UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSARA, INC.,
Petitioner,

v.

MOTIVE TECHNOLOGIES, INC.,
Patent Owner.

Case IPR2026-00034
U.S. Patent No. 12,136,276

PATENT OWNER'S PRELIMINARY RESPONSE

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2010	Hartley, R. and Zisserman, A., “Multiple View Geometry in Computer Vision, 2nd ed., Cambridge University Press (2000)

Patent Owner Motive Technologies, Inc. ("Patent Owner") respectfully submits the following Preliminary Response to the Petition for *Inter Partes* Review ("Petition") of Claims 1–20 ("Challenged Claims") of U.S. Patent No. 12,136,276 ("the '276 Patent") filed by Samsara, Inc. ("Samsara" or "Petitioner"). This Preliminary Response is accompanied by the declaration of Mr. Scott Andrews, an expert in Vehicle Information Systems and Vehicle Electrical/Electronics Systems, who testifies regarding technical facts and opinions relied upon in this Preliminary Response. *See* Ex. 2008, ¶¶ 1-17.

I. INTRODUCTION

Institution of Samsara's Petition should be denied because none of the grounds asserted in the Petition presents a reference or combination of references that have a reasonable likelihood of rendering obvious any Challenged Claim.

The Petition asserts four grounds of invalidity:

- Ground 1: Obviousness of Claims 1-3, 5-10, 12-16 and 18-20 based on U.S. Pat. Appl. Pub. No. 2020/0410704 to Choe, *et al.* ("Choe," Ex. 1005);
- Ground 2: Obviousness of Claims 1-3, 5-10, 12-16 and 18-20 based on Choe in view of U.S. Pat. Appl. Pub. No. 2014/0240500 to Davies ("Davies," Ex. 1007);

- Grounds 3A/3B: Obviousness of Claims 4, 11 and 17 based on Choe in view of Int'l Pub. No. WO 2009/027090 to Kuehnle ("Kuehnle," Ex. 1010) (Ground 3A) or Choe in view of Davies and further in view of Kuehnle (Ground 3B); and
- Ground 4: Obviousness of Claims 1-20 based on Int'l Pub. No. WO 2019/175286 to Westmacot, *et al.* ("Westmacot," Ex. 1008) in view U.S. Pat. Appl. Pub. No. 2022/0019829 to Tal, *et al.* ("Tal," Ex. 1009).

All Grounds must be denied because Petitioner fails to meet its burden of proof to demonstrate a reasonable likelihood that it would prevail with respect to any of the Challenged Claims. *See* 35 U.S.C. § 314(a).

With regard to Grounds 1, 2 and 3A/3B, Petitioner fails to show a reasonable likelihood that any of the references teach or suggest (1) "transmitting the overlaid image to a computing device over a network" and (2) "receiving a modification of the line from the computing device, the modification comprising a new line at a second position," as required by all of the Challenged Claims.

Ground 1 is based on Choe alone, and the Petition fails to show how Choe teaches the aforementioned elements, or why it would have been obvious to a person of ordinary skill in the art ("POSITA") to modify Choe to arrive at the claimed invention. In proffering motivations to do so, Petitioner impermissibly relies on hindsight bias.

As to Ground 2 (Choe + Davies), Petitioner fails to show how Davies resolves the problems with Choe, by teaching or suggesting the aforementioned elements. In addition, the Petition does not even show that there would be a motivation to combine Choe and Davies. Rather, Petitioner reaches this combination only by impermissibly relying on hindsight bias.

As to Ground 3A/3B (Choe + Kuehnle and Choe + Davies + Kuehnle), Petitioner does not assert that Kuehnle teaches or suggests the aforementioned elements, instead using Kuehnle only for reasons that are specific to dependent Claims 4, 11 and 17 and that do not resolve the fatal flaws in Choe and Davies. Moreover, again, the Petitioner does not show that there would be a motivation to combine Kuehnle with Choe and/or Davies.

Turning to Ground 4 (Westmacot + Tal), Petitioner fails to show that either reference teaches or suggests the above-referenced elements (1) "transmitting the overlaid image to a computing device over a network" and (2) "receiving a modification of the line from the computing device, the modification comprising a new line at a second position," as well as (3) "transmitting data representing the camera parameter to the camera device," as required by all of the Challenged Claims. Moreover, a POSITA would not have been motivated to combine

Westmacot with Tal. Petitioner instead once again impermissibly relies on hindsight bias in advancing this combination as well.

Because the Petitioner fails to show that the cited prior art, either alone or in combination, renders obvious any of the Challenged Claims, the Petition does not present "a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition," and thus it must be denied. 35 U.S.C. § 314(a).

II. BACKGROUND

A. The '276 Patent

The inventors of the '276 Patent identified a problem with prior art automotive systems for detection of objects on the road, which required use of "[m]ultiple cameras or sensors [that] may be installed in a vehicle to detect objects." Ex. 1001 at 1:17–18. The problem was that "use of multiple cameras" or proximity sensors "such as Radar and Lidar" was too expensive. *Id*. at 1:18–21. They realized that monocular cameras could provide a more cost-effective approach, but their use "require[d] the location of the camera to be predefined or preset." *Id*. at 1:21–24.

To address these deficiencies in the prior art, the '276 Patent describes various example embodiments for "using a monocular camera (e.g., an image sensor) that may be retrofitted and adjustable within the vehicle." *Id*. at 1:28–31.

To increase ease of use and avoid the need to have a predefined or preset location for the camera, the invention provides approaches for automatically "initializing such a camera onboard a vehicle." *Id*. at 1:35–36. "Upon driving, the camera initializes itself to determine its height with respect to the ground as well as a road plane normal," using its own image data. *Id*. at 1:31–34. "Thus, the camera may be installed in various positions and later re-initialized or recalibrated as needed." *Id*. In this way, the '276 Patent overcomes the shortcomings of the prior art by allowing a monocular camera—regardless of installation position—to be automatically recalibrated using only its own image data.

The Challenged Claims are directed to such a method, device, and software program for automatically calibrating a camera installed in a vehicle. For example, Claim 1 recites:

> A method comprising:
>
> [a] receiving an image of a roadway recorded by a camera device installed within a vehicle;
>
> [b] detecting a horizon line in the image;
>
> [c] overlaying a line on the image to generate an overlaid image;
>
> [d] transmitting the overlaid image to a computing device over a network;
>
> [e] receiving a modification of the line from the computing device, the modification comprising a new line at a second position;
>
> [f] computing a camera parameter based on the new line; and
>
> [g] transmitting data representing the camera parameter to the camera device.

Id. at Claim 1 (emphasis added). For the purposes of this Preliminary Response, the crucial elements of all Challenged Claims are transmitting overlaid images to a computing device over a network and subsequently receiving a modified image back from <u>the same computing device</u>. *See* Ex. 2008 at ¶¶ 33-39.

One embodiment of such a system is summarized in the specification as follows:

> [A] server-side system receives a video comprising a set of image frames and identifies one or more lines in the video using a predictive model (e.g., a convolutional neural network). In one embodiment, the lines can include a horizon line. After identifying the horizon line, the system computes some camera parameters (e.g., height, viewing angle, road plane normal, etc.) based on the horizon line. The system then overlays the computed horizon line on the video and transmits it to an annotator device for manual review. In response, the annotator device can transmit a confirmation indicating the horizon line was accurate. In some embodiments, the annotator device can reject the horizon line and manually add the horizon line. Once the horizon line is confirmed, the system returns the camera parameters to the calling party (e.g., a camera onboard a vehicle).

