

Platinum” in 2008 and “First full LED headlamp with AFS functions Audi A8” in 2010. (Ex. 5 at 1; Ex. 6 at 1; Ex. OTH-A at ¶62.)

It bears emphasis that prior to solving the issue of image detection, adaptive lighting technology that correlated the LED controls to coordinate-specific image detection was not feasible. (Ex. OTH-A at ¶63.)

B. Harbers

Harbers, U.S. Patent. No. 6,406,172 (Ex. PA-B, “Harbers ‘172”), is directed to a headlamp and dynamic lighting system with a light source comprising a plurality of opto-electronic elements, preferably LEDs. In Harbers, the

spatial distribution of the light beam generated by the light source is continuously adjustable... Preferably, the spatial distribution is influenced by the speed of the vehicle, the rotational position of the steering wheel of the vehicle, the weather conditions, and it can also be influenced by the driver. Preferably, the spectral characteristics of the light beam generated by the light source depend on the position in the light beam. The light beam comprises at least two beam segments having essentially different spectral characteristics.

(Ex. PA-B at Abstract, numerical identifiers omitted; Ex. OTH-A at ¶64.)

Though Harbers is continuously adjustable by the driver or in response to a specific set of defined inputs, Harbers doesn’t disclose any sensor capable of detecting objects or targets in the illuminated area. (Ex. OTH-A at ¶65.)

As Stam lays out in his declaration,

[p]rior to the development of image detection systems--such as the kind disclosed in the ‘573 Family of Patents and Stam PCT— headlamp systems employed auto high beam technology that generally relied on photodiode sensors, where any incident light would activate the photodiode sensors and cause the headlamp to unnecessarily switch from high beam to low beam. As pointed out in the ‘573

Family of Patents and Stam PCT, the inability to discriminate between light sources minimized the effectiveness of prior art auto high beam technology.

(Ex. PA-D at 1:65 -14:3; Ex. OTH-A at ¶66.)

Similarly, prior to the image detection systems disclosed in the '573 Family of Patents, continuously variable headlamps would aim the headlamp in the same direction as steered wheels and/or increase illumination range in proportion to vehicle speed, providing variability but not in reaction to the presence of oncoming or preceding vehicles. (Ex. PA-C at 2:22-24; Ex. OTH-A at ¶66.)

VI. Overview of the '551 Patent

A. Prosecution History

U.S. Patent Application No. 13/357,549 (“the ‘549 application”) that resulted in the '551 Patent was filed on January 24, 2012 and claims priority as a Continuation-In-Part to U.S. Patent Application No. 10/604,360, filed July 14, 2003, which was granted as US 8,100,552 on January 24, 2012, now lapsed, which claims benefit to U.S. Provisional Application No. 60/395,308, filed on July 12, 2002 and U.S. Provisional Application No. 61/535,981, filed on October 17, 2011. Notably, the patent applicant, Mr. Spero handled the prosecution of the '551 Patent on his own in as a *pro-se* applicant as mentioned in, for example, the Reply to Non-Final Office Action dated August 13, 2017 and the Reply to Office Action dated June 23, 2015.

In the first non-final action, mailed on October 10, 2014, all claims 1-26 were rejected. Claim 4 was rejected under 35 U.S.C. §112, sixth paragraph. (Non-Final Office Action, dated October 10, 2014, pp. 2-5.) Claim 4 was also rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. (Non-Final Office Action, dated October 10, 2014, pp. 5-6.) Claims 20 and 25 were rejected under 35 U.S.C. §112, second

paragraph, as being indefinite. (Non-Final Office Action, dated October 10, 2014, pp. 6-7.) Claims 1-3, 5-24 and 26 were rejected under 35 U.S.C. 102(b) as being anticipated by Spero et al, US 2004/0105264 (“Spero”). (Non-Final Office Action, dated October 10, 2014, pp. 7-17.) Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Spero in view of Kiyohara et al, US 2006/0222213 (“Kiyohara”). (Non-Final Office Action, dated October 10, 2014, pp. 18-19.) Claim 25 was rejected under 35 U.S.C. §103(a) as being unpatentable over Spero in view of Savage et al, US 2004/0138726 (“Savage”). (Non-Final Office Action, dated October 10, 2014, pp. 19-20.)

A response was filed on January 12, 2015, but the claims were not entered pursuant to a Notice of Non-Compliant Amendment mailed January 15, 2015. A subsequent claim set was filed and entered on March 16, 2015, amending claims 16, 20 and 25. Claim 16 was amended to add the letter “n” to the word “and.” (Amendment dated March 16, 2015, p. 6.) Claim 20 was amended to change “feeding information to a controller” to “transferring information to a controller,” to change “a controller” to “where said controller,” and to change “for adjusting” to “adjusts.” (Amendment dated March 16, 2015, p. 6.) Claim 25 was amended to delete “SAD and other” and add “selected from the group consisting of seasonal affective disorder, sleep disorders, circadian rhythm disorders, delayed sleep phase syndrome, vitamin D deficiency and skin disorders” after “disorders” (previously modified by the now-deleted “SAD and other”). (Amendment dated March 16, 2015, p. 8.)

Another non-final action was mailed on June 23, 2015, in response to the Amendment dated March 16, 2015. Claim 7 was rejected/objected to for antecedent basis reasons under 35 U.S.C. §112. (Non-Final Office Action, dated June 23, 2015, p. 2.) Claims 1 and 3 were rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan et al., US 2002/0047628 (“Morgan”)

in view of Lys et al., US 2002/0047646 (“Lys”). (Non-Final Office Action, dated June 23, 2015, pp. 3-4.) Claim 2 was rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan and Lys in view of Amerson et al., US 6,379,022 (“Amerson”). (Non-Final Office Action, dated June 23, 2015, p. 4-5.) Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan and Lys in view of Kinjo et al., US 2002/0046100 (“Kinjo”). (Non-Final Office Action, dated June 23, 2015, pp. 5-6.) Claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan and Lys in view of Zampini et al., US 2008/0136356 (“Zampini”) and Bolle et al., US 5,546,475 (“Bolle”). (Non-Final Office Action, dated June 23, 2015, pp. 6-8.)

Independent claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan in view of Amerson. (Non-Final Office Action, dated June 23, 2015, pp. 8-9.) Claim 7 was rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan and Amerson in view of Chang et al., US 2002/0039238. (Non-Final Office Action, dated June 23, 2015, pp. 9-10.)

Claims 8-17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan in view of Lys and further in view of Amerson. (Non-Final Office Action, dated June 23, 2015, pp. 10-18.) Claims 18-19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan in view of Lys in view of Amerson and further in view of Lemelson et al., US 5,983,161. (Non-Final Office Action, dated June 23, 2015, pp. 18-19.)

Claims 20-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan in view of Lys. (Non-Final Office Action, dated June 23, 2015, pp. 20-25.) The Examiner found arguments with regards to claims 1-26 persuasive but entered new grounds of rejection as indicated hereinabove. (Non-Final Office Action, dated June 23, 2015, pp. 25-26.)

A response was filed on September 23, 2015. Claim 7 was amended to include the language “wherein one or more light sources are directional” in response to the pseudo-§112

rejection noting the antecedent basis issue as noted hereinabove. (Amendment dated September 23, 2015, p. 3.) No other amendment was made.

A final rejection was mailed on October 5, 2015. This rejection reiterated all the prior rejections of the Non-Final Action of June 23, 2015, as noted hereinbelow and cited hereinabove, with the exception of the pseudo-§112 rejection for antecedent basis of claim 7.

Claims 1 and 3 were rejected under 35 U.S.C. §103(a) as unpatentable over Morgan in view of Lys. (Final Office Action, dated October 5, 2015, pp. 2-4.) Claim 2 was rejected under 35 U.S.C. §103(a) as unpatentable over Morgan in view of Lys and further in view of Amerson. (Final Office Action, dated October 5, 2015, p. 4.) Claim 4 was rejected under 35 U.S.C. §103(a) as unpatentable over Morgan in view of Lys and further in view of Kinjo. (Final Office Action, dated October 5, 2015, pp. 5-6.) Claim 5 was rejected under 35 U.S.C. §103(a) as unpatentable over Morgan in view of Lys and further in view of Zampini and Bolle. (Final Office Action, dated October 5, 2015, pp. 6-7.)

Claim 6 was rejected under 35 U.S.C. §103(a) as unpatentable over Morgan in view of Amerson. (Final Office Action, dated October 5, 2015, pp. 7-8.) Claim 7 was rejected under 35 U.S.C. §103(a) as unpatentable over Morgan in view of Amerson and further in view of Chang and Lys. (Final Office Action, dated October 5, 2015, pp. 8-10.)

Claims 8-17 were rejected under 35 U.S.C. §103(a) as unpatentable over Morgan in view of Lys and further in view of Amerson. (Final Office Action, dated October 5, 2015, pp. 10-17.) Claims 18-19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan in view of Lys and further in view of Amerson and Lemelson. (Final Office Action, dated October 5, 2015, pp. 17-19.)

Claims 20-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Morgan in view of Lys. (Final Office Action, dated October 5, 2015, pp. 19-25.)

Applicant filed a response after final on February 5, 2016, including amendments to claims 1, 3, 5, and 6-8 and cancellation of claim 9. This response received an Advisory Action on Feb. 26, 2016, indicating non-entry of the Amendment.

Applicant thereafter filed an RCE on May 26, 2016. The amendment included with the RCE amended claim 1 as follows: 1) Revision of “An illuminating device which produces light to meet an illumination requirement of an illuminated area...” to “A light fixture for illuminating an area to be lit capable of automatically meeting specific illumination requirements of difference sub-areas within the area to be lit...”; 2) Revision of “a light fixture including multiplicity of directional light sources, including at least two light sources pointing in different directions...” to “a multiplicity of independently controllable light sources, including at least two light sources of directional light output, such that each said source substantially illuminates a different sub-area within the area to be lit...”; and 3) Revision of “one or more detectors for sensing at least one of objects, surfaces and people within the illuminated area to be lit...” to “one or more detectors for sensing at least one of objects, surfaces and beings within the area to be lit including the specific sub-area location information...” (Amendment dated February 05, 2016, p. 2.)

Claim 3 was amended to change “wherein the controller taking into considerations the area...” to read “wherein the controller taking into considerations the intensity variations over the area...” (Amendment dated February 05, 2016, p. 3.)

