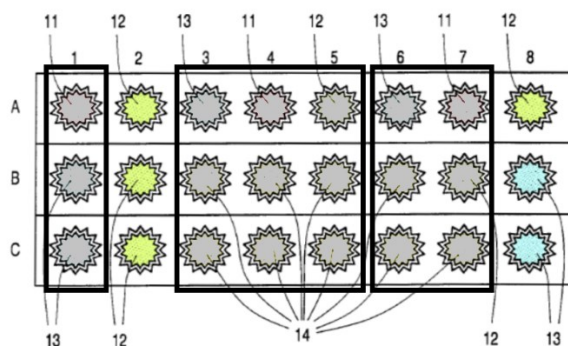
exactly how Karlsson blanks LEDs, but, for example, in a high traffic situation where light was detected from many directions, it is reasonable that a high, and certainly random, number of Harbers' LEDs would be blanked in an attempt to accommodate all the incoming light (Ex.2006, ¶149.)

For example, if Petitioner's proposed vertical blanking (used in its proofs of 26 and 65) were used in the presence of an oncoming leftmost light source and two preceding light sources (i.e., oncoming traffic and two preceding vehicles):



(Ex.1011, Fig. 2, Annotated)

At some later point in time, possibly even a second or two later, the output may change as follows, with the leftmost source (oncoming, adjacent lane) moving closer and the emitting vehicle closing in on the central source and the rightmost source. (Ex.2006, ¶151.) The utilized LEDs shift the illumination color from RBB|BYY to GGG|GBB:



Patent Owner thus attempts to explain the problem in a high-traffic scenario where a lot of light is detected all across a scene (e.g., a highway at night) using Petitioner's own contentions – vertical blanking from Karlsson arguments regarding claims 26 and 65. After vertical blanking (or any other Karlsson blanking) the remaining LEDs are of varied colors – unpredictably so, based on where light is detected at any moment. Accordingly, the resulting light output is going to be: a) the wrong color at many times, b) confusingly colored; c) extremely confusingly colored for vehicles viewing the output (where the color effect will be amplified); and d) continually shifting in color. (Ex.2006, ¶152.)

Petitioner never recognizes this issue or presents a solution, and no POSA would have been motivated to create such an unpredictable “disco light” for a headlight. (Ex.2006, ¶153.)

d. Petitioner presents absolutely no reason to merely use the curve from Harbers

Harbers mentions once that a curved substrate can be used as an alternate embodiment. (Ex.1011, 7:27-29.) The curve alone is used in Petitioner's third combination where Petitioner proposes "modifying the flat substrate of Karlsson's lighting means 2, 3 with Harbers **curved substrate**." (Petition, 86.) No LEDs or software of Harbers are used. Without software, there is no segmentation or control, and without LEDs, there are not even colored LEDs. There is no explained reason why a POSA would have viewed the curve alone as having any point in Karlsson or representing a solution to any problem. (Ex.2006, ¶154.)

3. In combinations having multiple control strategies from software (e.g., Beam-Thomient, Karlsson-Harbers, Karlsson-Harbers-Gotou, etc.), and multiple controllable hardware elements (e.g., LED array with a modulator), Petitioner never explains which controls are applied to which controllable elements

Because of the general confusing nature of Petitioner's combinations, it is not clear when, if ever, Petitioner is intended to use **both** a modulator and LED array. This combination does not appear to be present in Beam-Thominet, but may be present in Karlsson-Harbers. (§VI.A; §VI.H, *supra*.) Nonetheless, this ground is never properly explained in any instance where intended, for at least the additional reason that, because there are now **two** systems that can control light, each control strategy needs to control one, the other, or both, and that explanation is never

provided by Petitioner in any such combination or purported combination. (Ex.2006, ¶156.)

For example, if Karlsson LED+modulator+Harbers_Software was an intended combination (8C), then it needs to be explained what is being controlled by Karlsson and what is being controlled by Harbers. For example, although never suggested, if Harbers controlled the array and Karlsson the modulator, then any control of Karlsson to the modulator is going to override anything Harbers is trying to do, since the modulator sits between the array and the lens. (Ex.2006, ¶157.) Further, since Karlsson has no strategy for controlling a selectively segmented beam created by Harbers, the modulator control is not going to be correctly responsive to Harbers chosen segment being implemented in the array. This issue was neither noted nor addressed. (Ex.2006, ¶158.)

Without an understanding of how the multiple controllable systems of such a combination (LEDs+modulator) would be controlled by the multiple co-existent and often conflicting control strategies, no POSA would have made such a combination. The problem is only amplified when adding software such as Gotou in Ground 9, which then brings in yet another control function that is also never expressly ascribed to a particular controllable system. (Ex.2006, ¶159.)

B. Ground 1 – Beam or Beam-Thominet Applied to Claims 26-27 and 30-31

Sub-grounds (see §VI.A, *supra*):

1A	Beam Lamp+SLM		
1B	Beam LED		
1C	Beam Lamp+SLM	Thominet Software	
1D	Beam Control		Thominet LEDs
1E	Beam LEDs		Thominet Curve

1. There is no Motivation to Merely Use the Curve of Thominet as in Ground 1E

Petitioner has presented absolutely no valid reason to utilize the curve of Thominet as proposed in Ground 1E (*See*, §VII.A.1.d., *supra*). (Ex.2006, ¶161.)

2. Ground 1D Would Not Provide A System That Allows Beam to Function

Sub-ground 1D relies solely on Thominet’s hardware (LED Array being “substituted” for Beam’s Array 401). Without Thominet’s software, this combination has neither segments nor automatic control, and is unmotivated (*See*, §VII.A.1.c, *supra*). (Ex.2006, ¶164.)

3. Ground 1C Utilizing Both Selective Control from Beam and Thominet’s Automatic Segmenting Creates Unaddressed Conflicts in Operation

Due to the unpredictable results from the two conflicting control strategies advanced for the Beam (Lamp+SLM)-Thominet (Software) combination, no POSA would have made the combination proposed for Ground 1C (*See*, §VII. A.1.a-b, *supra*). (Ex.2006, ¶157.)

4. Independent Claim 26

**a. Claim 26.4 Petitioner's Proof is Directly
Contrary to the Claimed "*determining
illumination for at least a first subsection...
including the other vehicle*"**

Claim 26.4 calls for "determining illumination for ... a first subsection." Petitioner proves, at most, that the prior art determination is a determination of where not to illuminate, not a determination of illumination for a section as claimed.