Id. at 1:44–59. The inventors realized that a network-based camera initialization service could be implemented to provide a robust approach to initializing dash-cams in a reliable way using a computing device, for example, "a remote computing device executing the camera initialization service," such as an application running on a server remote from the camera in the vehicle. *See, e.g.*, *id*. at 5:21–28.

As discussed above with respect to the network-based camera initialization system described in the specification and recited in Claim 1 of the '276 Patent, the system first receives an image of a roadway recorded by an onboard vehicle camera, detects a horizon line in the image, and then overlays a line (e.g., on the horizon) on the image at a first position to generate an overlaid image. *Id*. at 1:43–53; Claim 1. The system then transmits the overlaid image to a computing device (e.g., a server) over a network. *Id*. If the overlaid image is determined by the computing device to be inaccurate (for example, in the wrong position), a human reviewer may manually review and modify the overlaid image of the roadway as needed, for example by creating a new line on the image at a second position (e.g., a new horizon line at a second position). *Id*. at 1:51–57; 6:6–49; *see id.* at Claim 1. Then, the system calculates a camera parameter (such as camera height, viewing angle, road plane normal, etc.) based on the new line by performing matrix operations to transform the camera's tilted perspective into a standardized view aligned with the road plane, and transmits the camera parameter back to the vehicle camera. *Id*. at 1:57–59; Claim 1.

Because this method operates using data from only a single image sensor/camera, it can be implemented not only in autonomous or semi-autonomous vehicles, but also in non-autonomous vehicles, which "may only include one camera device, such as a dash-mounted camera." *Id*. at 3:25–28.

B. Prosecution History

The prosecution of the application leading to the '276 Patent, which is a child of U.S. Patent No. 11,875,580, required a response to only a single Office Action. *See* Ex. 1002 at 0116. Prior to that Office Action, the Applicant submitted an IDS that disclosed, among other references, U.S. Patent. App. Pub. No. 2021/0049780 to Westmacot, *et al.*, which is the U.S. counterpart and is identical to the PCT Westmacot reference that Petitioner relies on here (Ex. 1008). *See id*. at 0065; Ex. 1001 at 2 ("References Cited" listing U.S. patent publication of Westmacot, *et al.*). Petitioner relies on this reference (Ground 4) even though the Examiner considered it and did not find it relevant enough to rely on it for any claim rejection in the Office Action. *See* Ex. 1002 at 0121–27.

The Examiner rejected the pending claims under 35 U.S.C. § 103 as unpatentable over U.S. Pub. No. 2019/0034740 A1 to Kwant *et al.* ("Kwant1") and U.S. Pub. No. 2019/0102674 A1 to Kwant *et al.* ("Kwant2"). *See id*. at 0122; *see also* Ex. 1011; Ex. 1012. Specifically, the Examiner found that the element "transmitting the overlaid image to a computing device over a network" of Claim 1 (then-pending Claim 21), that is at issue in this Preliminary Response, was disclosed in Figures 1 and 6 and Paragraph 71 of Kwant1: "In step 607, the horizon estimation platform 105 labels or annotates one or more map features depicted in the image based on the horizon." *See id.*; *see also* Ex. 1011 at [0071].

Additionally, the Examiner found that the element "receiving a modification of the line from the computing device, the modification comprising a new line at a second position" was disclosed in Kwant2's paragraph 50:

> "The learner module then computes an accuracy of the predictions for the initial set of model parameters. If the accuracy or level of performance does not meet a threshold or configured level, the learner module incrementally adjusts the model parameters until the model generates predictions at a desired or configured level of accuracy with respect to the manually annotated labels in the training data (e.g., the ground truth data)."

See Ex. 1002 at 0123; *see also* Ex. 1012 at ¶ [0050].

The Applicant filed a Response that did not amend any claims. *See* Ex. 1002 at 0131–40. Instead, with respect to Claim 1 (then-pending Claim 21), the Applicant traversed the rejection and explained why Kwant1 and Kwant2 failed to teach or suggest, among other elements, the elements of claim 1 discussed above. *Id.* at 0136–40. Regarding the "transmitting the overlaid image" element, the Applicant explained:

> Kwant1 never performs any type of visualization of the horizon line. Instead, Kwant1 at most describes using a horizon line as a tool for *other* operations that do not include visualizing the

> horizon. Specifically, and as cited by the Office Action, Kwant1 describes "annotating" images. However, these annotations do not involve "overlaying" the horizon as claimed. Instead, they refer to annotating *other objects* (e.g., signs) by using the horizon line as a point of reference. Thus, Applicant … asserts that Kwant1 fails to describe the overlaying and transmitting steps.

Id. at 0136–37 (footnotes omitted).

Regarding the "receiving a modification of the line" element, the Applicant explained:

> [N]othing in Kwant2 describes computing a "new line at a second position." By contrast, Kwant2 describes predicting a "label" and then comparing it to a known label. This is a fundamentally different operation. . . . At no point does Kwant2 describe a generative step of computing a new line in this type of operation. As a second example, even if the labels in Kwant2 were horizontal lines, there is no evidence that Kwant2 receives a horizontal line, predicts a new horizontal line, and then compares the new horizontal line to a third horizontal line. Indeed, at best, one would assume that Kwant2 receive[s] a [sic] image with no horizon, compute[s] the horizon, then compare[s] the computed horizon to an expected horizon. In this example, there is no "modification" of a line.

Id. at 0138–39 (footnote omitted).

In response to the Applicant's arguments, the Examiner issued a Notice of Allowance, stating:

> Applicant uniquely claimed a distinct feature in the instant invention, which are [sic] not found in the prior art, either singularly or in combination. The claims are allowable because the prior art fails to disclose the claimed feature [of] " . . . detecting a horizon line in the image; overlaying a line on the image to generate an overlaid image; <u>transmitting the overlaid image to a computing device over a network</u>; <u>receiving a modification of the line from the computing device, the modification comprising a new line at a second position</u>; computing a camera parameter based on the new line; and transmitting data representing the camera parameter to the camera device." This feature is not found or suggested in the prior art.[1]

Id. at 0176–77 (emphasis added). Notably, the Examiner did not identify the Westmacot reference as being one of the closest prior art references.