Claim 5 was amended to change “detect an identity of one or more foods...” to “detect an identity of one or more foods in a sub-area.” (Amendment dated February 05, 2016, p. 3.)

Claim 6 was amended to change “one or more cameras placed on the structure for detecting information...” to “one or more cameras placed on the structure for detecting coordinate-specific information...” (Amendment dated February 05, 2016, p. 4.)

Claim 7 indicated an amendment, but no amendment is apparent from the record. (Amendment dated February 05, 2016, p. 4.)

Claim 8 was amended to make the following changes: 1) Addition of “where different sub-areas of the illuminated area need to be illuminated at a different intensity and/or at a different spectrum than another sub-area of the illuminated area...” to the preamble; 2) Addition of “thereby illuminating different sub-areas of the illuminated area...” to the first limitation of the claim; Addition of 3) “according to best-practice standards” following “upon calculating the required illumination parameters...”; and 4) Addition of “that illuminates the specific sub-area...” following “the controller to adjust the directional light sources...” at the end of the claim. (Amendment dated February 05, 2016, p. 5.)

Claim 9 was cancelled and the remaining claims were renumbered and amended to adjust their dependency based on the renumbering. (Amendment dated February 05, 2016, pp. 5-8.) The Advisory Action also advised that this renumbering should not have occurred, although subsequent Examination appears to have relied on the renumbering. (*See, e.g.,* Index of Claims dated August 15, 2016.)

Another Non-Final Rejection was issued on August 15, 2016. This rejection objected to claim 1 which was missing the word “and,” to the use of “claim 20” in claims 20, 21 and 25, where “claim 19” should have been used, the use of “One” instead of “one” in claim 21, and the use of “claim 21” in claims 22-24, where “claim 20” should have been used. (Non-Final Office Action, dated August 15, 2016, p. 2.)

Claims 1-2, 5-7, 19 and 21-25 were rejected under 35 U.S.C. §102(e) as being anticipated by Kuhlman et al. 2012/0287493 (“Kuhlman”). (Non-Final Office Action, dated August 15, 2016, pp. 3-7.) Claims 8-18 were allowed, and claims 3-4 and 20-24 were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. (Non-Final Office Action, dated August 15, 2016, p. 7.)

An amendment was filed on January 16, 2017. The amendment amended claim 1 to add the word “and” as required by the Examiner. (Amendment dated January 16, 2017, p. 2.) The amendment further addressed the remaining numbering objections as noted above, without further substantive amendment to the claims. (Amendment dated January 16, 2017, pp. 7-8.)

A further Non-Final Rejection issued on May 1, 2017. One claim objection was noted, namely in claim 19, objecting to “a where said controller for adjusting adjusts” and indicating that this should be changed to “wherein said controller for adjusting...” (Non-Final Office Action, dated May 1, 2017, p. 2.) Objection was also made to the drawings as requiring a showing of “power and control device elements” as recited in claim 6. (Non-Final Office Action, dated May 1, 2017, p. 2.) Claims 19 and 25 were rejected under 35 U.S.C. §102(e) as being anticipated by Mueller et al., 2004/0052076 (“Mueller”). (Non-Final Office Action, dated May 1, 2017, pp. 3-5.) Claims 1-5 and 8-18 were indicated allowable. Claims 6-7 were indicated allowable subject to correction of the objection. Claims 20-24 were indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. (Non-Final Office Action, dated May 1, 2017, p. 5.)

An amendment was filed on August 1, 2017. The amendment amended claim 19 to correct the objection noted above, by changing “a where said controller for adjusting adjusts” to “wherein said controller for adjusting, adjusts...” (Amendment dated August 1, 2017, pp. 6-7.)

A Final Office Action was issued on August 11, 2017. An objection to the word “a” in line 6 of claim 19 was included. (Final Office Action, dated August 11, 2017, p. 2.) Claims 19 and 25 remained rejected under 35 U.S.C. §102(e) as being unpatentable over Mueller. (Final Office Action, dated August 11, 2017, pp. 2-5.) Claims 1-18 were indicated allowed, and claims 20-24 were indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. (Non-Final Office Action, dated May 1, 2017, p. 4.)

An Interview was held on November 13, 2017, as indicated by an Applicant-Initiated Interview Summary mailed on November 16, 2017. The summary indicated that a proposed amendment would overcome Mueller. (Interview Summary dated November 16, 2017.)

A Response After Final was filed on November 13, 2017, the same day as the Interview above. The response amended claim 19 to: 1) Change the preamble from “an automated irradiating device for providing radiation to individuals within an area, intended to provide a desired radiation in a sub-area proximate to the individuals, comprising...” to “an automated irradiating device for providing a desired radiation to individuals within an area, comprising...”; 2) Change “an irradiation fixture including one or more directional radiation sources where the radiation is in a defined direction” to “at least two substantially directional heat radiation sources pointing in different directions”; 3) Change “feeding transferring” to “transferring”; 4) Strike an occurrence of “a,” “(i),” and “(ii)”; and 5) Add “the automated irradiating device further comprising one detector being a camera with capability for transferring data to the processor arranged with image recognition algorithms for sensing any of the information selected from the list comprised of: a presence, an identity, a location, a position, an activity, and a body temperature of an individual; the controller having processing capability for using the information and determining the heating requirements of the individuals from at least one of (i) algorithms to calculate radiation parameters,

(ii) stored data of heating practices, and (iii) the identified individual's stored personal preferences;..."

A Notice of Allowance was mailed on December 19, 2017 and the Issue Fee was paid on March 18, 2018.

B. Summary of the '551 Patent

The '551 Patent, entitled "Detector Controlled Illuminating System," issued on April 24, 2018 to inventor Yechezkal Evan Spero and is unassigned. The application which led to the '551 Patent was filed on January 24, 2012, with a priority date of July 12, 2002. (Ex. PAT-A; Ex. OTH-A at ¶39.)

In contrast to the Stam '573 Family of Patents, the Spero '551 Patent introduced a system "built around a 'digital' light source":

The system is built around a "digital" light source. That is, the emanating lighting effect is the sum of the characteristics of a multiplicity of discretely controllable "digit" sources. **The difference between the individual 'digit' light sources and their summation manifests itself in the resultant light characteristic,** be in its intensity, spatial intensity distribution, spectral energy content and spectral intensity distribution. All of these characteristics are also variable with time.

(Ex. PAT-A at 16:39-46, emphasis added; Ex. OTH-A at ¶39.)

The '551 Patent discloses numerous flexible applications for this digital light source, centered around the "controllability offered by breaking the light output up into discrete specifically aimable and dimmable elements," which can be addressed by control electronics to effect intensity, spectrum and distribution." (Ex. PAT-A at 24:37-47; Ex. OTH-A at ¶41.) For headlights, the disclosures identify yet another level of control:

[t]he flexible characteristics of the DLF [digital lighting fixture] allow for spatial

variations of the intensity and spectral power distribution of the light over the area covered. When the element of variation of intensity and SPD [spectral power distribution] with time over the area covered is introduced another dimension of flexibility is introduced. These properties are unique to the DLF and allow them to deal with dynamic lighting situations in a way not afforded by prior-art lighting devices.

(Ex. PAT-A at 57:24-37; Ex. OTH-A at ¶41.)

The ‘551 Patent further explains how the “digital aspect” of the illuminating devices gives rise to “control capability” for individual LEDs or selectable groups of LEDs:

The multiple light sources of specific characteristics provide quanta of power and spectrum which are smoothly added or detracted to generate a changed lighting effect. The digital aspect arises from the sufficient progression of values, varying by minutes to produce a continuum so as to be non-discernable or irrelevant to the user. The added controllability is realized by **breaking up the light-production, into discrete, specifically aimable, and dimmable elements** which can be addressed by control electronics for the purpose of affecting the intensity, spectrum and spatial distribution of spectrum and of intensity of the illumination provided by the luminaire of the present invention.

The overall combination of control capability and discrete light sources yields a digital lighting fixture. The 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.

(Ex. PAT-A at 2:51-3:3, emphasis added.)

The ‘551 Patent also teaches how various applications can obtain a synergistic effect from the controllability offered by “discrete specifically aimable and dimmable elements” and image detection “devices capable of detection changes in the surrounding environment” “so as to provide

the optimal lighting solution in real-time.” (Ex. PAT-A at 57:32-37; Ex. OTH-A at ¶43.) By way of example, the ‘551 Patent discloses:

Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today.

(Ex. PAT-A at 51:43-49; Ex. OTH-A at ¶43.)

More particularly, the ‘551 Patent teaches how “[a]nalysis by a detector or an imaging system of the oncoming vehicles [*sic*] position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.” (Ex. PAT-A at 52:62-65.)

The ‘551 Patent further discloses glare-free adaptive driving beam systems:

[u]sing color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of “task lighting” and use the controller and properly aimed SLS [solid state light source, e.g. LED] to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.

(Ex. PAT-A at 52:66 – 53:4.)

These teachings are reflected in base claim 6 and the new reexamination claims, claims 24-87. See, claim 6 and claims 24, 32 and 56 below, which are representative of the new reexamination claims. The full set reexamination claims can be found at Ex. OTH-C, New Claims.

6. *An illuminating device having automatic control of the light provided to an illuminated area comprising:*
a structure for incorporating illuminating device elements;

one or more light sources incorporated in the structure and in communication with a power source;

electronic circuitry apparatus for the controlled powering of the light source and other illuminating device elements; one or more cameras placed on the structure for detecting coordinate-specific information about the illuminated area, said camera in communication with power and control device elements;

a controller integrated with the structure, in communication with the light source controlling power circuitry, said controller arranged to processes the information communicated from the camera and automatically control the light provided to the illuminated area.

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

a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;

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

electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;

one or more processors;

one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

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

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

determine first coordinates corresponding to an other vehicle, based on the coordinate-specific information;

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

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

32. *An illuminating device having automatic control of light provided to an illuminated area comprising:*

a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;

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

electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;

one or more processors;

one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area and positioned to capture an image of at least one target, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

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

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

create a beam of diminished illumination illuminating at least a portion of the at least one target with non-glaring illumination, created within a broader field of illumination having

different intensity than the beam, by one or more changes to characteristics of first light of a cluster of the LEDs providing the first light directed at the at least a portion and creating the beam, the beam diminished in intensity relative to the broader field of illumination illuminating at least above and on both sides of the beam; and

follow, based at least in part on data from one or more of the cameras, the at least one target with the diminished illumination as the at least one target changes location relative to the motor vehicle.