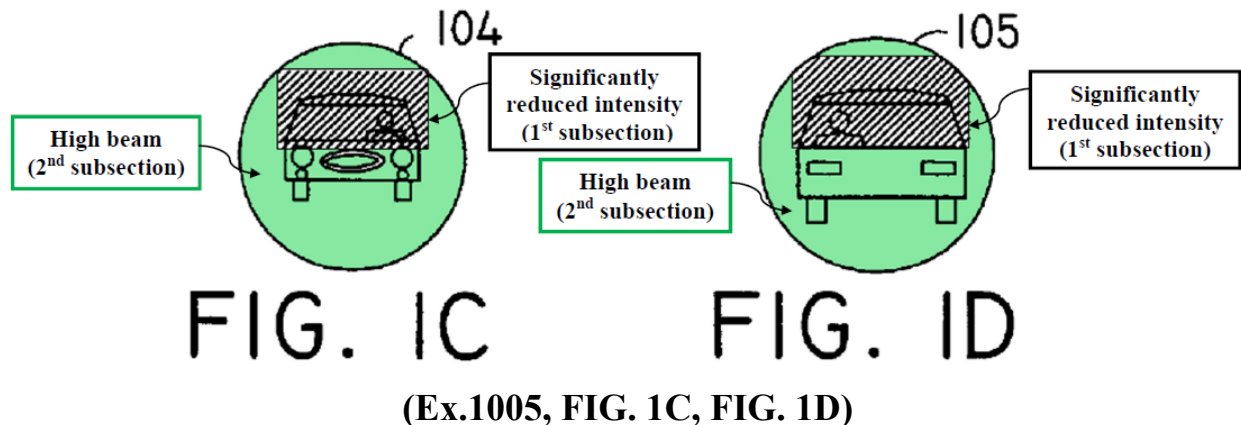
For claim 26.3, Petitioner's contends "Beam discloses "*determining* which ... rays of light must be *extinguished*." (Petition, 21.)

For claim 26.4, Petitioner states "Beam discloses "*reformatting* the *pattern* of a beam...to *prevent* it from illuminating *certain areas*..." (*Id.*, 23.)

Determining which light to "extinguish" is not determining "illumination," nor is reformatting a pattern to prevent illumination of an area. Petitioner has proven that Beam determines where not to illuminate, and, in doing so, has fatally proven that Beam does **not** "determine illumination for... a first subsection... including the other vehicle" as claimed. (Ex.2006, ¶¶171-174.)

b. Claim 26.5 –Beam/Beam-Thominet Is Not Shown to Teach “*determining illumination requirements ... for at least a second subsection of the field-of-view not including the other vehicle*”

Petitioner argues “Beam discloses determining illumination for a second subsection (not including the vehicle) by providing a higher brightness beam in the areas which do not dazzle the driver ahead.” (Petition, 25.) Petitioner then identifies that second subsection in Annotated Figs. 1C-1D. (*Id.*, 26.) (Ex.2006, ¶175.)



The “2nd subsection” as Petitioner **chose** to label **and explain them in its own evidence, plainly includes the second vehicle.** (Ex.2006, ¶176.)

This failure cuts across **all** sub-grounds, 1A-1E, rendering Petitioner’s proof deficient for every sub-ground.

For at least these reasons, Petitioner fails to prove claim 26’s unpatentability, also thereby failing to prove claims 27, 30 and 31 unpatentable.

C. Ground 2 – Beam/Beam-Thominet or Beam-Thominet-Stam Applied to Claim 65

Sub-grounds (*see* §VI.B, *supra*):

2A	Beam Lamp+SLM			
2B	Beam LED			
2C	Beam Lamp+SLM	Thominet Soft		
2D	Beam Control		Thominet LEDs	
2E	Beam LEDs		Thominet Curve	
2F	Beam Lamp+SLM	Thominet Soft		Stam
2G	Beam Control		Thominet LEDs	Stam
2H	Beam LEDs		Thominet Curve	Stam

1. Sub-grounds 2E and 2H Inherit Deficiencies of Sub-ground 1E

There is no motivation or reason to merely import the “curved substrate” of Thominet, as in sub-grounds 2E and 2H which include 1E, and adding Stam to this combination does not change this. (*See*, §VI.B, §VII.A.1.d, §VII.B.1, *supra*.) (Ex.2006, ¶¶180-181.)

2. Sub-grounds 2D and 2G Inherit Deficiencies of Sub-ground 1D

Sub-grounds 2D and 2G have the inherited deficiencies of included sub-ground 1D. (*See*, §VI.B, §VII.A.1.c., §VII.B.2, *supra*.) No POSA would have made either combination. (Ex.2006, ¶¶183-185.)

3. Sub-grounds 2C and 2F Inherit Deficiencies of Sub-ground 1C

Sub-grounds 2C and 2F have the inherited deficiencies of included sub-

ground 1C. (See, §VI.B, §VII. A.1.a-b, §VII.B.3 *supra*.) No POSA would have made either combination. (Ex.2006, ¶¶187-188.)

4. Independent Claim 65

- a. **Claim 65.4 and 65.5 – Beam’s Extinguishment of Illumination Renders All Grounds Insufficient to Prove “determine illumination that substantially illuminates the first subsection below a predefined illuminance.”**

Claim 65 recites “*determine illumination that substantially illuminates the first subsection ...*” (Petition, Appendix A, 65.5, 65.6.) This requires positive illumination, as “no illumination” does not “substantially illuminate” anything. Moreover, this requires a “determination” of this illumination. (Ex.2006, ¶192.) Beam, which utilizes a blanking strategy, provides **no** illumination directed at the “blanked area” because it either **blocks** lamp 202 emission towards that area via the SLM 203 or **changes** LEDs responsible for that area **to a non-emitting state**. (See, §IV.A, *supra*; Ex.2006, ¶192.)

Petitioner’s own explanation for 65.5 undercuts its position – Petitioner states, quoting Beam, “Beam discloses ‘reformatting the pattern... **to prevent it from illuminating certain areas.**’” (Petition, 44.) “Preventing illumination” of an area is plainly not “illumination that **substantially illuminates**” that area. (Ex.2006, ¶193.) Petitioner reinforces this understanding with its prior explanation for 26.3 – “Beam discloses “*determining* which of said multiple rays of light must

be *extinguished*.” (Petition, 21.) Neither concept is “determining illumination that substantially illuminates...” (Ex.2006, ¶193.)

Spillover illumination from areas intentionally illuminated may result in non-zero illumination of the shaded areas in Petitioner’s annotated figure, but Beam never determines, for example, what or how much spillover there will be, and the claim includes “determining” the illumination that illuminates the first section. (Ex.1005, 6:44-48; Ex.2006, ¶194.)

Since Beam is present in all grounds 2A-2H, Petitioner fails to prove this limitation for all grounds.

Beam’s base function, **emphasized by Petitioner**, is to **prevent** illumination. (Ex.2006, ¶195.) Adding a “level” from Stam will not change this function. (Ex.2006, ¶195.) Moreover, the teaching imported from Stam is merely about **when** one should modify lamp emission, so at best, Stam merely adds **when** to institute Beam’s emission-prevention. (Ex.2006, ¶195.)

Petitioner thus fails to prove claim 65’s unpatentability using any of sub-grounds 2A-2H.

D. Ground 3 – Beam-Thominet-Kobayashi Applied to Claims 32-36

Petitioner’s proof for claim 26 fails as noted above in §VII.B, meaning Petitioner has also failed to prove the unpatentability of claims 32-36 dependent

from claim 26. Petitioner's discrete proofs of the limitations of claims 32-36 also fail.