C. Relevant Person of Ordinary Skill in the Art

Patent Owner disagrees with Petitioner's proposed education and training of the relevant Person of Ordinary Skill in the Art ("POSITA") for the '276 Patent. Factors that may be considered to determine the level of ordinary skill in the art include the "type of problems encountered in the art; prior art solutions to those

[1] The "prior art" referred to here by the Examiner includes the identical U.S. counterpart to the PCT Westmacot reference used by the Petitioner for Ground 4.

problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). The level of ordinary skill in the art also may be reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

The '276 Patent "relate[s] to <u>automotive systems</u> and to machine learning systems for analyzing sensor data in such systems." Ex. 1001 at 1:14–17 (emphasis added). Petitioner's proposed POSITA appears to be some sort of expert in computer/machine vision but lacks any training or experience in "automotive systems," precisely what the '276 Patent relates to. *See* Ex. 2008 at ¶¶ 45–48. The problem in the art that the '276 Patent addresses is the initialization of cameras in automotive systems. *See* '276 Patent at Abstract. This is different than the type of problems that computer vision generally may encounter. *See* Ex. 2008 at ¶ 47. The typical educational level of active workers in the automotive systems field at the time of the invention of the '276 Patent was a bachelor's degree in engineering, typically Electrical Engineering or Computer Science. *Id*. at ¶¶ 45–48. A typical designer of a system such as those described in the '276 Patent would have at least two years working experience in the field, perhaps less with a more advanced degree. *Id.*

Moreover, the references relied on in the Petition are also generally related to the automotive field. *See id.* at ¶ 45; *see also, e.g.*, Ex. 1005 at [0001] ("disclosure relate[s] generally to operating autonomous vehicles"); Ex. 1007 at [0002] ("present invention is generally related to vehicle mounted cameras . . . ."); Ex. 1008 at 1:13–14 ("A rapidly emerging technology is autonomous vehicles (AVs) that can navigate by themselves . . . ."); Ex. 1009 at [0001] ("present invention is related to image processing for road related incidents"); Ex. 1010 at 1 ("present invention relates to . . . online calibration of a video system, particular in connection with an image-based road characterization by image processing methods and systems for detecting roadway scenes in vehicles"). Thus, some experience or training with automotive systems is necessary for the appropriate level of ordinary skill in the relevant art. *See Okajima*, 261 F.3d at 1355.

Accordingly, Patent Owner disagrees with Petitioner's proposed POSITA and submits that a POSITA for the '276 Patent as of 2021 would have had a bachelor's degree in engineering or computer science with one or two years' training and/or experience in the design of software for camera/sensor systems used in the automotive industry.

D. The Alleged Prior Art

1. Choe (Ex. 1005)

Choe, filed on June 28, 2019 and published on December 31, 2020, is directed to "calibrating a sensor system of an autonomous driving vehicle." Ex. 1005 at [0001].

The system described by Choe includes "sensor system 115," which is located onboard autonomous driving vehicle ("ADV") and detects or senses real-time local environment data (e.g., obstacles, objects, nearby vehicles, etc.). *Id*. at [0014], [0028]. Sensor system 115 may include "cameras 211," "radar unit 214," and "light detection and range (LIDAR) unit 215," as well as other sensors, such as sonar and infrared. *Id*. at [0022], [0023].

Sensor data provided by sensor system 115, such as an image captured by camera 211, is then processed by "perception module 302," "including detecting an object within the image and determining a horizon line representing a vanishing point of a road." *Id*. at [0045]; *see also id*. at [0035], [0036], [0048].

Next, "[a]n image processed by perception module 302 may be utilized by sensor calibration module 308 for sensor calibration." *Id*. at [0046]; *see also id*. at [0048]. For example, sensor calibration module 308 may render a 2D view including superimposing a horizon line onto the image. *See id*. at [0046], [0050].

The 2D view image may then be displayed on "display device 405" onboard the vehicle. *Id*.

Finally, based on images displayed on the display device, a "user can then enter feedback or adjustment using 'input device 404[,]' such as a keyboard or joystick. In response to the input provided by the user, 'modules 411-413' adjust certain parameters, render the images again, and display the updated images on display device 405. As a result, the user can calibrate the sensors until the calibration results as shown on display device 405 are satisfied." *Id*. at [0047]; *see also id*. at [0049]–[0053].

While Choe largely describes the above steps occurring entirely onboard the vehicle, it also teaches that certain steps may be performed "offline":

> The functionalities of sensor calibration module 308 may be maintained in a data analytics system such as server 103 to perform a sensor calibration of a sensor offline based on the images captured by the corresponding sensor. The calibration result can then be uploaded onto the vehicle to be utilized online during the image processing as a part of the perception process.

Id. at [0044]. In this embodiment, the processed images output by perception module 302, which does not yet include a horizon line, would be transmitted to server 103, where sensor calibration module 308 may superimpose the horizon line on the images before transmitting calibration information back to the vehicle.

2. Westmacot (Ex. 1008)

Westmacot, filed on March 13, 2019 and published on September 19, 2019, is the PCT version of its identical U.S. counterpart that was considered by the Examiner during prosecution and not found to be relevant to the claims of the ’276 Patent. It relates to image annotation, including the creation of annotated street-level road images captured by a camera in a vehicle for use, among other things, in training a machine-learning-based road-detection system for autonomous and semi-autonomous vehicles. *See* Ex. 1008 at 1:5–7, 1:13–20, 2:21–24.

Westmacot recognizes that machine learning using neural networks “require[s] large numbers of training images,” which include “annotat[ions] with the information that the neural network is required to learn.” *Id*. at 1:29–32. It describes a fully automatic method of generating training data and an extension of that method that introduces a manual correction (“human fixer”) stage if a higher quality training dataset is desired. *See id*. at 19:13–20.

Westmacot is directed to the problem of “quickly and efficiently but nonetheless, accurately annotating road images” captured by an onboard vehicle camera for training a neural network, specifically, “to prepare a very large training set of annotated road images.” *Id*. at 2:28–32.

3. Davies (Ex. 1007)

Davies, filed on March 13, 2014 and published on August 28, 2014, is directed to "adjusting an image, e.g., an image horizon, for a vehicle mounted camera." Ex. 1007 at [0002].

In Davies' system, processing of the images captured by the vehicle mounted camera may occur either onboard or offboard the vehicle. *See id*. at [0042]. In the context of offboard processing, the image output is transmitted via a router to a server, where it is stored for later playback, including to a human operator other than the driver of the vehicle. *See id*. at [0042], [0045].

Davies further teaches "adjusting the image horizon utilizing the data received from the at least one vehicle mounted sensor . . . ." *Id*. at [0057]. Although the image output may be made available for viewing by a human operator located offboard, the adjustment of the image horizon line according to Davies is performed "automatically." *Id*. at [0007]–[0009], [0031], [0060]–[0062]. Accordingly, because no human involvement is required in the horizon line adjustment process, the process may be performed entirely onboard even in a non-autonomous vehicle (the driver of which would likely be unavailable to perform a manual adjustment). In fact, Davies teaches that it may be desirable to adjust the images partially or completely onboard due to wireless bandwidth limitations:

> [I]t should be recognized that some or all of image adjustment may be performed on the vehicle. For example, an on-board (on the vehicle)

> processor may perform some or all of the image adjustment based upon data from the at least one sensor. Allocating processing power to the vehicle may be particularly useful, e.g., in wireless transmission applications where a reduced data package can take advantage of bandwidth limitations.

Id. at [0059].

4. Tal (Ex. 1009)

Tal, filed on July 15, 2020 and published on January 20, 2022, is directed to a system for "automat[ing] identification and reporting of road related incidents/conditions/objects 12 (e.g. pavement damage, street sign damage, debris on road, etc.) with respect to a road surface 14 and/or adjacent road surface 14 surroundings 13 in real time." Ex. 1009 at [0001], [0027]. Tal teaches that its system may optionally be used in connection with an autonomous vehicle. *See id*. at [0057].