56. *An illuminating device having automatic control of light provided to an illuminated area comprising:*

a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;

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

electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;

one or more processors;

one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area and positioned to capture an image of at least one other vehicle ahead of the motor vehicle, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

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

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

determine, based on data from one or more of the sensors, a vertical and horizontal position associated with the at least one other vehicle;

select a first cluster of the LEDs based at least in part on at least one of the vertical and horizontal position compared to known aimings of light associated with the first cluster; and reduce intensity of illumination to non-glaring illumination of a first area associated with the at least one other vehicle, relative to intensity of illumination on both sides of the first area at elevations common with the first area illuminated by a second cluster of the LEDs, by control of emission from the first cluster.

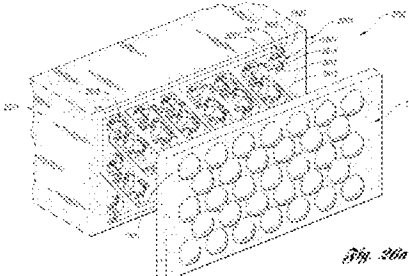
VII. 37 C.F.R. §1.510(b)(1): Statement Establishing Substantial New Question of Patentability (“SNQ”) of Claim 6 of the ’551 Patent

A. The Stam PCT and Harbers Combination Fails to Teach Numerous Limitations

The combination of Stam PCT and Harbers raises a substantial new question of patentability, as neither prior art reference was previously considered in the underlying prosecution of the ’551 Patent. While Patent Owner and inventor Mr. Spero, a *pro se* patent applicant, identified Stam ‘632 in the specification, neither Stam PCT nor Harbers were considered in the underlying prosecution of the ’551 Patent, let alone the combination of the two references. Furthermore, the disclosures of Stam PCT and Harbers are not cumulative to information considered by the examiner during prosecution of the ’551 Patent. Notably, the Stam PCT disclosure includes different subject matter than the Stam ‘632, in particular with respect to the relevant LED embodiments.

As seen in the table below, claim 6 includes several limitations in common with the teachings disclosed in Stam PCT and Harbers such that a reasonable examiner would consider the teachings of Stam PCT and Harbers to be important in the consideration of patentability. However, it is the position of the Patent Owner that while the combination of teachings from Stam PCT and Harbers raises a substantial new question of patentability, these references does not render claim 6 unpatentable.

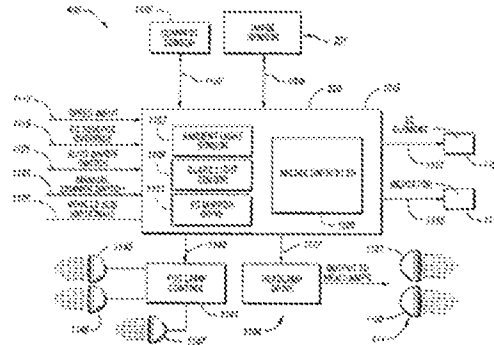
Claim 6 (original)	Stam PCT and Harbers
6. An illuminating device having automatic control of the light provided to an illuminated area comprising:	<u>Stam PCT</u>- “A system and method of automatically controlling exterior vehicle lights ... to maximize the illuminated area in front of the vehicle.” (Ex. PA-A at Abstract)
a structure for incorporating illuminating device elements;	<u>Stam PCT</u>- “The present invention pertains to control systems for controlling the exterior lights of a vehicle and components that can be used with such a control system.” (Ex. PA-A at 1.) “As noted above, such exterior lights may include headlamps, tail lights, foul weather lights such as fog lights, brake lights, center-mounted stop lights (CHMSLs), turn signals, back-up lights, cargo lights, puddle lights, license plate illuminators, etc.” (<i>Id.</i> at 10) See Fig. 1. <u>Harbers</u>- “The invention relates to a vehicle headlamp comprising a light source which includes a plurality of opto-electronic elements. The invention also relates to a vehicle provided with a headlamp.” (Ex. PA-B at 1:10-15.)
one or more light sources incorporated in the structure and in communication with a power source;	<u>Stam PCT</u>- “LED headlamp 2600 includes a heat extraction member 2601 that serves as a support for mounting semiconductor optical radiation emitters 2603, 2605. Where the semiconductor optical radiation emitters 2603, 2605 are electrically connected to the heat extraction member, the heat extraction member provides an electrical connection to the semiconductor optical radiation emitters. . . during operation.” (Ex. PA-A at 74.) See Figs. 26a and 26b. <u>Harbers</u>- “The use of a plurality of opto-electronic elements with a relatively high luminous flux enables a vehicle headlamp to be manufactured having much more dynamic lighting possibilities than the known vehicle headlamp. The opto-electronic elements can be switched on and switched off, with the spatial distribution of the generated light beam depending on the conditions.” (Ex. PA-B at 2:6-12.)

Claim 6 (original) <i>electronic circuitry apparatus for the controlled powering of the light source and other illuminating device elements;</i>	Stam PCT and Harbers <u>Harbers-</u> The use of a plurality of opto-electronic elements [LEDs] with a relatively high luminous flux enables a vehicle headlamp to be manufactured having much more dynamic lighting possibilities than the known vehicle headlamp. (Ex. PA-B at 2:6-9.) The ordering, providing and selectively switching on and off of opto-electronic elements... in the form of an array may also be considered as an invention itself. (<i>Id.</i> at 7:20-21.)
<i>one or more cameras placed on the structure for detecting coordinate-specific information about the illuminated area, said camera in communication with power and control device elements;</i>	Stam PCT- "The control system comprises an image array sensor including a plurality of pixels, an optical system configured to image the scene forward of the controlled vehicle onto the image array sensor, the optical system including a forwardmost surface, and a control circuit for processing the image of the scene obtained from the image array sensor and for controlling the exterior lights in response to objects detected in the processed scene." (Ex. PA-A at 2-3.)  <i>Fig. 26a</i>
<i>a controller integrated with the structure, in communication with the light source controlling power circuitry, said controller arranged to processes [sp] the information communicated from the camera and automatically control the light provided to the illuminated area.</i>	<u>Stam PCT-</u> A system and method of automatically controlling exterior vehicle lights includes an image sensor (201) and a controller (1105) to general control signals. The control signals are derived on information obtained from the image sensor as well as other detected parameters pertaining to the detected light source(s), the vehicle having the inventive control system, and the ambient environment. (Ex. PA-A at Abstract.) The control system comprises an image array sensor including a plurality of pixels, an optical system configured to image the scene forward of the controlled vehicle onto the image array sensor, the optical system including a forwardmost surface, and a control circuit for processing the image of the scene obtained from the

Claim 6 (original)**Stam PCT and Harbers**

image array sensor and for controlling the exterior lights in response to objects detected in the processed scene.
(Ex. PA-A at 5.)

See Fig. 11



Harbers- the “spatial distribution of the light beam generated by the light source is continuously adjustable... Preferably, the spatial distribution is influenced by the speed of the vehicle, the rotational position of the steering wheel of the vehicle, the weather conditions, and it can also be influenced by the driver.”
(Ex. PA-B at Abstract, numerical identifiers omitted.)

Below, relevant limitations of claim 6 will be reviewed in the context of the combination of Stam PCT and Harbers to establish that the claim is patentable. As the arguments presented below are not exhaustive of the applicable patentability grounds, Patent Owner reserves its right to present further arguments to the extent necessary.

6. An illuminating device having automatic control of the light provided to an illuminated area comprising:

... a structure for incorporating illuminating device elements;

According to the abstract, Stam PCT is directed to a “system and a method of automatically controlling exterior vehicle lights that includes an image sensor (201) and a controller (1105) to generate control signals.” (Ex. PA-A at 1.) As depicted in Figure 1, Stam PCT discloses illuminating device elements, e.g., exterior vehicle lights positioned on a vehicle. (Ex. PA-A at 120.)

Likewise, in Harbers the “invention relates to a vehicle headlamp comprising a light source which includes a plurality of opto-electronic elements. The invention also relates to a vehicle provided with a headlamp.” (Ex. PA-B at 1:10-15.)

... one or more light sources incorporated in the structure and in communication with a power source;

According to the proffered construction detailed in Section III, the claim term *light source* means an individual LED; Figures 26a and 26b of Stam PCT depict individual LEDs incorporated in the vehicle headlamp. (Ex. OTH-A at ¶54.) More specifically, the specification of Stam PCT links the LEDs to a power source:

LED headlamp 2600 includes a heat extraction member 2601 that serves as a support for mounting semiconductor optical radiation emitters 2603, 2605. Where the semiconductor optical radiation emitters 2603, 2605 are electrically connected to the heat extraction member, the heat extraction member provides an electrical connection to the semiconductor optical radiation emitters . . . during operation.

(Ex. PA-A at 74.)

Harbers also discloses individual LEDs incorporated in the vehicle headlamp, *in communication with a power source*:

The use of a plurality of opto-electronic elements with a relatively high luminous flux enables a vehicle headlamp to be manufactured having much more dynamic lighting possibilities than the known vehicle headlamp. The opto-electronic

elements can be switched on and switched off, with the spatial distribution of the generated light beam depending on the conditions.

(Ex. PA-B at 2:6-11, emphasis added; Ex. OTH-A at ¶64.)

... *electronic circuitry apparatus for the controlled powering of the light source and other illuminating device elements*;

This claim limitation is missing in the primary Stam PCT reference but disclosed in the Harbers reference. However, as established below, absent hindsight bias, there is no motivation to combine the two references. (Ex. OTH-A at ¶90.)

The primary inventor of Stam PCT, Joseph S. Stam, makes it clear in his declaration that though Stam PCT discloses two limited LED applications for headlamps, “[i]n all cases, the LEDs in each array were connected together and operated by a single controller, such that the entire array would be on/off or dimmed, as shown in Fig. 26a.” (Ex. PA-A at pp. 77-79; Ex. OTH-A at ¶53.) Accordingly, under the proper construction of light source detailed in Section III, the two limited LED embodiments in Stam PCT do not disclose *controlled powering of the* [individual LED] *light source*. (Ex. OTH-A at ¶75.)