Sub-grounds (*see* §VI.C, *supra*):

3A	Beam_Lamp+SLM	Thominet Software		Map-Data	Means 2	
3B	Beam_Control		Thominet LEDs	Map-Data	Means 2	
3C	Beam_LEDs		Thominet Curve	Map-Data	Means 2	
3D	Beam_Lamp+SLM	Thominet Software		Map-Data		Means 3
3E	Beam_Control		Thominet LEDs	Map-Data		Means 3
3F	Beam_LEDs		Thominet Curve	Map-Data		Means 3
3G	Beam_Lamp+SLM	Thominet Software		Map-Data	Means 2	Means 3
3H	Beam_Control		Thominet LEDs	Map-Data	Means 2	Means 3
3I	Beam_LEDs		Thominet Curve	Map-Data	Means 2	Means 3

1. All Sub-grounds Have Deficiencies Inherited from Included sub-grounds 1C-1E

All combinations involving Beam-Thominet fail for the reasons noted with respect to the included Beam-Thominet sub-ground 1C-1E combinations for Ground 1 (*See*, §VI.C, §VII.A.1, §VII.B.3, *supra*).

2. Petitioner Fails to Address Specific Differences in Claims 34/36, A Fatal Deficiency

Petitioner improperly combines all of claims 32-36 as though they claim the

same thing, contending that “the language of claims 33 and 34 is patentably indistinct from claim 32” and “the language of claims 34 and 36 is identical.” (Petition, 59; Ex.2006, ¶¶200-201.)

Claim 34 recites “determining illumination the increases illumination of an upcoming turn...” This expressly requires an **increase** of illumination. Claim 32 includes no such recitation. Petitioner fatally fails to note or explain the difference, rendering its proof deficient for claims 34/36. (*See Microsoft Corp.*, 13-14; Ex.2006, ¶201).

3. Beam-Thominet-Kobayashi Is Never Shown to “Increase” Illumination as in Claims 34 /36

As noted above Petitioner’s argument does not even address the requirements of claims 34 and 36 – “determining illumination th[at] increases illumination of an upcoming turn...” (Ex.2006, ¶202.)

The combined system of Beam-Thominet-Kobayashi cannot produce the claimed illumination “increase” because the system of Beam already maximally illuminates the scene to the fullest extent possible. (§IV.A, *supra*; Ex.2006, ¶203.)

Petitioner’s combinatorial argument does not explain how a system utilizing maximal illumination would possibly **increase** illumination of anything — rendering the proof deficient for claims 34/36. (Ex.2006, ¶204.)

4. A POSA Would Not Have Combined Beam-Thominet With Kobayashi

The combination with Kobayashi is unmotivated, as the combined system of Beam-Thominet, even were it appropriate, would have no use for Kobayashi's techniques. (Ex.2006, ¶206.)

Claims 32 and 33-36 require determining “illumination **for** the upcoming curve” (claim 32) or “**for** the upcoming turn” (claims 33-36).

Beam, as Petitioner admits, “operat[es] ‘at maximum intensity at all times.’” when rejecting parent claim 26, and that argument carries forward, as claim 26 is part of these claims. (Petition, 25, 37.) Accordingly, regardless of whether there is Kobayashi data indicating a curve or knowledge of a road profile or advancing direction, Beam is already argued to maximally illuminate everything it can illuminate. (Ex.1005, 4:57-59; Ex.2006, ¶¶207-208.)

If there is “maximum intensity at all times,” as Petitioner contends, then any curve that Beam **could** illuminate is already **maximally** illuminated. This leaves the combined system with no use for Kobayashi's map data. (Ex.2006, ¶209.)

In light of the fact that the presented combination can do absolutely nothing with Kobayashi's information, there is absolutely no reason to make such a combination that merely adds unusable, extraneous information. (Ex.2006, ¶210.)

For at least this reason, Petitioner's combination is not a combination any POSA would have been motivated to make, and thus Petitioner fails to prove the unpatentability of claims 32-36. (Ex.2006, ¶211.)

E. Ground 4 – Beam-Thominet-Stam-Kobayashi Applied to Claim 70

Petitioner's proof for claim 65 fails as noted above in §VII.C, meaning that Petitioner has also failed to prove the unpatentability of claim 70 that depends from claim 65. Petitioner's discrete proofs about claim 70 also fail.

Sub-grounds (*see* §VI.D, *supra*):

4A	Beam_Lamp+SLM	Thominet Software		Stam	Map-Data	Means 2	
4B	Beam_Control		Thominet LEDs	Stam	Map-Data	Means 2	
4C	Beam_LEDs		Thominet Curve	Stam	Map-Data	Means 2	
4D	Beam_Lamp+SLM	Thominet Software		Stam	Map-Data		Means 3
4E	Beam_Control		Thominet LEDs	Stam	Map-Data		Means 3
4F	Beam_LEDs		Thominet Curve	Stam	Map-Data		Means 3
4G	Beam_Lamp+SLM	Thominet Software		Stam	Map-Data	Means 2	Means 3
4H	Beam_Control		Thominet LEDs	Stam	Map-Data	Means 2	Means 3
4I	Beam_LEDs		Thominet Curve	Stam	Map-Data	Means 2	Means 3

1. All Sub-grounds Have Deficiencies Inherited from Included sub-grounds 1C-1E

All combinations involving Beam-Thominet fail for the reasons noted with respect to the sub-ground 1C-1E combinations for Ground 1. (*See*, §VI.D, §VII.A.1, §VII.B.3, *supra*.) (Ex.2006, ¶214.)

2. Petitioner Fails to Address Specific Differences in Claim 70, A Fatal Deficiency

Petitioner’s statement that “the language of claim 70 is patentably indistinct from claim 34,” is not technically accurate – claim 34 relates to increasing illumination of “an upcoming turn” (a decidedly planned maneuver) and claim 70 relates to increasing illumination of “an upcoming curve.” The Petition fails to properly note and address the difference, resulting in a fatal flaw in the argument for claim 70. (*See Microsoft Corp.*, 13-14.) (Ex.2006, ¶215.)

3. Beam-Thominet-Stam-Kobayashi Is Never Shown to “Increase” Illumination as Claimed in Claim 70

Claim 70 also requires that the determination “increases illumination.” For the reasons noted in Ground 3 with respect to claim 34, the Petition fails to prove this point for claim 70 as well – a failing extending to all nine sub-grounds of Ground 4. (§VII.D.3, *supra*; Ex.2006, ¶216).

4. A POSA Would Not Have Combined Beam-Thominet-Stam With Kobayashi

Claim 70 requires “determining illumination that increases illumination of an upcoming curve.” For reasons noted with respect to claims 32-36 above, no POSA would have been motivated to make a combination where such a determination would be extraneous, given that the combination cannot achieve the claimed “increase” and therefore lacks any utility for such a determination.

(§VII.D.4.)

For at least this reason, Petitioner’s combination is not a combination any POSA would have been motivated to make, further failure in proof of the unpatentability of claim 70. (Ex.2006, ¶217.)

F. Ground 5 – Beam-Thominet-Stam-Braun Applied to Claims 66-67

Claims 66-67 depend from claim 65, which Petitioner fails to prove unpatentable, extending the failure to 66-67. (*see* §VII.C., *supra*) Petitioner’s discrete proofs about claims 66-67 also fail. (Ex.2006, ¶220.)

Ground: (*see* §VI.E, *supra*):

5	Beam_Lamp+SLM	Thominet_Software	Stam	Braun
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1. Ground 5 Has Deficiencies Inherited from Included sub-ground 1C

Ground 5 includes sub-ground 1C and thus fails for the reasons noted with respect the sub-ground 1C combinations for Ground 1 (*See*, §VI.E, §VII.A.1.a-b, §VII.B.3, *supra*; Ex.2006, ¶222.)