The system described by Tal includes an "imager"/"camera" mounted to the vehicle that captures images of the road and surroundings. *See id*. at [0029], [0030]. Onboard "device 101" collects the images from the camera, and onboard "computer processor 111" may determine any objects of interest present in the images using "image processing instructions 905 (e.g. neural network(s) 905)." *See id*. at [0030], [0113], [0114]. Then, "data 20" containing information about the identified objects and "sensor 700 information" are transmitted to "server 107 (via the network 17 utilizing the cellular connection 106 or wireless connection 105, for example)." *Id*. at [0030]. Tal teaches that processing of images (*i.e.*, determining objects of interest) "can be performed by the device 101 alone, by server 107 alone, or by both the server 107 and the device 101." *Id*.

5. Kuehnle (Ex. 1010)

Kuehnle, filed on August 28, 2008 and published on March 5, 2009, is directed to a "system for online calibration of a video system, particularly in connection with an image-based road characterization . . . for detecting roadway scenes in vehicles" using an onboard camera. Ex. 1010 at 1. The system described by Kuehnle includes "digital video camera 4" which captures images of a road, and "computer based electronic circuit 8" located onboard the vehicle, which processes the data received from the camera. *Id*. at 6:3–6. Images captured by the camera have "vanishing point 11 located where a road 12 disappears ('vanishes'), so at the horizon 13, where its two sides 14 and 15 converge. Objects appear to emerge from the vanishing point 11 as one approaches them, or recede into [the vanishing point] as they move away." *Id*. at 6:9–14. According to Kuehnle, [k]knowledge of the location of the vanishing point 11, together with assumptions about what the camera 4 sees, makes it possible to determine and continually refine the camera 4 orientation relative to the world (scene)." *Id*. at 6:25–27.

III. <u>GROUND 1: PETITIONER FAILS TO SHOW THAT CHOE ALONE RENDERS OBVIOUS ANY OF CLAIMS 1–3, 5–10, 12–16, AND 18–20</u>

In Ground 1, Petitioner challenges Claims 1–3, 5–10, 12–16, and 18–20 under 35 U.S.C. § 103 based on Choe (Ex. 1005). Each of the independent claims of the ’276 Patent (Claims 1, 8, and 15) recites, *inter alia*, the following claim elements: (1) “transmitting the overlaid image to a computing device over a network” and (2) “receiving a modification of the line from the computing device, the modification comprising a new line at a second position.” As discussed below, Petitioner fails to show that these elements can be found in Choe because crucially, Petitioner has not shown that Choe discloses transmitting an overlaid image to <u>a computing device</u> over a network and subsequently receiving a modified image back from <u>the same computing device</u>.

Petitioner also does not argue that Choe teaches or suggests these elements by implication.

Finally, contrary to Petitioner’s argument, it would not have been obvious to a POSITA to modify Choe to incorporate these claim elements.

Accordingly, and as discussed in detail below, Petitioner fails to show a reasonable likelihood that Choe renders obvious any of Claims 1–3, 5–10, 12–16, and 18–20 of the ’276 Patent, and thus, a trial should not be instituted on Ground 1.

A. Petitioner Fails to Show That Choe Teaches or Suggests "Transmitting [An] Overlaid Image to a Computing Device . . . " and "Receiving a Modification of the Line [Overlay] From the Computing Device . . . "

All of the claims of the '276 Patent require obtaining an image of a roadway recorded by a camera onboard a vehicle and then overlaying a line on the image to generate an overlaid image. *See* '276 Patent, Independent Claims 1, 8, and 15. The next step is for the camera to transmit the overlaid image to <u>a computing device</u>, over a network. *Id*. After that, the camera receives a modification of the line comprising a new line at a second position from <u>the same computing device</u>. *Id*. Petitioner acknowledges that Choe does not expressly teach or suggest the claim elements (1) "transmitting the overlaid image . . . to a computing device" and (2) "receiving a modification . . . from the computing device . . . ." Pet. at 21 ("Choe does not expressly state that these overlaid images are transmitted …"), 44 ("To the extent Patent Owner contends that Choe alone does not render obvious" the "receiving" step, it "would have been obvious in view of Davies"). Petitioner also does not argue that Choe teaches or suggests these claim elements by implication.

Rather, Petitioner argues that the "computing device" limitation of the claims of the '276 Patent is satisfied by Choe's disclosure of a device that is located offboard the vehicle at a remote location, *e.g.*, "server 103." *See, e.g.*, Pet. at 20–23; Ex. 2008 at ¶ 52. For example, Petitioner asserts that in Choe, "[f]or remote calibration . . . overlaid images must be sent to server 103 so that they can be rendered and adjusted at the remote terminal." Pet. at 21 (emphasis added). As another example, Petitioner contends that in Choe, the vehicle receives updated calibration from "a remote computing device (the server)." *Id*. at 23 (emphasis added). But Petitioner's argument fails because nowhere does Choe teach or suggest an exchange of overlaid images or overlay modifications between the vehicle and server 103 (i.e., what Petitioner contends satisfies the "computing device" claim element). *See* Ex. 2008 at ¶ 52.

As Petitioner acknowledges, Choe discloses two types of embodiments: (i) in-vehicle delivery (e.g., an in-vehicle calibration module sending updated pitch/yaw/roll over the vehicle bus) and (ii) off-board computing with parameters returned and forwarded to the camera. *See, e.g.*, Pet. at 27. Contrary to Petitioner's argument, however, neither type of embodiment involves the vehicle transmitting an overlaid image to server 103 (which Petitioner contends satisfies the "computing device" claim element), or the vehicle receiving an overlay modification back from server 103. *See* Ex. 2008 at ¶¶ 53–61.

In the first type of embodiment described by Choe, the camera calibration is performed entirely onboard the vehicle. First, perception module 302 (which is onboard the vehicle) receives and processes image sensor data, including determining a horizon line. *See* Ex. 1005 at [0045]. Sensor calibration module

308 (which is onboard the vehicle) then utilizes the processed image to superimpose a horizon line onto the image. *See id*. at [0046]. Next, the overlaid image is displayed on display device 405 (which is onboard the vehicle), allowing a user to enter feedback or adjustments using input device 404 such as a keyboard or joystick (which is onboard the vehicle). *See id*. at [0047]. In response to the input provided by the user, the camera parameters are adjusted, the images are rendered again, and the updated images are displayed on display device 405 (again, which is onboard the vehicle). *See id*. at [0047]. In this way, a user can calibrate the sensors until the calibration is satisfactory. *See id*. Thus, in this first embodiment, contrary to the Petitioner's assertion, Choe does not teach or suggest the vehicle transmitting an overlaid image to server 103, or receiving an overlay modification from server 103, either expressly or by implication. *See* Ex. 2008 at ¶¶ 54–57. A POSITA would understand that there is no need to exchange the overlaid images between the vehicle and the remote server because the vehicle is self-sufficient as to the calibration process. *Id*.