In his declaration, Stam explains that the embodiments in Stam PCT were primarily directed to halogen/HID light sources, with the exception of two limited LED embodiments, and underscores why in Stam PCT “the light source is treated as a fixed block of light—whether halogen/HID or an LED array— that can be ‘steered’ up/down or right/left, treating an array of LEDs as a unit that would be operated together” and “thus not individually controlled or capable of facilitating control to selectable groups of LED chips.” (Ex. OTH-A at ¶¶49-55, 73.)

The Stam declaration provides context for the state of LED headlamp applications and how that impacted the prevailing view at the time, as reflected in the Stam PCT: “[i]n view of the

technical constraints that limited LED usage in headlights in 2001-2002, we limited our use of LED applications to two applications—headlamp steering and flashing”:

It has long been considered to be desirable to provide headlamps that can be steered in the direction that the vehicle is turning. It is also desirable to provide forward lighting that can be turned OFF, or substantially attenuated, for such a short period of time that the driver does not notice that the lights are OFF. In this way, reflections do not exist during image acquisition. Although a light emitting diode (LED) lamp can be used to provide these features in a cost-effective manner, LED lamps producing enough light to implement a vehicle headlamp are not commercially available. LEDs suffer from a number of disadvantages that limit their application in vehicle headlamps, not the least of which are the relatively small amounts of light produced by LEDs and manufacturability limitations when incorporating LEDs having exotic constructions. Because of these disadvantages, LED lamps have not been used to implement a vehicle headlamp despite the fact that LEDs are more rugged, more energy efficient, and significantly longer lasting than other light technologies. Additionally, means of producing white light from LEDs have only recently become practical as discussed in U.S. Patent No. 5,803,579, entitled ILLUMINATOR ASSEMBLY INCORPORATING LIGHT EMITTING DIODES, issued to John K. Roberts et al. on September 8, 1998.

(Ex. PA-A at 72-73, emphasis added; Ex. OTH-A at ¶50.)

As Stam provides in his declaration “[i]n view of the LED constraints at the time, the Stam PCT disclosure is limited to two LED applications that could be used as a complement to and/or as a substitute for halogen/HID light sources, to address specific imaging challenges and improve auto high beam functionality.” (Ex. PA-A at 72-79; Ex. OTH-A at ¶51.)

The Stam declaration explains the two LED applications disclosed in the Stam PCT:

One of these LED applications focuses on the problem of flashing, which occurs when reflections off an object, such as a sign, are misinterpreted by the image sensor as an oncoming vehicle and trigger disruptive, rapid high/low beam flashing

(repeatedly turning high beams on and off). As one solution for headlamp flashing, we contemplated the use of LEDS to rapidly reduce the light levels or turn the LEDS off, during an image-sampling interval, so that the reflections do not exist or interfere with image acquisition and processing. If done fast enough, the driver would not notice the change in light levels and the problem of flashing would be rectified. Such rapid reduction of intensity would be difficult or impossible with halogen/HID light sources.

The second LED application focused on an improved way to “steer” the light source by replacing the halogen/HID light with an LED array that could be aimed at a fixed angle for auto high beam applications. To facilitate “steering” for auto high beam applications, we disclosed use of an LED array to 1) help provide sufficient output light and 2) project light in more than one either horizontal (*see* Fig. 27) or vertical direction (*see* Fig. 28) by providing a support member with two different angled orientations. In all cases, the LED arrays were connected together and operated by a single controller, such that the entire array would be on/off or dimmed, as shown in Fig. 26a.

(Ex. PA-A at 73-79; Ex. OTH-A at ¶¶52-53.)

In his declaration, Stam provides a detailed analysis of Figures 26a and 26b, to establish that Stam PCT fails to disclose controlled powering of individual LEDs or a selectable group of LEDs:

More specifically, in Fig. 26a, every optical radiation emitter (LED chip) 2603 is electrically connected together “to electrical conductor strip 2607 through a wire bond 2609 and a resistor 2611. Each of the emitters 2605 is connected to electrical conductor strip 2613 through a bonding wire 2615 and a resistor 2617.” (*Id.* at p. 74.) **Since electrical conductor strips 2607, 2613 are shown to be common to multiple LED chips, they necessarily are not individually controlled or capable of facilitating control to selectable groups of LEDs.**

(Ex. OTH-A at ¶54, emphasis added.)

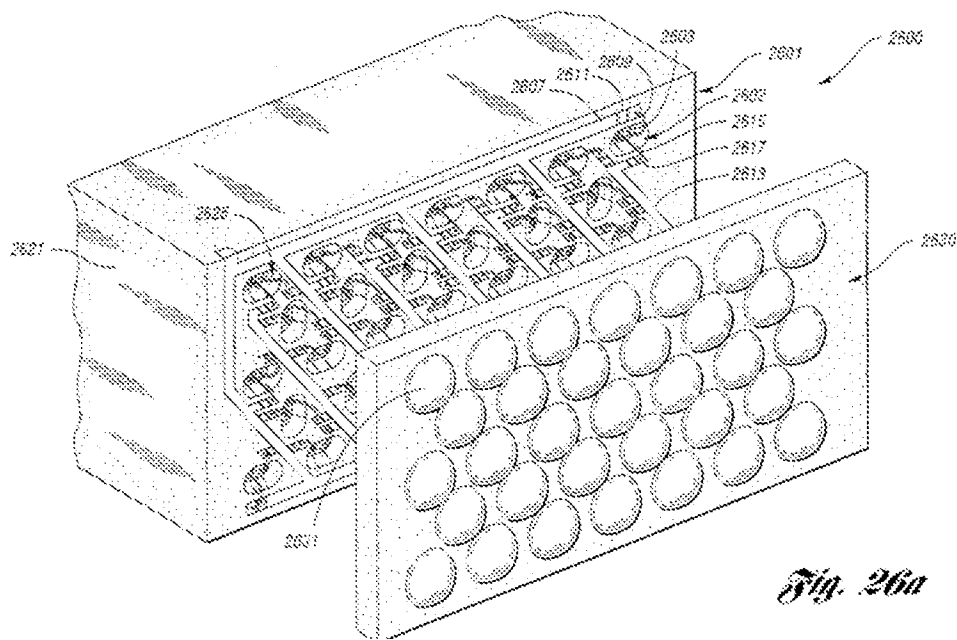


Fig. 26a

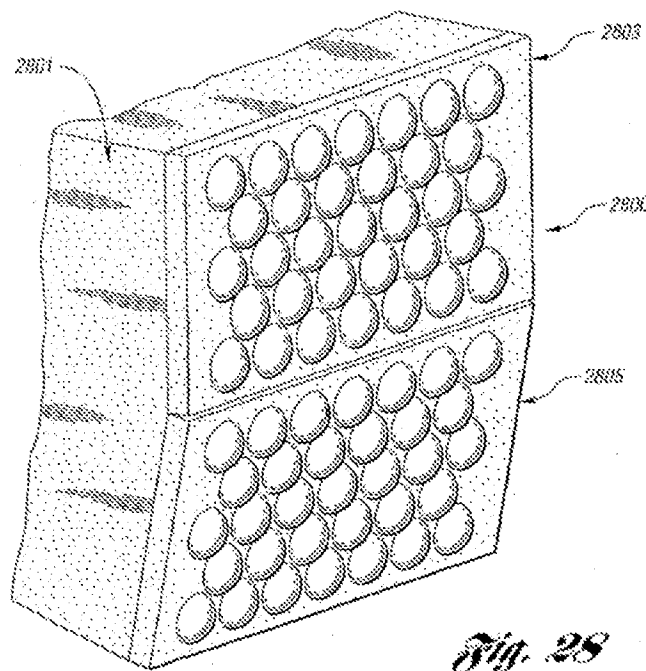
While Stam PCT provides power and control functionality to the LED array as a fixed unit, it fails to provide *controlled powering of the* [individual LED] *light source*. (Ex. OTH-A at ¶75.) Figs. 50a-50c of the Stam PCT, further illustrate the types of illumination beam patterns that can be produced from the disclosed auto high beam applications. (Ex. OTH-A at ¶55.) Regarding Figs. 50a-50c, as Stam notes, “[i]n each case, the light source is treated as a fixed block of light—whether halogen/HID or an LED array—that can be ‘steered’ up/down or right/left by varying the power to the LED array—treating an array of LEDs as a unit that would be operated together.” (Ex. OTH-A at ¶55.)

Another headlamp configuration is depicted in Fig. 28, in which two LED arrays are provided, one for low and high beams—here again, each array is treated as a single unit to be operated together:

[a]nother alternative design for a headlamp for providing low and high beams is illustrated in Fig. 28. The headlamp 2800 includes a heat extraction member 2801

having two lamp sections 2803 and 2805. The heat extraction member 2801 is configured to include the two lamp sections 2803 and 2805, each of which is substantially identical to lamp 2601 [in Fig. 26a]. The heat extraction member provides two front faces at an angle of 1° to 2° , and may advantageously be angled at approximately 1.5° . The angle is exaggerated in Fig. 28 so that the angled surfaces are readily visible.

(Ex. PA-A at 79, emphasis added; Ex. OTH-A at ¶56.)



In his declaration, Stam also provides context for a specification statement in reference to Fig. 28 and the two separate LED lamp sections, 2803 and 2805 for high and low beams – “[b]y controlling the selection of the LEDs that are illuminated, the headlamps can be aimed” (Ex. PA-A at 79)—which Stam states, “when read in context, is consistent with the Stam PCT teaching that one or more LED arrays can be controlled as a single unit and in that capacity, steered and aimed.” (Ex. OTH-A at ¶57.) Similarly, Stam clarifies that the specification sentence – “[t]he circuit traces disclosed in Fig. 26a illustrate a pattern that may be used where separate supply is provided for the

different emitters” (Ex. PA-A at 77.)”discloses the use of separate color emitters, for the purpose of creating white light and thus requires separate supplies for the different color emitters, but does not teach the ability to individually control an LED chip or selectable clusters of LED chips.” (Ex. OTH-A at ¶74.)

Finally, in his declaration, Stam acknowledges that

It was not until US Patent No. 6,861,809 which was filed on September 5, 2002 and published on June 12, 2003 that we first described the use of individually controllable LEDs where a portion of the LEDs within an array could be dimmed or turned off to avoid glaring an oncoming vehicle.

(Ex. PA-E; Ex. OTH-A at ¶61.)