2. Petitioner’s Proposed Usage of Braun to “Spotlight” Pedestrians or Signs Renders the Combination Unmotivated, As Beam-Thominet-Stam Has No Illumination Left to Use for a “Spotlight”

First, for the reasons presented with respect to claim 34, there is no un-used illumination of the Beam-Thominet-Stam combination to use to “spotlight”

anything – rendering the addition of Braun for this function also superfluous. (§VII.D.3, *supra*; Ex.2006, ¶223.) Braun’s teachings are cited for “spotlighting”, an impossibility for a system already maximally using its emitters. (Petition, 66; Ex.2006, ¶223.)

For at least this reason, there is no motivation to add Braun to Beam-Thominet-Stam and Petitioner thus fails to prove unpatentability of claims 66-67.

3. Petitioner Fails to Explain How the Combination Would Function with Requisite Particularity

Assuming *arguendo*, however, that the combination could achieve the proposed outcome – Petitioner proposes adding software of Braun to provide pattern recognition for identifying pedestrians (claim 66) and/or signs (claim 67). Then, according to Petitioner, Braun control would provide “spotlight” illumination of “people” or “roadway signs.” (Petition, 66; Ex.2006, ¶225.)

In addition to failing to explain how this can be achieved when the array is already fully utilized, Petitioner does not explain whether or how this control would be used in conjunction with blanking. I.e., if the control were used to “spotlight” part of a blanked area (because a person/sign was detected within the region), how this would not negatively affect a driver in the area. At times, Braun’s control will attempt to place light in places Beam’s control is attempting to blank, and the conflicting strategies are never resolved by Petitioner. (Ex.2006, ¶226.)

Without a solution (which neither Braun nor Petitioner provide) for the contemporaneous operation of these two functions, these conflicting functions would not have been combined into a single headlamp system by a POSA. Since Petitioner did not address this issue of the combination, Petitioner has failed to provide the requisite explanation as to why these two systems would be combined in the manner proposed. (Ex.2006, ¶227.) For at least these additional reasons, Petitioner fails to prove unpatentability of claims 66-67.

G. Ground 6 – Beam-Thominet-Harbers Applied to Claims 28-29

Claims 28-29 depend from claim 26, and all substantive failures with respect to claim 26 extend to these claims through dependency. Petitioner’s discrete proofs of the limitations of claims 28-29 also fail.

Sub-grounds (*see* §VI.F, *supra*):

6A	Beam_Lamp+ SLM	Thominet Software		Harbers_Software
6B	Beam Control		Thominet LEDs	Harbers Software
6C	Beam Control		Thominet Curve	Harbers LEDs
6D	Beam LEDs		Thominet Curve	Harbers Curve

1. All Sub-grounds Have Deficiencies Inherited from Included sub-grounds 1C-1E

All combinations involving Beam-Thominet fail for the reasons noted with respect the sub-ground 1C-1E combinations for Ground 1. (*See*, §VI.F, §VII.A.1,

§VII.B, *supra*.

2. Combinations 6A and 6D Lack Any Colored Sources

Combinations 6A and 6D both lack colored light sources – and neither Thominet’s nor Harbers’ software describes how to derive color in the absence of colored LEDs. Therefore, the coloration of road portions (claim 28) or shift to yellow in the presence of fog (claim 29) are not possible under the explanation provided using the combinations presented for sub-grounds 6A/6D. (Ex.2006, ¶231.)

3. Any Combination Involving Colored LEDs Would Create a Color-Shifting Output whenever the Control Function of Beam Began

For all other combinations, assuming *arguendo* that Thominet teaches colored LEDs, then at least one light source of the combination includes a colored LED. Thus, regardless of whether the color comes from Thominet or Harbers, this creates the unaddressed color-shifting issue noted above as a problem with Karlsson-Harbers, *mutatis mutandis*. (§VII.A.2.c, *supra*; Ex.2006, ¶232.) Beam, which selectively blanks illumination, will, similar to Karlsson, unpredictably blank sections of the LED array (now including color) and will therefore produce an unpredictably color-changing forward beam, as various different colored LEDs are blanked or illuminated. (expert.). Thus, the argument against adding colored LEDs applies here as well, *mutatis mutandis* — and no POSA would have been

motivated to make such an unpredictable and often non-functional combination.
(Ex.2006, ¶233.)

Petitioner fails to prove the unpatentability of claims 28-29 for at least the reasons presented.

4. Petitioner Fails to Show How Beam-Thominet-Harbers Teaches “*sensed fog or snow*” as in Claim 29

“Lowering the beams for conditions like rain, snow... or fog” in Beam is a manual function of Beam and not an illumination requirement determined by the processor as claimed. (Ex.1005, 3:34-36.) Petitioner further cites Harbers. (Petition, 76; Ex.1011, 10:6-14.) This teaching cited merely notes that “the spectral composition of the light beams generated by the light source can be adapted...;” there is no teaching of automatic adaptation and still no teaching of “**sensed** fog or snow” as claimed. (Ex.2006, ¶235.)

Since Petitioner has at least failed to prove that any of the references in the combination can react to “**sensed** fog or snow,” for at least the failure to demonstrate **how** any of the references **can sense** fog or snow, the proof fails for this additional reason. (Ex.2006, ¶236.)

H. Ground 7 – Beam-Thominet-Stam-Harbers Applied to Claims 68 and 69

Claims 68-69 depend from claim 65, and all failures with respect to claim 65 extend to these claims through dependency. Petitioner’s discrete proofs of the

limitations of claims 68-69 also fail.

Sub-grounds (*see* §VI.G, *supra*):

7A	Beam_Lamp+ SLM	Thominet Software		Stam	Harbers_Software
7B	Beam Control		Thominet LEDs	Stam	Harbers Software
7C	Beam Control		Thominet Curve	Stam	Harbers LEDs
7D	Beam LEDs		Thominet Curve	Stam	Harbers Curve

**1. All Sub-grounds Have Deficiencies Inherited from
Included sub-grounds 1C-1E**

All combinations involving Beam-Thominet fail for the reasons noted with respect the sub-ground 1C-1E combinations for Ground 1 (*See*, §VI.G, §VII.A.1, §VII.B, *supra*). (Ex.2006, ¶239.)

**2. Grounds 7A and 7D Suffer from the Same
Shortcomings as Grounds 6A and 6D, Lack of
Colored Light Sources**

Stam does not add colored light sources, and so sub-grounds 7A and 7D are deficient for the same reasons as sub-grounds 6A and 6D. (§VII.G.2, *supra*.)

**3. Grounds 7B and 7C Suffer from the Same Color-
Shifting Problem as Grounds 6B and 6C**

Stam does not prevent the color-shifting issue noted with respect to sub-grounds 6B and 6C, and so grounds 7B and 7C suffer from the same issue and no POSA would have been motivated to make this non-functional combination (§VII.G.3, *supra*; Ex.2006, ¶240.).