In the second type of embodiment described by Choe, calculation of the calibration parameters based on the images captured by the image sensor/camera is performed entirely offboard the vehicle. *See, e.g.*, Ex. 1005 at [0017], [0031], [0044], [0054]. Server 103 is provided at a remote location offboard the vehicle (*see* Ex. 1005 at [0018]), and may include a "data analytics system to perform data analytics services for a variety of clients" (Ex. 1005 at [0029]), including sensor calibration (*see* Ex. 1005 at [0044]). More specifically, server 103 hosts sensor calibration system 125 (*see* Ex. 1005 at [0031]) or sensor calibration module 308 (*see* Ex. 1005 at [0044]), either of which may perform the sensor calibration process and both of which are offboard the vehicle. The sensor calibration process includes, among other steps, "superimposing a horizon line onto the image." Ex. 1005 at [0046]; *see also id*. at Fig. 7, [0059]. Thus, server 103 does not (and cannot) receive an overlaid image from the vehicle because server 103 is the component that generates the overlaid image in the first place. Put another way, because the horizon line overlaying is performed remotely, there would be no overlaid image onboard the vehicle for it to transmit to server 103. Indeed, Choe teaches that server 103 "perform[s] a sensor calibration of a sensor offline based on <u>the images captured by the corresponding sensor</u>." Ex. 1005 at [0044] (emphasis added). Elsewhere in the reference, Choe teaches that "[t]he sensor calibration process may be performed offline based on the previously captured sensor data . . . ." *Id*. at [0031]. A POSITA would understand these disclosures to refer to transmitting raw images (or at the very least images that have not been processed to include a horizon line overlay). *See* Ex. 2008 at ¶¶ 58–59. Thus, contrary to Petitioner's assertion, Choe does not teach or suggest the vehicle transmitting an overlaid image to server 103, either expressly or by implication.

Also, in the second type of embodiment, a human adjusts the line overlay on the image at server 103 and the camera calibration factors are determined. *See* Ex. 1005 at [0046], [0047]. And, the calibration factors (not the overlaid image) may be "uploaded onto the vehicle." *Id*. at [0044]; *see also id*. at [0031]. Thus, Choe also does not teach or suggest the vehicle receiving an overlay modification from server 103, either expressly or by implication. *See* Ex. 2008 at ¶ 60. A POSITA would understand that there is no need for server 103 to transmit an overlay modification back because server 103 itself calculates the calibration parameters (based on the overlay modification) for uploading to the vehicle. *Id*.

In sum, the Petition fails to show a reasonable likelihood that Choe teaches or suggests transmitting an overlaid image to <u>a computing device</u> over a network and subsequently receiving a modified image back from <u>the same computing device</u>, as required by all the Challenged Claims.

B. Petitioner's Alleged Motivations to Modify Choe to Arrive at the Claimed Invention All Fail

Petitioner argues that despite Choe failing to teach or suggest the claim elements "transmitting the overlaid image . . . to a computing device" and "receiving a modification . . . from the computing device . . . ," a POSITA implementing Choe's system would nevertheless have modified it to perform both of those steps. *See* Pet. at 21–24. These arguments should be rejected.

Regarding the claim element "transmitting the overlaid image to a computing device over a network," Petitioner argues that the "motivations for transmission are straightforward." Pet. at 22. Not so.

First, Petitioner argues that sending the overlaid image ensures consistency "by avoiding redundant detection and reducing server compute." Pet. at 22. But Petitioner fails to explain what it means by "redundant detection." To the extent Petitioner is referring here to the detection of a horizon line, and if a POSITA were concerned with minimizing "server compute," Petitioner fails to explain why the POSITA would not simply follow Choe's approach of performing the camera calibration entirely onboard the vehicle (*i.e.,* no involvement from server 103), which arguably would achieve both of those benefits. *See* Ex. 2008 at ¶ 65.

Second, Petitioner argues that transmitting overlaid images "support[s] Choe's server-side training, drift monitoring, and audit functions." Pet. at 22.

Petitioner's argument for "server-side training" relies on the overlaid images "already encod[ing] perception results and user adjustments." Pet. at 22. But this is a fallacy. Any "perception results and user adjustments" would not be obtained until the next step following transmission of the overlaid image to the computing device, *i.e.,* after the overlay is modified to comprise a new line at a second position. Put differently, when the vehicle transmits the original overlaid image to the server, with any overlay modification not yet having been performed by the user (located at the server), there are no "perception results and user adjustments" to support machine learning training. *See* Ex. 2008 at ¶ 66.

Regarding "drift monitoring," Petitioner fails to explain the relevance given that Choe does not mention this. *Id*.

Regarding "calibration audit trails" (Ex. 1003 at ¶ 137), again, Petitioner fails to explain how the original overlaid image would further the goal of maintaining a calibration audit trail when the calibration does not happen until a later step in the claimed process. *Id*.

Third, Petitioner argues that "[i]n human-in-the-loop scenarios, transmitting the same UI view used in-vehicle provides clear calibration context." Pet. at 22. This argument assumes far too much. Again, if a POSITA were implementing Choe's first type of embodiment (*i.e.*, where camera calibration is performed entirely onboard the vehicle), server 103 does not need any calibration context. If, on the other hand, a POSITA were implementing Choe's second type of embodiment (*i.e.*, where calculation of calibration parameters is performed entirely offboard the vehicle), as Choe describes, server 103 requires only the raw image captured by the camera, from which the server can generate an overlaid image and continue on to perform the calibration process. *See* Ex. 2008 at ¶¶ 63–67.

Accordingly, Petitioner fails to advance any credible reason a POSITA would have implemented the step of "transmitting the overlaid image to a computing device over a network" in connection with Choe's system. *Id*.

Moving to the claim element "receiving a modification of the line from the computing device, the modification comprising a new line at a second position," Petitioner argues that "selecting where to perform a disclosed function within a client-server system is a simple design choice among two predictable choices" and that courts allow "common sense" to supply the rationale for straightforward implementation details. Pet. at 23–25. Specifically, Petitioner argues that "[p]lacing Choe's disclosed line-editing on the server is a predictable, routine variant . . ." *Id*. at 24. But these arguments completely miss the mark.

First, as to Petitioner's "simple design choice" argument, Choe already discloses line-editing on a remote server (*e.g.*, server 103), as discussed above in connection with the second type of embodiments described by Choe. *See supra* Section III.A. But Choe further teaches that the remote server also calculates the calibration parameters, which can finally be uploaded to the vehicle. *Id*.; *see also* Ex. 1005 at [0031], [0044]. Once the vehicle has already received the calibration parameters, it has no use for the overlay modification and, therefore, it would make no sense for the server to send the overlay modification to the vehicle (or to any other component or device within the system). *See* Ex. 2008 at ¶¶ 63–67.

Second, as to Petitioner's "common sense" argument, the Federal Circuit has ruled:

> In cases in which "common sense" is used to supply a missing limitation, as distinct from a motivation to combine … our search for a reasoned basis for resort to common sense must be searching. And, this is particularly true where the missing limitation goes to the heart of an invention.

Arendi S.A.R.L. v. Apple Inc., 832 F.3d 1355, 1363 (Fed. Cir. 2016) (reversing the Board's finding of unpatentability that rested on "common sense"). Here, especially because Petitioner seeks to resort to "common sense" to supply a missing limitation that "goes to the heart of [the] invention" claimed in the '276 Patent, it is required to supply a "reasoned basis." Petitioner has failed to provide any such basis. To the contrary, common sense forecloses Petitioner's theory – Choe's server 103 transmits calibration parameters, not overlay modifications, and the vehicle therefore has no use for any such modification.