See Fig. 7b and the accompanying description: “[a]lternatively, the window 700 may contain several independently controlled blocks 702 as shown in Fig. 7B. There may be any number of blocks, depending on the granularity of control that is desired. By selectively darkening these blocks, almost any desired beam pattern can be achieved.” (Ex. PA-E at 13:6-14:3, emphasis added; Ex. OTH-A at ¶61.)

Thus, for the reasons set forth above, Stam PCT fails to teach the limitation *electronic circuitry apparatus for the controlled powering of the light source*. (Ex. OTH-A at ¶75.)

By contrast, the Harbers reference teaches “[t]he use of a plurality of opto-electronic elements [LED] with a relatively high luminous flux enables a vehicle headlamp to be manufactured having much more dynamic lighting possibilities than the known vehicle headlamp.” (Ex. PA-B at 2:6-9; Ex. OTH-A at ¶64.) Harbers further provides: “[t]he ordering, providing and selectively switching on and off of opto-electronic elements... in the form of an array may also be considered as an invention itself. (Ex. PA-B at 7:20-21.) Accordingly, Harbers discloses the *electronic circuitry apparatus for the controlled powering of the light source*

limitation. (Ex. OTH-A at ¶81.) However, as disclosed in detail below, absent hindsight bias, there is no motivation to combine Stam PCT with Harbers.

... one or more cameras placed on the structure for detecting coordinate-specific information about the illuminated area, said camera in communication with power and control device elements;

As depicted in Fig. 26a, Stam PCT teaches “an image array sensor including a plurality of pixels, an optical system configured to image the scene forward of the controlled vehicle onto the image array sensor, the optical system including a forwardmost surface, and a control circuit for processing the image of the scene obtained from the image array sensor and for controlling the exterior lights in response to objects detected in the processed scene.” (Ex. PA-A at 2-3.)

By contrast, Harbers doesn’t disclose *a camera for detecting coordinate-specific information about the illuminated area, said camera in communication with power and device control elements*. (Ex. PA-B.) Although Harbers discloses “ordering, providing and selectively switching on and off opto-electronic elements . . . in the form of an array” in response to the velocity of the vehicle, rotational position of the steering wheel, bad weather or in dimly-lit areas (Ex. PA-B at 7:11-22), it lacks a camera or sensor, in communication with power and control device and is thus incapable of *detecting coordinate-specific information about the illuminated area*. (Ex. OTH-A at ¶¶82-83.)

... a controller integrated with the structure, in communication with the light source controlling power circuitry, said controller arranged to processes the information communicated from the camera and automatically control the light provided to the illuminated area;

Neither Stam PCT nor Harbers teach this limitation.

Stam PCT fails to teach a controller, *in communication with the light source controlling*

power circuitry, wherein the controller is *arranged to processes [sic] the information communicated from the camera and automatically control the light provided to the illuminated area*. As detailed above, in Stam PCT, LEDs are not individually controlled or capable of facilitating control to selectable groups of LEDs and thus the controller in Stam PCT is not *in communication with the light source [individual LED] controlling power circuitry* and 2) not *arranged to processes [sic] the [coordinate-specific] information communicated from the camera and automatically control the light provided to the illuminated area*. (Ex. OTH-A at ¶¶76-77.) Stated differently, because there is no mechanism for controlled power of individual LEDs in Stam PCT, the controller cannot be *in communication with the light source controlling power circuitry* and thus cannot be *arranged to processes [sic] the [coordinate-specific] information from the camera to automatically control the light provided to the illuminated area*. *Id.*

Likewise, Harbers doesn't teach *a controller arranged to process the information communicated from the camera and automatically controlling the light provided to the illuminated area*. (Ex. OTH-A at ¶¶82-84.) Harbers does not disclose a camera, let alone a camera *for detecting coordinate-specific information about the illuminated area* and thus doesn't correlate automatic control of the light based on *information communicated from the camera*. (*Id.*) Harbers discloses automatic adjustments in relation to vehicle velocity and steering wheel position, not dynamic adjustments *based on [coordinate-specific] information communicated from the camera*. (Ex. OTH-A at ¶83.)

B. No Motivation to Combine

In addition to the deficiencies that arise when mapping claim 6 to the Stam PCT and Harbers combination, there is no motivation to combine the asserted references. (Ex. OTH-A at ¶¶79, 84, 86-88.) First, the combination of Stam PCT and Harbers changes the principle of operation of Harbers. (Ex. OTH-A at ¶90.) Though Harbers provides light that can continuously

adjust, those adjustments are limited to a set of defined vehicle inputs such as vehicle speed or steering wheel position and/or manual adjustments. (*Id.*) Harbers does not provide any set of operations that includes a camera or *a controller arranged to process the information communicated from the camera, to automatically control the light provided to the illuminated area.* (*Id.*) As Stam states in his declaration, “[a]ny hypothetical combination of the teachings of Stam PCT and Harbers would require a substantial reconstruction and redesign of the elements shown in Harbers as well as a fundamental change in its basic principles of operation”:

Notably, in 2000, when Harbers was filed, although camera-based image detection systems were disclosed, Harbers did not describe or suggest that their system did or could include any such LED-to-image detection correlation. Moreover, while the problem of headlamp glare was well known in 2000, the Harbers system is not directed to that problem. Accordingly, any combination of Stam PCT and Harbers, requires that the principle of operation in Harbers undergo a substantial change. For these reasons, absent hindsight bias, a POSITA in 2002 would have no motivation to combine Stam PCT and Harbers.

(Ex. OTH-A at ¶¶90-91.)

C. Teaching Away

Second, when viewed as a whole, Stam PCT includes statements that teach away from a headlamp with individually controlled LEDs, as required by the claims. (Ex. OTH-A at ¶¶92-94.) Stam PCT includes the following “teaching away”: “**LEDs suffer from a number of disadvantages that limit their application in vehicle headlamps**, not the least of which are [1] the relatively small amounts of light produced by LEDs and [2] manufacturability limitations when incorporating LEDS having exotic constructions. **Because of these disadvantages, LED lamps have not been used to implement a vehicle headlamp.** . . . Additionally, means of producing white light from LEDS have only recently become practical.” (Ex. PA-A at 74, emphasis added.) In his

declaration, Stam expressly provides:

[i]t is my position that given the clear statements in Stam PCT regarding the constraints and technical issues surrounding use of LEDs for headlights, during the 2002-2003 time frame, a POSITA would be discouraged from using individually controlled LEDs or otherwise expanding usage of LEDs in headlights beyond the two limited applications of LED arrays expressly disclosed.

(Ex. OTH-A at ¶94.)

D. Contemporaneous filings establish relevant mindset

Third, as evidenced by contemporaneous prior art filings in 2002, those skilled in the art of auto headlight design, needed to rely on proven technologies—e.g., halogen and xenon applications. (Ex. OTH-A at ¶95.) At that time, LED technology was not viewed as suitable for headlamp applications. (*Id.*) As Stam lays out in his declaration, from 2000-2003, the fields of LED lighting and image sensing were “emerging technologies, each under development for distinct product offerings” and were “as a matter of course, separate and distinct.” (*Id.* at ¶96.) But for a working relationship between a member of the LED lighting product team and a member of the image sensing product team, that “forged a unique opportunity for interdisciplinary engagement and collaboration” at Gentex, and spurred the ‘573 Family of Patents, Stam states that to the best of his knowledge, “it would not have been obvious for a POSITA in 2002-2003 to combine coordinate-specific image detection technology with any LED functionality.” (Ex. OTH-A at ¶¶95-96.)

Thus, when viewed in the context of the relevant 2002-2003 time frame, a POSITA would lack motivation to combine teachings from Stam PCT and Harbers in the manner claimed, for the following reasons: 1) Stam PCT teaches away from use of individually controlled LEDs as recited in the claimed invention; 2) any hypothetical combination is inconsistent with the principle of

operation of Harbers and thus a by-product of hindsight bias; and 3) during the relevant time, the evolving fields of LED technology and image detection were wholly separate fields. (Ex. OTH-A at ¶¶90-97.) Finally, as detailed in Section XI, objective indicia further support nonobviousness.

VIII. Support for New Claims

Please see Exhibit OTH-D for Support for New Amendments. For ease of review, OTH-D illustrates new claims 24-87 in redlined form in view of base claim 6.

IX. New Claims 24-87 are Patentably Distinct over The Combination of Stam PCT and Harbers

As new claims 24-87 narrow the scope of base claim 6, the nonobvious arguments presented in Section VIII, apply with equal force to the newly presented claims. The narrowing amendments made in claims 24-87 present additional points of distinction with respect to the Stam PCT and Harbers combination.

Stam PCT and Harbers fail to teach or suggest many of the features recited in new claims 24-87 over base claim 6. Looking first at each asserted reference individually, Stam PCT fails to teach the following limitations in all new claims specifically 1) controlling individual LEDs responsive to coordinate-specific image detection data, based on known aimings or coordinates of those LEDs and 2) a control strategy that correlates individual LED controls to coordinate-specific sensor data of an object/target to diminish/enhance illumination of a coordinate-specific region. (Ex. OTH-F, Side-by-Side independent claim comparison; Ex. OTH-A at ¶¶77-79.)

As a result, Stam PCT does not teach or suggest controlling an individual LED or group of LEDs within an array, responsive to coordinate-specific image detection data, so that the controller 1) per claim 6, is *arranged to processes [sic] the [coordinate-specific] information communicated from the camera and automatically control the light provided to the illuminated area*; 2) per new claim 24 can *change emission of the selected cluster of LEDs relative to emission of other LEDs*

not included in the cluster to create headlamp illumination that preserves a first level of illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle; 2) per new claim 32, follow, based at least in part on data from one or more of the cameras, the at least one target with the diminished illumination as the at least one target changes location relative to the motor vehicle; and 3) per new claim 56, select a first cluster of the LEDs based at least in part on at least one of the vertical and horizontal position compared to known aimings of light associated with the first cluster; and reduce intensity of illumination to non-glaring illumination of a first area associated with the at least one other vehicle, relative to intensity of illumination on both sides of the first area at elevations common with the first area illuminated by a second cluster of the LEDs, by control of emission from the first cluster. (Ex. OTH-F; Ex. OTH-A at ¶78.)