4. Petitioner Fails to show “[sensor] data includes data indicating fog or snow” as in claim 69

Just as Petitioner failed to show that there was “*sensed fog or snow*” in claim 29, here Petitioner, in rejecting by analogy, also fails to even note or show the specific requirement that the “*data*” (sensor data of claim 65) “*includes data indicating fog or snow.*” This element is simply missing from the analysis, because Petitioner never explained how this element was inconsequentially different from the elements of claim 29. This fatal defect renders the argument for claim 69 insufficient, in addition to the failures in proof. (*See Microsoft Corp.*, 13-14;Ex.2006, ¶241.)

I. Ground 8 – Karlsson or Karlsson-Harbers Applied to Claims 26-31, 65, and 68-69

Sub-grounds (see §VI.H, *supra*):

8A	Karlsson LEDs		
8B	Karlsson LEDs+Mod		
8C	Karlsson LEDs+Mod	Harbers Software	
8D	Karlsson Control		Harbers Array
8E	Karlsson LEDs+Mod		Harbers Curve

1. There is no Motivation to Merely Use the Curve of Harbers as in Ground 8E

Harbers curved substrate alone has not been shown to add anything useful to the combination. (§VII.A.2.d, *supra*; Ex.2006, ¶244.)

2. Lacking Harbers' Software, Ground 8D Is an Unmotivated Combination That Lacks Harbers' Segmentation and Further Presents Color-Shifting Issues

Without light segmentation the motivation to use Harbers hardware alone is lacking. (§VII.A.2.b, *supra*.) Further, the use of Harbers' colored array creates a color-shifting problem. (§VII.A.2.c, *supra*; Ex.2006, ¶247.)

3. Ground 8C Is An Unmotivated Combination Due to the Unaddressed Issues Arising From Conflicting Control Strategies

Petitioner never explains how Karlsson's selective dimming and Harbers particular automatic controls would contemporaneously function in situations where the two strategies required conflicting control. (§VII.A.2.a, *supra*; Ex.2006, ¶252.)

4. Ground 8C Fatally Lacks Necessary Particularity

In Ground 8C, there are two controllable systems, an LED array 2 and a modulator 3. There are also two control strategies, Karlsson's blanking and Harbers automatic selectivity and beam segmentation. (Ex.2006, ¶255.)

Petitioner never explains which controllable structure would be controlled by which control function, rendering the argument fatally flawed for a lack of particularity. (§VII.A.3, *supra*; Ex.2006, ¶256-257)

5. Karlsson’s Failings Alone Are Sufficient To Defeat All Proposed Grounds Utilized Against Claims 26-31, 65, and 68-69

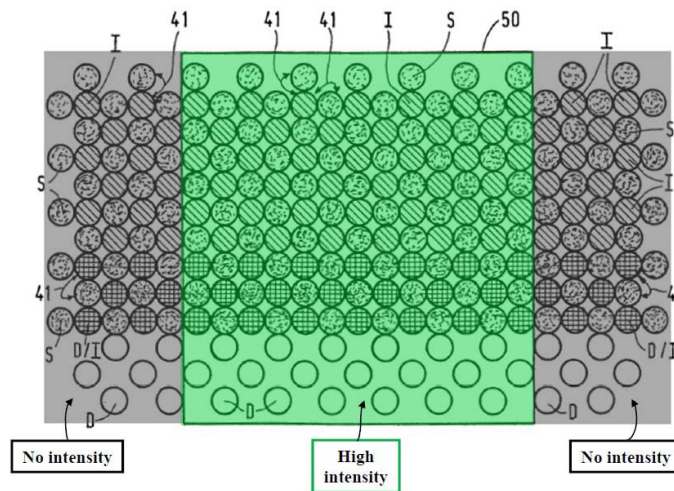
Karlsson’s teachings, depending on the situation, are misapplied, are non-existent as alleged, or fail to meet a limitation of a given claim – substantive failings that extend across all sub-grounds. (Ex.2006, ¶259.)

Petitioner contends that Fig. 14 is a functional representation of the actual operation of Karlsson in the presence of detected light, stating that “the shaded subsections below are “no/low intensity” sections **that correspond to detected light**. (Petition, 80.) That is, these are not merely electively unused areas, they are, by Petitioner’s contention, “shaded areas (outside emitted light beam 50) – [where] ‘no light or light having a low intensity is emitted **in those directions from which light is detected**.’” (*Id.*) Karlsson, however, does not actually say this with respect to Fig. 14. (Ex.2006, ¶260.)

Moreover, Petitioner’s Fig. 14 annotations represent that vertical blanking occurs, i.e., an entire column of light is extinguished in response to detected illumination. (Ex.2006, ¶261.) That is also not supported by any evidence from Karlsson, but an apparent “guess” as to how Karlsson would address detected light using LEDs; Karlsson itself is very vague on this point. (Ex.2006, ¶261.)

On the other hand, Petitioner’s statement, that those “shaded areas” are sections that correspond to “directions from which light is detected,” is useful to

understand Petitioner’s position on how Karlsson generally functions — namely, these Annotations present an array that would be fully utilized were light not being detected. (Petition, 80; Ex.2006, ¶262.)



(Ex.1010, Fig. 14, Annotated by Petitioner)

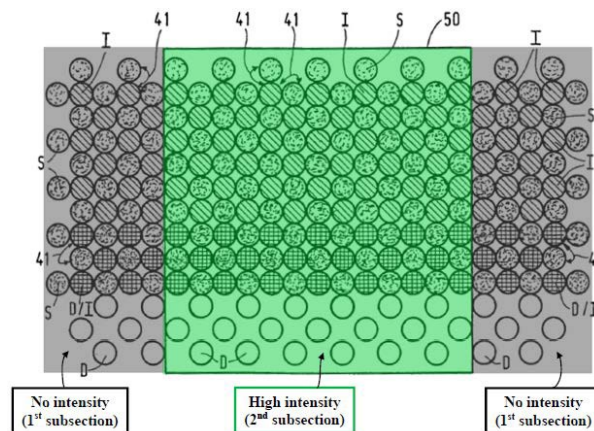
Petitioner’s “full usage of the array except when accommodating glare” interpretation generally supports Patent Owner’s similar understanding of how Karlsson functions. (Ex.2006, ¶87-107.)

**a. Claim 26 – Karlsson, Alone or In Combination,
Fails to Teach or Suggest Elements Petitioner
Refers to as 26.4 and 26.5**

Claim 26 recites “determining illumination for at least a first subsection ... including the other vehicle ..., as indicated by the sensor data, and for at least a second subsection ... not including the other vehicle ...” Collectively, the Petition addresses these as elements 26.4 and 26.5. (Ex.2006, ¶264.)

(1) 26.4

For the explanation of claim 26.4, “determining illumination for at least a first subsection ... including the other vehicle ...,” Petitioner alleges that Fig. 14 of Karlsson shows this element in the “shaded area with no intensity.” (Petition, 93.) Petitioner’s annotated figure, recreated below, represents the two grey areas as the claimed “first subsection.” (Ex.2006, ¶265.)



(Ex.1010, Fig. 14, Annotated by Petitioner)

Again, there is no teaching in Karlsson that Fig. 14 represents control over an array responsive to detected light, or that such control would include vertical blanking of LEDs – so the argument first fails as mere conjecture, as the “evidence” presented is not supported by the record as showing what it purports to show. (Ex.2006, ¶266.)