Finally, Choe is devoid of any teaching or suggestion that would motivate a POSITA to make the modifications Petitioner asserts as obvious. Choe does not identify any shortcomings or challenges with its approach, or any potential areas of future improvement.

In sum, Petitioner fails to advance any credible reason a POSITA would have implemented the steps of "transmitting the overlaid image . . . to a computing device” and “receiving a modification . . . from the computing device . . .” in connection with Choe’s system.

C. Petitioner’s Use of Hindsight to Arrive at the Claimed Invention Also Fails

Petitioner also impermissibly uses hindsight to arrive at the claimed invention.

As explained above, Choe has two types of embodiments. One type of embodiment where the process for computing the camera calibration parameters is happening fully onboard the vehicle, and one where it is happening fully offboard. Petitioner claims that Choe could also be doing some of the necessary steps for this process on board and some offboard rather than all onboard or all offboard. But this argument was clearly developed with the Challenged Claims in mind. This must be true because Choe does not discuss or even suggest this possibility at all. This smells of impermissible hindsight bias. *See* Ex. 2008 at ¶ 67. Put simply, Petitioner’s analysis suffers from “the prejudice of hindsight bias,” which “overlooks that the genius of an invention is often a combination of known elements which in hindsight seems preordained.” *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1068 (Fed. Cir. 2018) (internal quotation marks omitted).

* * *

Petitioner does not show a reasonable likelihood that Choe renders obvious any of Claims 1–3, 5–10, 12–16, and 18–20 of the ’276 Patent. As such, Petitioner has failed to meet its burden and trial should not be instituted on Ground 1. *See Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d at 1363 (explaining that the petitioner in an IPR "has the burden from the onset to show with particularity why the patent it challenges is unpatentable").

IV. GROUND 2: PETITIONER FAILS TO SHOW THAT CHOE IN VIEW OF DAVIES RENDERS OBVIOUS ANY OF CLAIMS 1–3, 5–10, 12–16, AND 18–20

Petitioner argues in Ground 2 that Choe in view of Davies (Ex. 1007) renders obvious Claims 1–3, 5–10, 12–16, and 18–20.

With respect to Ground 2, Petitioner fails to show that Davies cures the deficiencies in Choe with respect to claim elements: (1) "transmitting the overlaid image to a computing device over a network" and (2) "receiving a modification of the line from the computing device, the modification comprising a new line at a second position." Specifically, the Petition does not show where or how Davies teaches or suggests transmitting overlaid images to a computing device over a network and subsequently receiving a modified image back from the same computing device.

Also, even if Petitioner sufficiently showed that Choe and Davies disclosed the aforementioned elements, it would not be enough because a POSITA would not be motivated to combine Choe and Davies to arrive at the Challenged Claims.

Accordingly, and as discussed in detail below, Petitioner fails to show a reasonable likelihood that Choe in view of Davies renders obvious any of Claims 1–3, 5–10, 12–16, and 18–20 of the ’276 Patent, and thus, trial should not be instituted on Ground 2.

A. Petitioner Fails to Show That Davies Teaches or Suggests "Transmitting [An] Overlaid Image to a Computing Device . . . " and "Receiving a Modification of the Line [Overlay] From the Computing Device . . . "

To support its argument that Davies teaches or suggests the claim elements "transmitting the overlaid image to a computing device over a network" and "receiving a modification of the line from the computing device, the modification comprising a new line at a second position," Petitioner quotes or paraphrases several passages from Davies, including Paragraphs [0042]–[0045], [0059], and [0066]–[0070]. *See* Pet. at 42–43. But Petitioner, providing scant discussion of these passages, fails to actually explain or show how Davies teaches or suggests either of these claim elements, in at least two crucial respects. *See* Ex. 2008 at ¶ 81.

First, Petitioner fails to explain how Davies teaches <u>generating an overlaid image</u>, much less "transmitting" it to a computing device over a network and then "receiving" an overlay modification from the <u>same</u> computing device. *See* Ex. 2008 at ¶¶ 82–87. Davies discloses that a camera onboard a vehicle captures images and then transmits the raw images (*i.e.*, images having no line overlays) to an operations base ("OB"). *See, e.g.*, Davies at [0042], [0045], [0046], [0055]. At the OB, an operator can view and adjust the images for broadcast or other presentation, for example, to spectators at a sporting event or to TV viewers. *Id.* at [0036]–[0056], [0061]. For example, the operator may adjust "an image horizon 12 such that it matches a skyline horizon (shown as line 28) during tilting of a racecar as it transitions from a straightaway to a banked turn, with an increase in zoom during the turn." Davies at [0062]. However, capturing an image and then adjusting it (e.g., panning, tilting, or zooming) as Davies teaches (*see, e.g.*, Davies at [0044], [0049]; *see also id*. at [0032]), is entirely different from overlaying a line on an image and modifying that line, which is what the claims of the '276 Patent require. This important distinction is underscored by the fact that Davies has nothing to do with the camera calibration problem that both Choe and the '276 Patent seek to solve. *See* Section IV.B, *infra*.; *see also* Ex. 2008 at ¶ 87.

Second, Petitioner does not articulate which component of Davies' system it contends satisfies the "computing device" limitation that appears in both of the claim elements "transmitting the overlaid image . . . to a computing device" and "receiving a modification . . . from the computing device . . . " recited in the Challenged Claims. "It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds for the challenge to each claim.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (quoting 35 U.S.C. § 312(a)(3)) (emphasis added); *see also Netflix, Inc. v. DivX, LLC*, 84 F.4th 1371, 1377 (Fed. Cir. 2023) ("A petitioner may not rely on a vague, generic, and/or meandering petition and later fault the Board for failing to understand what the petition really meant. Ultimately, it is the petitioner's burden to present a clear argument."). This is an exacting standard, and Petitioner does not come close to meeting it here.

In sum, Petitioner fails to show a reasonable likelihood that Davies substantively cures the deficiencies in Choe by teaching or suggesting the claim elements "transmitting the overlaid image to a computing device over a network" and "receiving a modification of the line from the computing device, the modification comprising a new line at a second position."

B. Even If Choe Combined With Davies Teaches the "Transmitting" and "Receiving" Steps of the Challenged Claims, There Would Still Be No Motivation to Combine These References

Petitioner argues that a POSITA would have been motivated to combine Choe with Davies. *See* Pet. at 36–40. Petitioner is wrong. *See* Ex. 2008 at ¶¶ 69–80. A POSITA would not have combined Choe with Davies because they are directed to solving two completely different problems in completely different ways, and any asserted motivation to do so is rooted in impermissible hindsight bias. *Id.* at ¶¶ 69–75.