In sum, Stam PCT fails to optimize lighting patterns to match the particular road scene. (Ex. OTH-A at ¶79.) By treating light as a fixed block, in the presence of objects/targets, high beams—which output significantly brighter light and enhance safety—are shifted away from the road scene rather than individually controlled at a coordinate-specific level to provide optimized, non-glaring lighting patterns. (*Id.*)

Accordingly, Stam PCT fails to teach the following limitations in base claim 6 and by extension, claims 24-87: 1) a headlamp with *electronic circuitry apparatus for the controlled powering of the light source and other illuminating device elements* and 2) a controller *in communication with the light source controlling power circuitry*, that a) per claim 6 is *arranged to processes [sic] the information communicated from the camera and automatically control the light provided to the illuminated area;* b) per representative claim 56, can be controlled to illuminate a coordinate-specific area based on *known aimings of LEDs;* c) per representative claim

24 can *emit light toward at least a portion of the other vehicle based on the LEDs having emission aimings associated with the first coordinates*; and d) per representative claim 32 *follow, based at least in part on data from one or more of the cameras, the at least one target*. See, Ex. OTH-F which provides each of the reexamination independent claims side-by-side, to highlight the missing limitations in all claims. (Ex. OTH-F; Ex. OTH-A at ¶80.)

Turning next to Harbers, though Harbers teaches that “spatial distribution of the light beam generated by the light source is continuously adjustable” by opto-electronic elements and thus discloses the *electronic circuitry apparatus for the controlled powering of the light source* limitation, the combination of the ‘538 PCT and Harbers fails to teach many of the limitations of claim 6 and the newly presented amended claims. (Ex. PA-B; Ex. OTH-A at ¶81.)

While the opto-electronic elements in Harbers are continuously adjustable by the driver or in response to a specific set of defined inputs, Harbers doesn’t disclose any sensor capable of detecting objects or targets in the illuminated area, or per claim 6, a camera *for detecting coordinate-specific information about the illuminated area, said camera in communication with power and device control elements*. (Ex. PA-B; Ex. OTH-A at ¶82.)

And, although Harbers discloses “ordering, providing and selectively switching on and off opto-electronic elements...in the form of an array” in response to the velocity of the vehicle, rotational position of the steering wheel, bad weather or in dimly-lit areas (Ex. PA-B at 7:11-22), it fails to correlate individual LED controls to coordinate-specific camera/sensor data, as required by claims 6 and 24-87 and thus fails to disclose a digital headlamp that utilizes an adaptive driving beam to address glare. (Ex. OTH-C; Ex. OTH-A at ¶83.)

Thus, Harbers fails to provide any of the following limitations, in all new claim sets³: 1)

³ A claim set is an independent claim and the claims that depend from that independent claim.

sensors for detecting coordinate-specific information-- one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area; 2) controllers processing the sensor data- a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; 3) controlling an individual LED or group of LEDs within an array, responsive to coordinate-specific image detection data based on known aimings or coordinates of those LEDs, for example, per claim 48: illuminate a portion of at least one object, indicated by data from at least one of the one or more sensors, by selecting a first cluster of the LEDs to emit first light directed towards a first area including the at least the portion of at least one object, the first area determined based at least in part on the data, the first cluster selected based at least in part on known aimings of light associated with the first cluster determined to correspond to the first area; and 4) a control strategy that correlates LED controls to coordinate-specific sensor data of an object, to optimize illumination in a glare-free manner, for example as reflected in new claim 24: change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the cluster to create headlamp illumination that preserves a first level of illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle. (Ex. OTH-F; Ex. OTH-A at ¶84.)

In reference to the above paragraph, Stam PCT fails to teach the last two limitations, namely controlling individual LEDs responsive to coordinate-specific image detection data, based on known aimings or coordinates of those LEDs and a control strategy that correlates individual LED controls to coordinate-specific sensor data of an object/target to diminish/enhance

illumination of a coordinate-specific region. (Ex. OTH-A at ¶85.)

Accordingly, each asserted reference individually and on combination fails to disclose one or more limitations of claim 6 and the new reexamination claims 24-87. Stam thus asserts, “it is my opinion that each reference is missing numerous features of the new claims and even if combined, the combination of Stam PCT and Harbers taken as a whole fails to teach or suggest a headlamp that correlates LED controls to coordinate specific sensor data of a target to diminish/enhance illumination at a coordinate-specific region.” (Ex. OTH-A at ¶86.)

Turning to representative, new reexamination claim sets, the combination of Stam PCT and Harbers, taken as a whole fails to teach or suggest, *inter alia*, controlling an individual LED or group of LEDs within an array, responsive to coordinate-specific image detection data, so that the controller 1) per new claim 24, can change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the cluster to create headlamp illumination that preserves a first level of illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle; 2) per new claim 32, create a beam of diminished illumination illuminating at least a portion of the at least one target with non-glaring illumination, having different intensity than the beam, by one or more changes to characteristics of first light of a cluster of the LEDs providing the first light directed at the at least a portion and creating the beam, the beam diminished in intensity relative to the broader field of illumination illuminating at least above and on both sides of the beam; and follow, based at least in part on data from one or more of the cameras, the at least one target with the diminished illumination as the at least one target changes location relative to the motor vehicle; and 3) per new claim 56, select a first cluster of the LEDs based at least in part on at least one of the vertical and horizontal position compared to known aimings of light associated with the first cluster; and reduce intensity of illumination to non-

glaring illumination of a first area associated with the at least one other vehicle, relative to intensity of illumination on both sides of the first area at elevations common with the first area illuminated by a second cluster of the LEDs, by control of emission from the first cluster. In sum, the combination of Stam PCT and Harbers provide no teachings on methods to optimize illumination—for example, high beams, which output significantly brighter light and enhance safety—in the presence of objects or upcoming curvatures in the road. (Ex. OTH-F; Ex. OTH-A at ¶¶87-88.)

Finally, as described in relation to claim 6 above, absent hindsight bias and the use of the ‘551 Patent as a blueprint, there is no motivation to combine the Stam PCT and Harbers references in the manner claimed. As explained in detail above, when viewed in the context of the relevant 2002-2003 time frame, a POSITA would lack motivation to combine teachings from Stam PCT and Harbers in the manner claimed, for the following reasons: 1) Stam PCT teaches away from use of individually controlled LEDs as recited in the claimed invention; 2) any hypothetical combination is inconsistent with the principle of operation of Harbers and thus a by-product of hindsight bias; and 3) during the relevant time, the evolving fields of LED technology and image detection were wholly separate fields. (Ex. OTH-A at ¶¶90-97.)

While the representative features identified above are believed to be sufficient to patentably distinguish Claim 6 and new Claims 24-87 over the prior art, these features are not exhaustive and various other patentable features included in these claims have not been described in detail for the sake of brevity.

X. Objective Indicia Supports Nonobviousness

Objective indicia, such as unexpected results, industry praise, teaching away and long-felt need, “can be the most probative evidence of non-obviousness in the record, and enable the court

to avert the trap of hindsight.” *Crocs, Inc. v. ITC*, 598 F.3d 1294, 1310 (Fed. Cir. 2010). These objective criteria “turn back the clock and place the claims in the context that led to their invention.” *Mintz v. Dietz*, 679 F.3d 1372, 1378 (Fed. Cir. 2012). As such, the Federal Circuit requires consideration of these objective indicia because they “provide objective evidence of how the patented device is viewed in the marketplace, by those directly interested in the product.” (*Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1391 (Fed. Cir. 1988); *Spectralytics, Inc. v. Cordis Corp.*, 649 F.3d 1336, 1344 (Fed. Cir. 2011).)

As Stam concludes in his declaration, the objective evidence “in the form of long felt, but unmet need and industry praise” further “bolsters the patentability of the claimed invention--providing objective evidence that the glare-free adaptive driving beam technology claimed in the ‘551 Patent is nonobvious over the asserted references.” (Ex. OTH-A at ¶98.)

A. Industry Praise

Over the years, numerous industry organizations, such as NHTSA, AAA and IIHS, industry publications, such as Autoweek and Driving Vision News, and Automotive Industry Awards such as the PACE Award conferred by Automotive News have provided industry praise for the glare-free adaptive beam technology (ADB) covered in claim 6 and new reexamination claims 24-87 of the ‘551 Patent. (Ex. OTH-A at ¶99.) A few recent examples of such industry praise, correlated to the 2018 lead up to the proposed NHTSA amendments, are provided below.⁴

⁴ For purposes of this reexamination request, the NHTSA definition of ADB will be employed: “ADB systems are an advanced headlamp beam switching technology that provides increased illumination without increasing glare” utilizing advanced equipment including sensors (such as cameras), data processing software and headlamp hardware (such as shutters or LED arrays.” (Ex. 4, NHTSA Proposed Rule 2018 at 2). ADB systems detect oncoming and preceding vehicles and

(Ex. OTH-A at ¶99.)

In a 2019 report AAA stated:

Increasing roadway lighting without creating glare for other motorists should increase the safety of nighttime driving. This is the promise of adaptive driving beam headlamp technologies. NHTSA describes adaptive driving beam as, “a type of adaptive front-lighting system that automatically enables upper beam headlamps and adapts their beam patterns to create a shaded area around oncoming and preceding vehicles to improve long-range visibility for the driver without causing discomfort, distraction, or glare to other road users.

(Ex. 8, AAA 2019 report at 3, emphasis added; Ex. OTH-A at ¶100.)

The 2019 AAA report further stated:

Auto-dimming systems (and manual high-low beam switching) are inherently limited. These systems must switch to low beam in the presence of traffic, resulting in a sharp reduction in roadway lighting. All headlamp systems which are limited to either high or low beam operation cannot avoid causing glare to other vehicles when driving on undulating roadways and cresting hills. ADB headlamp systems, with selective activation or shading of specific elements of the headlight beam, hold the promise to successfully address this major shortcoming of all current headlamp systems.”

(Ex. 8 at 56, emphasis added; Ex. OTH-A at ¶101.)

An April 14, 2021 article by Autoweek explains the problem with prior automatic high-beam systems and praises the ADB technology solution:

[e]xisting automatic high-beam headlight systems are great, but there are limitations to what they can do. If you’re driving in a suburban area with traffic and

automatically adjust the headlamp beams to provide less light to the occupied roadway and more light to the unoccupied roadway. (Ex. 4 at 2.)

streetlights, they can become confused and leave the bright beams on when they shouldn't, or in some cases they can end up switching between low and high beam lights rapidly, which is both annoying and bad for visibility. Smart headlights help alleviate these problems by reading the road and surrounding conditions and applying light only where it is needed. Instead of the need to switch between two brightness settings, adaptive headlights' brightness and shape change in response to surrounding conditions. Where some automatic high beam systems become confused between streetlights and oncoming headlights and switch off when they shouldn't, smart headlights' advanced sensors and detection systems will eliminate the errant shifts in brightness.