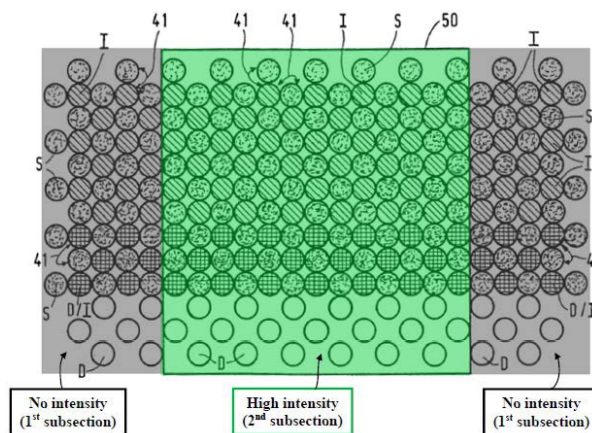
Thus, the conclusion about annotated Fig. 14 is not explained with sufficient particularity to result in a proof, lacking actual record-supported evidence, and

results in an incomplete proof as presented. (Ex.2006, ¶267.)

(2) 26.5

Also, Petitioner’s explanation with respect to 26.5, “including determining illumination ... for at least a second subsection of the field-of-view **not including the other vehicle**” is both confusing in explanation and deficient in its proof. (Ex.2006, ¶269.)

Petitioner again presents the above annotated Fig. 14 and contends “Karlsson thus determines illumination for a different subsection outside of the detected vehicle (e.g., high intensity area to either side of the first subsection). Confusingly, the figure does not show an alleged high-intensity area “to either side of the first subsection.” (Ex.2006, ¶270.)



(Ex.1010, Fig. 14)

For the annotated “high intensity subsection” **between** the two first subsections, Petitioner makes no valid proof, nor even attempts to prove, that this

region is a region “not including the other vehicle.” (Ex.2006, ¶271.)

Karlsson does not explain exactly which LEDs it chooses in response to a detected light source. Petitioner assumes Karlsson would block off vertical strips of LEDs by speciously assuming that Fig. 14 shows Karlsson’s response to detected light. (§VII.I.5.a(1), *supra.*; Ex.2006, ¶272.)

Now, Petitioner is also assuming, unsupportedly and unexplainedly, that those vertical strips would extend laterally far enough (i.e., in **horizontal** width) to **fully encompass** an oncoming vehicle, i.e., that the “first subsection” in the Fig. 14 above would be wide enough so that no portion of the vehicle would be contained in the central region. This assumption is made despite the fact that all Karlsson discloses how to detect is light. (Ex.2006, ¶273.)

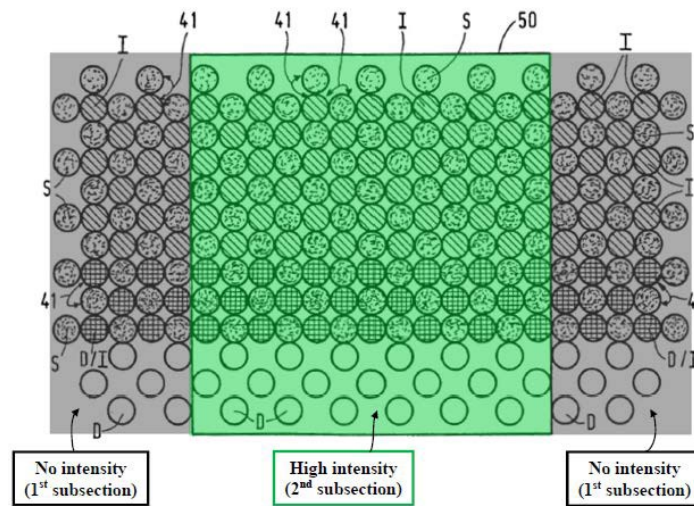
That interpretation, that Karlsson just happens to exclude all portions of a vehicle from the illuminated central portion, merely on the basis of detected light that Karlsson cannot even correlate to a vehicle, is unsupported on the record. Nor is there any proof of this shown in explanation or the figure. Petitioner never explains why or how the 1st subsection would fully encompass the vehicle, required for the 2nd subsection to “not include” the vehicle as claimed. (Ex.2006, ¶274.)

Thus, Petitioner fails to prove the presence of “determining illumination ... for at least a second subsection of the field-of-view not including the other vehicle”

and fails to prove that claim 26 is unpatentable – in a manner that extends across all sub-grounds of Ground 8.

b. Claim 65 — Petitioner Fails to Prove That Karlsson, Alone or In Combination, Teaches or Suggests “*determining illumination ... for one or more subsections, to either side of the first subsection*”

Claim 65.4 recites “determining illumination ... for one or more subsections, to either side of the first subsection.” Presumably this limitation is why Petitioner made the confusing statement, as part of its combined 26/65 analysis, that “Karlsson thus determines illumination for a different subsection outside of the detected vehicle (e.g., high intensity area **to either side of the first subsection**).” (Petition, 95.) But, the Figure, the only actual alleged **evidence** of the “to either side of the first subsection,” notably actually fails to show what it is alleged to show. (Ex.2006, ¶277.)



(Ex.1010, Fig. 14, Annotated by Petitioner)

Further, Petitioner has provided no suitable explanation that Fig. 14 is even the system of Karlsson functioning to provide selective illumination in the presence of detected light. (§VII.I.5.a(1), *supra.*; Ex.2006, ¶278.)

Petitioner never demonstrates with requisite evidence that illumination is being varied as claimed. (Ex.2006, ¶279.) For example, if Petitioner is correct about Fig. 14, then the **singular** window of light is never shown to exist on both sides of a detected vehicle. Karlsson never describes creating a plurality of such windows, and it is possible (for the sake of argument only, using Petitioner's explanation) that Karlsson simply uses this **single** window of light, shifting and shrinking/expanding it as more or less illumination is detected. (Ex.2006, ¶279.)

Accordingly, Petitioner fails to prove that claim 65 is unpatentable, a failure that extends across all sub-grounds of Ground 8.

c. Claim 27

Claim 27 depends from claim 26 and has thus not been proven unpatentable by Petitioner.

d. Claims 28/68 – Only Sub-ground 8D Includes Colored Light Sources and That Sub-ground is a Combination no POSA Would Have Made Due to Its Unpredictable Nature and Distracting Output

Petitioner relies on a combination of Harbers-Karlsson for the proof of claims 28/68, rendering any sub-grounds exclusively reliant on Karlsson alone inapplicable. (Ex.2006, ¶283.)

Combinations 8C and 8E lack any teaching of or capability to create color. (§VII.I.1-4, *supra*.) 8C uses Karlsson's light source, never been shown to emit color. (§VII.I.3-4, *supra*.) 8E merely curves Karlsson's array, also not resulting in color. (§VII.I.1, *supra*; Ex.2006, ¶284.)

Ground 8D is the only sub-ground where the colored LEDs of Harbers, relied on in Petitioner's explanation of claims 28/68, exist in the combination. That combination, however, suffers from the issues noted with respect to using singularly colored LEDs to achieve a color shifting. (§VII.I.2, *supra*; Ex.2006, ¶285.)