A POSITA would not have considered combining Choe with Davies because the two references are directed to two completely different problems: Choe seeks to solve the problem of calibrating a vehicle camera/sensor using only image data (*see, e.g.*, Ex. 1005 at [0003], [0015]–[0017]) whereas Davies seeks to solve the problem of adjusting images received from a vehicle camera using data from one or more sensors for broadcast or other presentation (*see, e.g.*, Ex. 1007 at [0002]–[0008], [0036]–[0038], [0049]–[0056], [0061]). More specifically, Choe's goal is to periodically calibrate camera, LIDAR, and RADAR sensors so that the perception system of an autonomous vehicle can accurately detect and recognize objects and lane configuration in the driving environment. *See, e.g.*, Ex. 1005 at [0003]. In contrast, Davies' goal is to adjust an image received from a vehicle mounted camera so that it will be suitable for broadcast or other presentation, for example, a car racing event being broadcast to fans attending the event or watching it on TV. *See, e.g.*, Davies at [0032], [0036]–[0038], [0049]–[0056], [0061]. Davies does not even once mention the words "calibrate" or "calibration."

Choe and Davies address materially different problems and therefore disclose fundamentally different solutions, undermining any rationale to combine them. *See* Ex. 2008 at ¶¶ 69–75.

Choe's solution to its problem involves a processor overlaying a line on an image captured by an onboard vehicle camera/sensor, and then a <u>human</u> manually modifying the overlaid line. The difference between the original overlay and the modified overlay is used to calculate camera calibration parameters. These parameters may then be transmitted to the onboard vehicle camera. *See, e.g.*, Ex. 1005 at [0015], [0049], [0059].

Davies' solution to its problem, on the other hand, involves receiving an image from a vehicle and automatically (i.*e.*, without human involvement) adjusting it as needed for presentation, with no data transmission back to the camera onboard the vehicle. *See, e.g.*, Ex. 1007 at [0041], [0043], [0044], [0046], [0049], [0056]. Unlike Choe's solution to its problem, Davies' solution to its problem does not involve generating any overlaid images. Rather, it involves simply adjusting raw images. Another difference between the two solutions is that Choe uses only image data to calculate the camera calibration parameters (*see, e.g.*, Ex. 1005 at [0015]–[0017]) while Davies teaches that it is advantageous to use data from multiple sensors (e.g., gyroscope, accelerometer, etc.) to determine when and how to adjust an image (*see, e.g.*, Ex. 1007 at [0006]–[0008], [0030], [0031], [0057]–[0059], [0061], [0070]).

In its discussion of the alleged motivation to combine Choe with Davies, Petitioner goes so far to as to argue that Davies teaches "transmission of processed/annotated imagery and calibration data between a vehicle device and a remote server, with remote modifications returned to update local parameters."

Pet. at 36. This is entirely wrong. As discussed above, Davies teaches merely transmission of raw images (not "processed/annotated imagery" or "calibration data") between a vehicle, and does not teach or suggest "updat[ing] local parameters." *See, e.g.*, Ex. 1007 at [0042], [0045], [0046], [0055].

Petitioner's assertion that Choe and Davis can be combined to achieve the Challenged Claims rests entirely on impermissible hindsight bias. As explained above, Choe and Davies are directed to solving two completely different problems in two different ways. Again, Choe seeks to solve the problem of calibrating a vehicle camera/sensor using only image data. *See, e.g.*, Ex. 1005 at [0003], [0015]–[0017]. Davies seeks to solve the problem of adjusting images received from a vehicle camera using data from one or more sensors for broadcast or other presentation. *See, e.g.*, Ex. 1007 at [0002]–[0008], [0036]–[0038], [0049]–[0056], [0061]. In light of their divergent objectives, a POSITA would have no reason to combine these references absent impermissible hindsight bias derived from the benefit of already having the Challenged Claims in hand. *See* Ex. 2008 at ¶¶ 69–75; *see also Polaris Indus., Inc.*, 882 F.3d at 1068.

* * *

Petitioner does not show a reasonable likelihood that Choe in view of Davies renders obvious any of Claims 1–3, 5–10, 12–16, and 18–20 of the '276 Patent. As such, Petitioner has failed to meet its burden and trial should not be instituted on

Ground 2. *See Harmonic Inc.*, 815 F.3d at 1363 (explaining that the petitioner in an IPR "has the burden from the onset to show with particularity why the patent it challenges is unpatentable").

V. GROUNDS 3A/3B: PETITIONER FAILS TO SHOW THAT CHOE IN VIEW OF KUEHNLE OR CHOE IN VIEW OF DAVIES AND KUEHNLE RENDERS OBVIOUS CLAIM 4, 11, OR 17

Petitioner argues that dependent Claim 4 (which ultimately depends from independent Claim 1), dependent Claim 11 (which ultimately depends from independent Claim 8) and dependent Claim 17 (which ultimately depends from independent Claim 15) are obvious in view of Choe combined only with Kuehnle, or Choe combined with Davies and Kuehnle.

As shown above, Choe and Davies do not disclose the "transmitting" and "receiving" steps of the independent claims. Thus, if Kuehnle does not disclose these elements and plug the deficiencies in Choe and Davies, the introduction of Kuehnle cannot support invalidation of any claims because at least two elements of all claims are still missing from Petitioner's proffered combination of references. Here, Petitioner does not even argue that Kuehnle supplies the "transmitting" and "receiving" elements of independent Claims 1, 8 and 15. It follows that Kuehnle does not fill crucial holes in Choe and Davies, and therefore, Choe + Kuehnle and Choe + Davies + Kuehnle cannot render Claims 4, 11 and 17 (or any Challenged Claims) invalid.

Even if Kuehnle filled the holes in Choe and Davies (which it does not and which Petitioner does not even contend that it does), Petitioner fails to put forward a credible motivation that a POSITA would have combined Kuehnle with Choe and/or Davies. *See* Ex. 2008 at ¶¶ 89–91. Petitioner relies on Kuehnle for its alleged teaching of speed and duration of travel thresholds in connection with its challenge to Claims 4, 11 and 17. But neither Choe nor Davies make use of or even discuss speed or duration of travel information. *Id*. Nor does either Choe or Davies suggest any limitations or shortcomings that would be overcome by implementing such thresholds. *Id*.

Accordingly, Petitioner has failed to meet its burden, and trial should not be instituted on Grounds 3A/3B. *See Harmonic Inc.*, 815 F.3d at 1363 (explaining that the petitioner in an IPR "has the burden from the onset to show with particularity why the patent it challenges is unpatentable").

VI. **GROUND 4: PETITIONER FAILS TO SHOW THAT WESTMACOT IN VIEW OF TAL RENDERS OBVIOUS ANY CHALLENGED CLAIMS**

In Ground 4, Petitioner challenges Claims 1–20 under 35 U.S.C. § 103 based on Westmacot (Ex. 1008) in view of Tal (Ex. 1009). Each of the independent claims of the '276 Patent (Claims 1, 8, and 15) recites, *inter alia*, the following three claim elements: (1) "transmitting the overlaid image to a computing device over a network," (2) "receiving a modification of the line from the computing device, the modification comprising a new line at a second position," and (3) "transmitting data representing the camera parameter to the camera device."

As discussed below, Petitioner fails to show that Westmacot teaches or suggests transmitting overlaid images to <u>a computing device</u> over a network and subsequently receiving a modified image back from <u>the same computing device</u>. Nor does Petitioner show that Westmacot teaches or suggests transmitting data (e.g., a camera parameter) back to the vehicle camera.

Petitioner also does not contend that Westmacot teaches or suggests any of these elements by implication.