(Ex. 7, Autoweek at 3, emphasis added; Ex. OTH-A at ¶102.)

The Autoweek article goes on to establish the unmet need and praise for ADB technology:

It's no secret that the headlights on new cars are getting brighter. Now, even low beam headlights can be distracting to other drivers and pedestrians. Because adaptive headlights keep the bright lights off of pedestrians and other drivers, it's easier for people walking to stay out of the way and for other drivers to see where they're going. If there's an oncoming vehicle, the beam is partially blocked or turned off so that the other driver isn't blinded, but the rest of the road remains illuminated by bright light, which greatly improves their visibility without drastically reducing yours.

(Ex. 7 at 4, emphasis added; Ex. OTH-A at ¶103.)

Similarly, Driving Vision News states: "The benefit of a glare-free function is not only to shadow out other cars but also to provide further visibility for upcoming curves and dangerous situations; there is a clear safety gain by illuminating this curve in front of the driver." (Ex. 9, Driving Vision News at 1, emphasis added; Ex. OTH-A at ¶104.)

In his declaration and the accompanying exhibits, Stam correlates some of the above industry praise for ADB technology, side-by-side with limitations from exemplary claims and

support for these claims, to establish nexus between the industry praise and the claimed invention of the reexamination claims of the ‘551 Patent. *See*, Ex. OTH-E, Industry praise nexus support document. In the right-hand column of that document, Stam correlates the industry praise verbiage with the claim limitations and provides an exemplary explanation, as to how a person of skill in the art would understand the praise verbiage. (Ex. OTH-A at ¶¶105-106.)

By way of example, the Stam declaration correlates each limitation of claim 24 with the industry praise verbiage and an explanation of the nexus between the two. Notably, the rationale articulated with respect to claim 24 applies to all similar limitations in claim 6 and the other new claims. *See*, OTH-E; Ex. OTH-A at ¶107.

On the issue of nexus, Stam opines first in reference to the preamble in claim 24, *[a]n illuminating device having automatic control of the light provided to an illuminated area comprising*, and the praise verbiage from the PACE Award Automotive News article provides: HELLA “has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers” (Ex. 10 PR Newswire at 1.) With respect to the preamble and the cited praise verbiage, Stam states “[i]t is my opinion that, from the described functionality, it’s clear to a person skilled in the art that the praise is directed to an *illuminating device* as laid out in the preamble.” (Ex. OTH-A at ¶108; OTH-E at 1, 10, 27 and 45.)

The declaration next addresses the limitation in claim 24, *a structure for incorporating illuminating device elements* and the praise verbiage from the PACE Award Automotive News article which provides: “The system automatically adjusts **a car's headlamps** to deliver ‘glare free’ illumination, dimming or switching on and off light sources based on traffic conditions.”

(Ex. 10, PR Newswire at 1; Ex. OTH-E, ‘551 Industry praise nexus support document.) In reference to the above claim limitation and praise verbiage, Stam states: “[i]t is my opinion that, from the described functionality, it’s clear to a person skilled in the art that the praise is directed to *a structure for incorporating illuminating device elements.*” (Ex. OTH-A at ¶109; Ex. OTH-E at 1, 11, 27 and 45.)

The declaration addresses the limitation in claim 24, *a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source* and the praise verbiage from the PACE Award Automotive News article provides: HELLA “has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers” (Ex. 10 at 1.) In reference to the above claim limitation and praise verbiage, Stam states:

[i]t is my opinion that, from the described functionality, it’s clear to a person skilled in the art that the praise is directed to the limitation *a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source.*

(Ex. OTH-A at ¶110; Ex. OTH-E at 5, 14, 30-31, 48.)

The declaration addresses the limitation in claim 24, *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements* and the praise verbiage from the PACE Award Automotive News article which provides:

HELLA . . . has won the prestigious 2014 Automotive News PACE Award for its

industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers. The system automatically adjusts **a car's headlamps** to deliver 'glare free' illumination, dimming or switching on and off light sources based on traffic conditions.

(Ex. 10 at 1, emphasis added.)

In reference to the above claim limitation and praise verbiage, Stam states: "[i]t is my opinion that, from the described functionality, it's clear that the praise is directed to an illuminating device, including *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements.*" (Ex. OTH-A at ¶111; Ex. OTH-E at 7, 16, 33 and 51.)

The declaration addresses the limitation in claim 24, *one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors* and the praise verbiage from the PACE Award Automotive News article: "The **new Matrix Beam system combines a front camera**, high-performance software and "intelligent lighting" technology **to recognize cars that are being followed as well as oncoming traffic.**" (Ex. 10 at 1, emphasis added.) In reference to the above claim limitation and praise verbiage, Stam states: "[i]t is my opinion that, from this sentence, it's clear to a person skilled in the art that the industry praise is directed to an illuminating device that includes the details of the camera sensor limitation." (Ex. OTH-A at ¶112; Ex. OTH-E at 8, 17, 34, and 52.)

The declaration addresses the limitation in claim 24, *a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus, said controller arranged to process the*

information communicated from the cameras and to automatically control the light provided to the illuminated area and the praise verbiage from the PACE Award Automotive News article which provides:

A leader in automotive lighting and electronics, HELLA's "glare-free high-beam" headlights **use individually controlled LEDs that adjust automatically to real-time traffic conditions** to reduce glare for other drivers. **The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic.**

The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions.

(Ex. 10 at 1, emphasis added.)

In reference to the above claim limitation and praise verbiage, Stam states: “[i]t is my opinion that, from the above sentences and the inherent knowledge possessed by a person skilled in the art, it’s clear that the industry praise is directed to an illuminating device that includes the details of the controller limitation, wherein the controller processes information from the camera.” (Ex. OTH-A at ¶113; Ex. OTH-E at 9-10, 18-19, 35-36, 53-54.)

The declaration addresses the limitation in claim 24, *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to*, and the praise verbiage from the PACE Award Automotive News article which provides:

A leader in automotive lighting and electronics, HELLA's "glare-free high-beam" headlights **use individually controlled LEDs that adjust automatically to real-time traffic conditions** to reduce glare for other drivers. **The new Matrix Beam system combines a front camera, high-performance software and "intelligent**

lighting" technology to recognize cars that are being followed as well as oncoming traffic.

The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions.

(Ex. 10 at 1, emphasis added.)

In reference to the above claim limitation and praise verbiage, Stam states: "[i]t is my opinion that, from the above sentences and the inherent knowledge of a person skilled in the art, in order to implement the "high performance software" it's clear that *memory storing instructions*" would necessarily be provided." (Ex. OTH-A at ¶114; Ex. OTH-E at 20, 36-37, and 54-55.)

The declaration addresses the limitation in claim 24, *enable the controller to . . . determine first coordinates corresponding to an other vehicle, based on the coordinate-specific information*, and the praise verbiage from the PACE Award Automotive News article which provides:

A leader in automotive lighting and electronics, HELLA's "glare-free high-beam" headlights **use individually controlled LEDs that adjust automatically to real-time traffic conditions** to reduce glare for other drivers. **The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic.**

The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions.

(Ex. 10 at 1, emphasis added.)

In reference to the above claim limitation and praise verbiage, Stam states: "[i]t is my

opinion that, from the above sentences and the inherent knowledge of a person skilled in the art, it's clear that the industry praise is directed to an illuminating device that determines the position of at least one other vehicle.” (Ex. OTH-A at ¶115; Ex. OTH-E at 20-21, 42, and 55-56.)

The declaration addresses the limitation in claim 24, enable the controller to . . . *select a cluster of the LEDs that emit light toward at least a portion of the other vehicle based on the LEDs having emission aimings associated with the first coordinates*, and the praise verbiage from the PACE Award Automotive News article:

The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic.

The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions.

Individually controlled LEDs also provide two or more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.

(Ex. 10 at 1, emphasis added.)

In reference to the above claim limitation and praise verbiage, Stam states: “[i]t is my opinion that, from the above sentences and the inherent knowledge of a person skilled in the art, an illuminating device that includes “individually controlled LEDs” necessarily selects the LEDs to be aimed based on the position of the detected vehicle, per the *select a cluster* limitation.” (Ex. OTH-A at ¶116; Ex. OTH-E at 22-23 and 56-57.)

The declaration addresses the limitation in claim 24, enable the controller to . . . *change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the*

cluster to create headlamp illumination that preserves a first level of illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle and the praise verbiage from the PACE Award Automotive News article:

The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic.

The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions.

Individually controlled LEDs also provide two or more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.

(Ex. 10 at 1, emphasis added.)

In reference to the above claim limitation and praise verbiage, Stam states: "[i]t is my opinion that, from the above sentences it would be clear to a person skilled in the art that the industry praise description of an illuminating device with "two or more dark zones with 'light-in-between'" to maximize visibility, corresponds to the above-identified claim limitation, providing reduced illumination in the dark zones relative to the illumination on both sides of the dark zone." (Ex. OTH-A at ¶117; Ex. OTH-E at 24-25, 42, and 61-62.)

As evidenced by the nexus established above in regards to claim 24 and as further shown in OTH-E, which establishes nexus between representative claims 6, 24, 32 and 56 and exemplary industry praise verbiage, this objective indicia of industry praise bolsters the nonobviousness of claim 6 and the new reexamination claims 24-87. In his declaration, Stam underscores the role of the nexus evidence: "the objective evidence of industry praise with a nexus to the reexamination

claims supports my underlying conclusion that the Glare-Free Adaptive Driving Beam system covered in the reexamination claims are nonobvious over the combination of Stam PCT and Harbers and are thus patentable.” (Ex. OTH-A at ¶118; Ex. OTH-E at 10.)

B. Long Felt but Unmet Need

Automotive companies and the industry at large have long recognized the two-fold need for 1) increased visibility at night and 2) avoiding the discomfort of glaring headlamps. (Ex. OTH-A at ¶119.)

This two-fold need was first solved by the glare-free adaptive driving beam systems described by Spero in the ‘551 Patent, which gave rise to claim 6 and the new reexamination claims, supported by the 2002 provisional application filing by Spero. (Ex. OTH-A at ¶120.)