Accordingly, the sub-ground 8D constitutes a ground that no POSA would have been motivated to create or use in the manner proposed. For at least these

reasons, Petitioner has failed to prove the unpatentability of claims 28/68.
(Ex.2006, ¶286.)

e. Claims 29/69 – In Addition To The Shortcomings For Claims 28/29, Petitioner’s Argument Fails to Address Limitations of the Claims

(1) No POSA would have made the proposed combination

Claims 29/69 also call for colored illumination, and on this front all the deficiencies of the Karlsson-Harbers combinations from Claims 28/68 apply.
(§VII.I.5.d, *supra*; Ex.2006, ¶288.)

(2) Petitioner further fails to demonstrate how Karlsson-Harbers accommodates “sensed snow or fog.”

Additionally, Petitioner never proves the presence of “**sensed** fog or snow,” or any sensor capable of creating “[sensor] data including data indicating fog or snow.” Merely noting that certain beams of Harbers are created for use in fog or snow is insufficient to prove that any processor is determining illumination requirements that accommodate sensed fog or snow (claim 29) or that any sensor data indicates fog or snow (claim 69). These separate limitations are not argued differently, another fatal failure by Petitioner in failing to note the different requirements of the claims. (Ex.2006, ¶290.)

These shortcomings render this argument additionally deficient for a failing

in particularly with respect to claims 29 and 69. (Ex.2006, ¶291.)

f. Claims 30/31

Claims 30/31 depend from claim 26. Petitioner's failures to demonstrate the unpatentability of claim 26 extend to claims 30/31. Claims 30/31 have thus not been proven unpatentable by Petitioner. (Ex.2006, ¶293.)

J. Ground 9 – Karlsson-Harbers-Gotou Applied to Claims 32-36/70

Failings with respect to substantive proofs of unpatentability of claims 26/65 extend to claims 32-36/70 through dependency.

Sub-grounds (*see* §VI.I, *supra*):

9A	Karlsson_LEDs+Mod	Harbers_Software		Gotou
9B	Karlsson_Control		Harbers_Array	Gotou
9C	Karlsson_LEDs+Mod		Harbers_Curve	Gotou

1. The Inclusion of Gotou Does Not Remove the Noted Problems with the Combination of Karlsson-Harbers

Initially, none of the shortcomings of the various imported sub-grounds 8C-8E from Karlsson-Harbers are cured by including Gotou, and some are amplified as noted below. So, for at least the reasons already presented, all sub-grounds would not be combinations a POSA would have made. (§VII.I.1-4, *supra*; Ex.2006, ¶296.)

In sub-ground 9B where colored LEDs are utilized with Gotou, any change

to a beam that allegedly “increases” the light or changes the light to illuminate a curve is going to potentially change the color of the beam as well, because certain outer colored LEDs would be utilized in the presence of a turn, simply based on their placement (assuming the combination could even achieve the function as Petitioner contends). Petitioner never recognizes or addresses this issue, and this is yet another reason why a person would not be motivated to utilize the colored LEDs of Harbers in a Gotou strategy that allegedly attempts to accommodate a curve or turn through changes or increases to illumination. This would only serve to create additional unpredictable usages of colored LEDs in the proposed combination. (Ex.2006, ¶297.)

Accordingly, there are no grounds that should actually survive to address claims 32-36/70. However, additional shortcomings will be proven with respect to all grounds. (Ex.2006, ¶298.)

2. Karlsson’s Strategy to Utilize All LEDs for High Beam Illumination, Except When Preventing Glare, Leaves No Light Remaining to Be Controlled or Increased Into a Curve or Turn

As noted in the description of Karlsson above, and as Petitioner’s proposed interpretation of Karlsson’s Fig. 14 supports, Karlsson’s general strategy is to operate optimally at all times, leaving nothing left to be determined for a curvature (claims 32), to be determined for a turn (claims 33, 35) and certainly nothing left to

be “increased” (claims 34, 36, 70). Further, Petitioner’s usage of Karlsson’s array for claims 26/65 as a maximally illuminating array (except when selectively dimmed), carries forward to these claims via dependency. The elements of those claims are part of these claims, and the array is never explained to function differently — i.e., in a manner whereby some number of unused LEDs would remain for achieving claims 32-36/70. (Ex.2006, ¶299.)

**a. Claims 32/33/35 – The Inclusion of Gotou
Would Be Recognized as Superfluous by a
POSA and The Combination Would Not Have
Been Made**

These claims recite determining illumination for an upcoming curve (32) or turn (33, 35). Gotou is introduced as providing this determination, but the determination is superfluous, as there is nothing Karlsson could do to comply with any change desired by Gotou, when operating as proposed by Petitioner for claim 26. (§VII.I.5.a(2), *supra*; Ex.2006, ¶300.)

Thus, no POSA would have been motivated to include the system of Gotou only to make a determination with which Karlsson-Harbers can do nothing. (Ex.2006, ¶301.)

Further, when Petitioner argues that Karlsson would “direct light of the spotlight beams appropriately,” that is an explanation devoid of substantive evidence or reasoning. (Petition, 130.) Petitioner never explains how Karlsson-

Harbers is doing this or which combination of which sub-ground is doing this, or, for that matter, which controllable system is doing this, in combinations 9A and 9C, which both have multiple controllable systems — LED array 2 and modulator 3. This is a fatal failing in particularity. (§VII.A.3, *supra*; Ex.2006, ¶302.)

Petitioner now has three varied functions that are all apparently just simply supposed to work in concert — Harbers’ beam segmentation, Karlsson’s selective dimming, and now Karlsson-Harbers re-direction of illumination into a curve based on Gotou’s information. (Ex.2006, ¶303.)

There are a multitude of possible problems resulting from the contemporaneous use of three proposed control functions that were never designed to be used in concert. A massive degree of experimentation would be required to even have a system that functioned in an acceptable manner, assuming such a system even existed — one is certainly never explained. Petitioner never even addresses the existence of these problems, let alone tries to provide a solution to even a single one. (Ex.2006, ¶304.)

Given the multitude of possible situations arising from systems that purportedly individually accommodate varied instances of weather, curves, turns and traffic, all features that are highly prevalent on roads and which thus occur in almost limitless combinations, any POSA seeking to make a combination of Karlsson-Harbers, let alone Karlsson-Harbers-Gotou, would have needed to

understand and adapt the system to deal with all the likely scenarios — an absurdly complex undertaking when working with three systems not actually designed to work with each other and none of which had built in accommodation of un-contemplated alternative control functions. Yet Petitioner simply combines all the parts and assumes that the system is just going to work (Ex.2006, ¶305.).

Accordingly, the highly unpredictable combination is not a combination a POSA would have made, regardless of which embodiment of Karlsson-Harbers were combined with Gotou. This is at least yet another reason why Petitioner fails to prove the unpatentability of claims 32, 33 and 35. (Ex.2006, ¶306.)

b. Petitioner Additionally Fails to Demonstrate the Presence of An Upcoming Turn Indicated By Sensor Data

In claims 33 and 35, the upcoming turn is claimed to be “indicated by the sensor data.” Petitioner argues that this is taught by Gotou — making a statement that “illumination is controlled along the ‘planned running direction’” that, for some unexplained reason, cites Patent Owner’s Patent. (Petition, 132; Ex.2006, ¶307.)

Whether a “planned running direction” indicates an upcoming “turn” (not curve) and how that “planned running direction” results from sensor data is never explained. (Ex.2006, ¶308.)