As evidenced by contemporaneous prior art filings in 2002-2003, LED technology was in nascent stages and not viewed as suitable for headlamp applications. In 2003 and for several years thereafter, those skilled in the art of auto headlight design and controls used LEDs for taillights and interior spotlights but not front headlights. By way of example, see EP1391347, filed by Hella in 2002 which is directed to a pivoting, auto high-beam lamp devoid of any teaching of the use of LEDs and U.S. Patent No. 6,752,523 filed in 2002 by Koito, which discloses the use of LEDs for taillights but not headlights. It was not until 2006–2009 that automotive lighting companies began filing patents directed to digital headlights for adaptive driving beam technology (Ex. OTH-G, Krukenbaum ‘347 patent; Ex. OTH-H, Takahashi ‘523 patent; Ex. OTH-A at ¶121.)

Notably, LED headlights were first used in vehicles in 2007-2008. *See*, Toyota’s use of a partial LED headlight in 2007 and Audi’s introduction of full LED headlights in 2008 (Ex. 1; Ex. 2; Ex. OTH-A at ¶121.)

Despite the launch of LED headlights in 2007-2008, regulatory restrictions by the National

Highway Traffic Safety Administration (NHTSA) have prevented adaptive driving beam technology from activation in the US, though such technology has been employed outside the US for years. For a period of several years, starting in 2013, OEMs petitioned NHTSA for a change in regulations. In 2018, NHTSA announced proposed rules to amend the regulations to allow adaptive driving beam technology. (Ex. 4, NHTSA Proposed Rule 2018 at 1; Ex. OTH-A at ¶122.) In July 2020, Alliance for Automotive Innovation (“Auto Innovators”) consisting of OEMs provided supplemental comments to the NHTSA notice of proposed rulemaking detailing their position on the proposed rulemaking. (Ex. 11, Alliance for Automotive Innovation at 1.)

The supplemental comment filed by the Alliance for Automotive Innovation, makes a compelling case for why the prior art auto-high beam applications did not satisfy the long-felt need for “adaptive driving beam technology,” which refers to adaptive LED headlights that address high beam glare through coordinate-specific control strategies (Ex. 11). By way of example, the Alliance for Automotive Innovation, which includes the majority of the global auto industry, acknowledged that “an average of 0.3% of nighttime fatal crashes list glare as a contributing factor, alternatively data shows that over 70% of pedestrian fatalities have occurred at night.” (Ex. 11 at 8, emphasis added; Ex. OTH-A at ¶123.)

One industry publication from 2014, underscores the long felt, but unmet need for a glare-free headlight that optimizes illumination: “[e]ven after 130 years of headlight development, more than half of vehicle crashes and fatalities occur at night despite significantly less traffic. More than 300,000 crashes and thousands of fatalities are caused by rain and snow at night annually. Approximately 30% of drivers are stressed by glare causing hundreds of fatalities every year.” (Ex. 3, Tamburo R. (2014) at 1-2, emphasis added; Ex. OTH-A at ¶124.)

According to AAA, vehicle headlamps are a primary safety system:

Research data from the National Highway Traffic Safety Administration (NHTSA) reports approximately 25 percent of automotive travel occurs at night. However, nearly 52 percent of all driver fatalities and 71 percent of all pedestrian deaths occur during dark driving times . This data leads to the conclusion that driving in dark or low-light conditions increases the likelihood of a collision at least partially due to a combination of limited forward illumination by current automotive lighting systems and the speeds at which drivers travel . The efficacy of headlamps compliant with U.S. regulations may be a contributing factor. Research conducted by AAA determined that modern headlamps on low beam provide adequate lighting for speeds of only 39 mph to 52 mph, depending on the type of headlamp

(Ex. 8, AAA 2019 report at 3, emphasis added; Ex. OTH-A at ¶120.)

Notably, as part of NHTSA's proposed rulemaking in 2018, NHTSA provided an extensive summary of why a long-felt unmet need exists for adaptive driving beam technology. Excerpts of the NHTSA summary are reproduced below to establish that during the relevant 2002-2003 time period, a long-felt need existed for the glare-free adaptive beam technology [ADB] covered in the reexamination claims of the '551 Patent. (Ex. OTH-A at ¶126.)

Based on the definitions of ADB in the NHTSA Proposed rulemaking, specifically the sections boldfaced below, claim 6 and new claims 24- 87 of the '551 Patent are directed to an Adaptive Driving Beam [ADB] system (Ex. OTH-A at ¶127). The underlined quotes in the below excerpt, provide strong evidence that the ADB system covered by in the '551 reexamination claims satisfies a long-felt but unmet need:

While the benefits of improved visibility and the harmful effects of glare are difficult to quantify, they are real. For example, a recent study from the Insurance Institute for Highway Safety found that pedestrian deaths in dark conditions increased 56% from 2009 to 2016. The harmful effects of glare are highlighted by

the thousands of consumer complaints NHTSA has received from the public over the years, Congressional interest, and the Agency's research. NHTSA received more than 5,000 comments in response to a 2001 Request for Comments on glare from headlamps and other frontal vehicle lamps. Most of these comments concerned nighttime glare. In 2005, Congress directed the Department of Transportation to study the risks of glare. In response to these concerns, NHTSA initiated a multipronged research program to study the risks of, and possible solutions to, glare. **ADB [Adaptive Driving Beam] systems are an advanced type of headlamp beam switching technology that provides increased illumination without increasing glare.** Headlamp beam switching were first introduced in the 1950s, and while not initially widely adopted, have more recently become widely offered as optional equipment. These traditional beam switching systems switch automatically from the upper beam to the lower beam when meeting other vehicles. **ADB systems improve on this technology. They utilize advanced equipment, including sensors (such as cameras), data processing software, and headlamp hardware (such as shutters or LED arrays). ADB systems detect oncoming and preceding vehicles and automatically adjust the headlamp beams to provide less light to the occupied roadway and more light to the unoccupied roadway. ADB technology enhances safety in two ways. First, it provides a variable, enhanced lower beam pattern that is sculpted to traffic on the road, rather than just one static lower beam pattern. It provides more illumination than existing lower beams without glaring other motorists (if operating correctly. Second, it likely will lead to increased upper beam usage.** Research has shown that most drivers under-utilize the upper beams. The effects of this increase as speeds increase, because at higher speeds the need for greater seeing distance increases. ADB technology (like traditional beam switching technology) enables the driver to activate the ADB system so that it is always in use and there is no need to switch between lower beams and upper beams. In this way, the upper beam will be more widely used, and used only when there are no other vehicles present. For both these reasons, ADB has the potential to reduce the risk of crashes by increasing visibility without increasing glare. In particular, it offers potentially significant

safety benefits in avoiding collisions with pedestrians, cyclists, animals, and roadside objects.

“Background & Safety Need

ADB technology is an advanced type of semiautomatic headlamp beam switching technology. More rudimentary beam switching technology was first introduced in the 1950s and was limited simply to switching between upper and lower beams. **Adaptive driving beam technology is more advanced. It uses advanced sensors and computing technology that more accurately and precisely detect the presence and location of other vehicles and shape the headlamp beams to provide enhanced illumination of unoccupied portions of the road and avoid glaring other vehicles.”**

“The Twin Safety Needs of Glare

Vehicle headlamps must satisfy two different safety needs: Visibility and glare prevention. Headlamps provide forward visibility (and also work in conjunction with parking lamps on passenger cars and other narrow vehicles to provide conspicuity). They also have the potential to glare other motorists and road users. For this reason, headlighting systems include a lower beam and an upper beam. Lower beams (also referred to as passing beams or dipped beams) illuminate the road and its environs close ahead of the vehicle and are intended for use during low speed driving or when meeting or closely following another vehicle. Upper beams (also referred to as high beams, main beams, or driving beams) are intended primarily for distance illumination and for use when not meeting or closely following another vehicle. The lower beam pattern is designed to produce relatively high levels of light only in the close-in forward visibility region; the upper beam is designed to produce high light levels in close-in and longer distance regions. **Thus, headlighting has traditionally entailed a trade-off between forward longer-distance visibility for the driver and glare to other road users.**

Visibility and glare are both related to motor vehicle safety. Visibility has an

obvious, intuitive relation to safety: The better a driver can see the road, the better he or she can react to road conditions and obstacles and avoid crashes. Although the qualitative connection to safety is intuitive, quantifying the effect of visibility on crash risk is difficult because of many confounding factors (for example, was the late-night crash because of diminished visibility or driver fatigue?). Glare, again intuitively, is related to safety because it degrades a driver's ability to see the forward roadway and any unexpected obstacles. Glare is a sensation caused by bright light in an observer's field of view. It reduces the ability to see and/or causes discomfort. Headlamp glare is the reduction in visibility and discomfort caused by viewing headlamps of oncoming or trailing vehicles (via the rearview or side mirrors).¹ Empirical evidence suggests that headlamp glare degrades important aspects of driving performance, such as decreasing the distance at which an object in or near the roadway can be seen, increasing driver reaction times, and reducing the probability a driver will detect an object.² It is difficult, however, to quantify the effect of glare on crash risk.

The potential problems associated with glare are highlighted by the thousands of complaints NHTSA has received from the public on the issue. The introduction of halogen headlamp technology in the late 1970s and high intensity discharge and auxiliary headlamps in the 1990s was accompanied by a marked upswing in the number of glare complaints to NHTSA. In response to increased consumer complaints about glare in the late 1990s, NHTSA published a Request for Comments in 2001 on issues related to glare from headlamps, fog lamps, driving lamps, and auxiliary headlamps. NHTSA received more than 5,000 comments, most of which concerned nighttime glare from front mounted lamps."

(Ex. 4 at 2-5, emphasis added; Ex. OTH-A at ¶127.)

Based on the above examples of industry praise, teaching away, and long felt but unmet need and their nexus to the claimed invention, there is "sufficient objective evidence that the '551

Patent was not obvious during the relevant time frame and given the state of the industry at that time.” (Ex. OTH-A at ¶127.)

XI. Conclusion

The prior art documents presented in the above Request were not previously considered by the Office pursuant to MPEP § 2242.

Claim 6 and new claims 24 – 87 of the ’551 Patent are patentable over the prior art documents cited herein. The prior art documents teach the subject matter of the ’551 Patent in a manner such that a substantial new question of patentability for Claim 6 is raised by this Request. Accordingly, the Office is requested to grant this Request and to initiate reexamination with special dispatch.

Respectfully submitted,

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