Part of the problem is that Petitioner tried to deal with claims having

different limitations all at the same time, without ever addressing those different limitations. (Ex.2006, ¶309.)

“What is never explained, for example, is where or how the “intended direction of the driver” or “planned running data” is indicated by **sensor data** as claimed. Karlsson’s steering sensor only functions when the vehicle is already being turned, and is useless for indicating “an **upcoming** turn,” and there is no evidence presented that Karlsson’s light sensor can somehow “see” curves or turns ahead. Those sensors are the only sensors ever actually noted by Petitioner. (*Id.*, 131). No proof is provided or explained for how any “sensor” of Karlsson indicates an “upcoming” turn. (Ex.2006, ¶310.)

For this additional reason, Petitioner fails to prove the unpatentability of claims 33 and 35.

c. Claims 34/36/70 – Petitioner Does Not Explain How Karlsson’s Maximum Illumination Usage can Be Further Used to “Increase” Illumination

Claims 34, 36 and 70 all recite “determining illumination that **increases** illumination” of either an upcoming turn (34, 36) or road curve (70). With this additional requirement, the combinations of Karlsson-Harbers-Gotou now have an additional problem meeting the limitations of the claims. (Ex.2006, ¶311.)

The claims now call for an express “increase” in illumination, and as Patent Owner has noted, and as Petitioner’s argument in 26.5 supports, the LEDs are

already maximally utilized by Karlsson's strategy. Therefore, under any situation where illumination is not detected, there is nothing remaining to increase. (Ex.2006, ¶312.)

For this additional reason, Petitioner fails to prove the unpatentability of claims 34/36/70.

d. Claims 34/36/70 – Petitioner Does Not Even Address The Requirement to “Increase” Illumination

Claims 34, 36 and 70 all recite “determining illumination that **increases** illumination” of either an upcoming turn (34, 36) or road curve (70). Nothing in the explanation for claims 32/36/70, all addressed collectively, even remotely attempts to mention or discuss “increased” illumination as required by claims 34, 36 and 70. (Ex.2006, ¶313.)

This is an additional shortcoming in particularity, fatal in Petitioner's failure to address the claimed feature and/or explain why such a feature was otherwise inconsequential. (Ex.2006, ¶314.)

For this additional reason, Petitioner fails to prove the unpatentability of claims 34/36/70.

K. Ground 10 – Karlsson-Harbers-Braun Applied to Claims 66/67

Petitioner's failings of proof with respect to claim 65 extend to claims 66/67

through dependency.

Sub-grounds (*see* §VI.J, *supra*):

10A	Karlsson_LEDs+Mod	Harbers_Software		Braun
10B	Karlsson_Control		Harbers_Array	Braun
10C	Karlsson_LEDs+Mod		Harbers_Curve	Braun

1. The Inclusion of Braun Does Not Remove the Noted Problems with the Combination of Karlsson-Harbers

Initially, none of the shortcomings of the various imported sub-grounds 8C-8E from Karlsson-Harbers are cured by including Braun. So, for at least the reasons already presented, all sub-grounds would not be combinations a POSA would have made. (VII.I.1-4, *supra*; Ex.2006, ¶317.)

In sub-ground 9B where colored LEDs are utilized with Braun, any utilization of a beam to “spotlight” a person or sign will potentially use colored LEDs, possibly even a single colored LED. (Ex.2006, ¶318.) Petitioner never recognizes or addresses this issue, never explaining which LEDs would be used when, but this is yet another reason why a person would not be motivated to utilize the colored LEDs of Harbers in a strategy that now additionally and unpredictably creates “spotlights” in the scene. This would only serve to create additional unpredictable usages of colored LEDs in the proposed combination. (Ex.2006, ¶318.)

Accordingly, there are no grounds that should actually survive to address

claims 66/67. Out of an abundance of caution, however, additional shortcomings will be proven with respect to all grounds. (Ex.2006, ¶319.)

2. Karlsson’s Strategy to Utilize All LEDs for High Beam Illumination, Except When Preventing Glare, Leaves No Light Remaining to Be Used for “Spotlighting”

Karlsson is already fully utilizing its array, leaving no LEDs left to utilize to “illuminate” anything, as Braun is stated to do. (Petition, 136.) Thus, the combination at best results in an unusable determination of the presence of a person or sign. Accordingly, no POSA would have been motivated to combined Braun with Karlsson-Harbers as contended, all additional determinations would be extraneous at best. (Ex.2006, ¶320.)

3. Petitioner Fails To Explain How the Proposed System Would Function — Including Which Control Strategies Would Control Which Controllable Systems

Once again, Petitioner fails to note, let alone address, which control function, Karlsson, Harbers or Braun, would be given primacy, as with Beam-Thominet-Braun or how the three control functions would otherwise interact in scenarios where at least two control functions demanded contradictory results. (§VII.A.2.a, *supra*.) Nor does Petitioner, in this case, describe which functions are controlling which of the two (LED array 2, modulator 3) controllable light-related systems of the proposed combination. (§VII.A.3, *supra*; Ex.2006, ¶321.)

Karlsson has two controllable systems to control light, the source array 2 and the modulator 3 and three discrete control functions are presented in a single combination. None were designed with the others in mind. All except Karlsson were designed to work with an LED array alone. Petitioner never explains, for example, whether Karlsson would control the LED array or the SLM, whether Harbers strategy would be implemented with the LED or SLM, and/or whether Braun's strategy would be implemented with the LED or SLM. Both control systems control the same ultimate light output, so an understanding of which strategy is controlling what, as well as which strategies have primacy or how they otherwise interact, is necessary for any combination, and none of this is ever even noted by Petitioner, let alone explained. The combination has not been explained with any functional particularity, and moreover all the conflicts are clear motivations not to combine these systems. (Ex.2006, ¶322.)

4. A Person of Ordinary Skill in the Art Would Not Have Been Motivated to Combine Braun With Karlsson-Harbers Because of the Conflicting Strategies

In addition to a lack of explanation about the particulars of implementing control strategies, Petitioner never addresses the conflicts from combining three control strategies with two controllable light-related systems. The various strategies will attempt to control elements in conflicting manners, having different

desired outcomes and being responsive to discrete variables — e.g., Karlsson may instruct vertical blanking of a region (under Petitioner's solution) where Braun instructs illumination of a person or sign. (Ex.2006, ¶323.)

No POSA would have undertaken the task of combining all these elements with such conflicting control plans as part of a combined strategy, without understanding and addressing the conflicts, two required undertakings never presented in the Petition. Moreover, it is not clear, and unexplained, how these conflicts even result in a functional system. (Ex.2006, ¶324.)

For these additional reasons, Petitioner presents unmotivated combinations, leaving no suitable combination usable to demonstrate alleged unpatentability of claims 66-67. (Ex.2006, ¶325.)

VIII. Conclusion

In light of the remarks herein, Patent Owner respectfully requests that the Board finds all challenged claims not unpatentable.

Dated: October 12, 2023

Respectfully submitted,

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Patent No.: 10,894,503

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Certificate of Service

The undersigned hereby certifies that on October 12, 2023, a complete and entire copy of **PATENT OWNER'S RESPONSE and all exhibits**, 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 13,971 words, excluding the parts of the paper exempted by §42.24(a).

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