Moreover, Petitioner fails to show that Tal cures these deficiencies in Westmacot.

Finally, even if Petitioner sufficiently showed that Westmacot and Tal disclosed the aforementioned elements, it would not be enough because a POSITA would not be motivated to combine these references to arrive at the Challenged Claims.

Accordingly, and as discussed in detail below, Petitioner fails to show a reasonable likelihood that Westmacot in view of Tal renders obvious any of the Challenged Claims, and thus, a trial should not be instituted on Ground 4.

A. Petitioner Fails to Show That Westmacot Teaches or Suggests (1) “Transmitting [An] Overlaid Image to a Computing Device . . . ,” (2) “Receiving a Modification of the Line [Overlay] From the Computing Device . . . ,” and (3) “Transmitting Data Representing the Camera Parameter to the Camera Device”

Petitioner acknowledges that Westmacot does not expressly teach or suggest the claim elements “transmitting the overlaid image to a computing device over a network,” “receiving a modification of the line from the computing device, the modification comprising a new line at a second position,” and “transmitting data representing the camera parameter to the camera device.” *See* Pet. at 59, 65, 67–68, 71. Petitioner also does not contend that Westmacot teaches or suggests these claim elements by implication. Accordingly, Petitioner fails to show a reasonable likelihood that Westmacot teaches or suggests these claim elements.

B. Petitioner Fails to Show That Tal Cures the Deficiencies in Westmacot

Petitioner contends that Tal teaches the above-referenced elements missing from Westmacot. To support its argument, Petitioner quotes or paraphrases several passages from Tal, including Paragraphs [0027], [0099], [0101], [0114], [0138], [0148]–[0153]. *See* Pet. at 65–66, 68. But Petitioner provides scant discussion of these passages and fails to actually explain how they disclose any of the claim elements missing from Westmacot.

First, Petitioner completely fails to show where in Tal an alleged overlaid image is transmitted to <u>a computing device</u> from a camera on a vehicle, and that a modified overlaid image is subsequently received from that same computing device. *See* Ex. 2008 at ¶¶ 93–99. Indeed, nowhere in the Petition does it identify a single computing device that performs these claimed functions. *Id*.

Second, Petitioner fails to explain how Tal teaches transmitting camera parameter data back to the camera onboard the vehicle. *Id*. at ¶¶ 100–104. This deficiency makes sense because Tal has nothing to do with the camera calibration problem that the ’276 Patent seeks to solve. *Id*.

In sum, Petitioner fails to show a reasonable likelihood that Tal cures the deficiencies in Westmacot with respect to the above-referenced claim elements.

C. Even if Westmacot Combined With Tal Teaches the Aforementioned Elements of the Challenged Claims, There Would Still Be No Motivation to Combine These References

Petitioner argues that a POSITA would have been motivated to combine Westmacot with Tal. *See* Pet. at 57–60. Petitioner is wrong for at least two reasons: (1) a POSITA would not have considered combining Westmacot with Tal because they are directed to solving two completely different problems, and (2) the alleged motivations for a POSITA to combine Westmacot with Tal are not credible and suffer from hindsight bias. *See* Ex. 2008 at ¶¶ 105–116.

First, a POSITA would not have considered combining Westmacot with Tal because the two references are directed to solving two completely different problems. Westmacot seeks to solve the problem of annotating road images for creating a data set for training a neural network. *See, e.g.*, Ex. 1008 at 1:29–32, 2:28–32. Tal seeks to solve the problem of detecting road related incidents in connection with roadway surveys. *See, e.g.*, Ex. 1009 at [0002], [0006]. In view of these significant differences between Westmacot and Tal, a POSITA would not have considered combining them. *See* Ex. 2008 at ¶¶ 105–116.

In an attempt to draw a throughline to connect Westmacot and Tal, Petitioner argues that both references are directed to camera calibration. *See, e.g.*, Pet. at 57 ("Westmacot discloses a . . . calibration system"), 59 ("Tal . . . teach[es] transmission of . . . calibration data" and "Tal teaches transmitting [annotated outputs] . . . for . . . calibration consistency"), 60 ("Both references operate in the same field . . . calibration . . . and complement each other."), 70 ("Westmacot computes calibration locally"; "the server . . . produce[s] calibration-related outputs . . . for . . . calibration"; "These teachings confirm a distributed calibration framework"), and 72 ("Tal teaches a two-way, networked pipeline for image-derived calibration data"). This is entirely wrong.

In fact, Westmacot teaches that calibration is not required for its system to operate, making its system less expensive to implement:

> <u>Preferably</u> the expected road structure is determined using only information derived from image data captured by the image capture device (that is, the vehicle path as derived from the image data of the captured images, and optionally one or more reference parameters

> derived from image data captured by the image capture device), without the use of any other vehicle sensor and without any [sic] requiring any calibration of the image capture device.

Ex. 1008, 3:26–31 (emphasis added).

> The image processing techniques described below allow all the above to be determined with inexpensive and un-calibrated equipment, such as a mobile phone or a dash-cam costing a few hundred pounds, or other low cost consumer equipment. . . . The 3D path of the camera CP can be deduced by post processing captured videos from un-calibrated cameras using existing visual SLAM (simultaneous localization and mapping) techniques.

Id. at 37:10–18 (emphasis added).

> By exploiting all of the above, it is possible to fully automatically generate annotation of the lane driven by the car in all images of the video, using only images captured from a low-cost and un-calibrated image capture device.

Id. at 46:27–29 (emphasis added).

And, Tal merely states that calibration may be done. Ex. 1009 at [0069]. In short, camera calibration is not a focus of either reference. *See* Ex. 2008 at ¶ 115.

Second, Petitioner's alleged motivations for a POSITA to combine Westmacot with Tal are not credible. The alleged motivations center around both references discussion of camera calibration, including "closing the calibration loop" and "calibration consistency." Pet. at 59. However, as discussed above, camera calibration is not a focus of either reference and the fact remains that each reference is concerned with solving a different problem in a different way, relative to one another. *See* Ex. 2008 at ¶¶ 105–116.

Finally, any suggestion that Westmacot and Tal can be combined to achieve the Challenged Claims is the result of impermissible hindsight bias. As explained above, Westmacot and Tal are directed to solving two different problems in two different ways. Again, Westmacot seeks to solve the problem of annotating road images for creating a data set for training a neural network. *See, e.g.*, Ex. 1008 at 1:29–32, 2:28–32. Tal seeks to solve the problem of detecting road related incidents in connection with roadway surveys. *See, e.g.*, Ex. 1009 at [0002], [0006]. In light of their divergent objectives, a POSITA would have no reason to combine these references absent impermissible hindsight bias derived from the benefit of already having the Challenged Claims in hand. *See* Ex. 2008 at ¶¶ 105–116; *see also Polaris Indus., Inc.*, 882 F.3d at 1068.

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Petitioner does not show a reasonable likelihood that Westmacot in view of Tal renders obvious any of the Challenged Claims. As such, Petitioner has failed to meet its burden and trial should not be instituted on Ground 4. *See Harmonic Inc.*, 815 F.3d at 1363 (explaining that the petitioner in an IPR "has the burden from the onset to show with particularity why the patent it challenges is unpatentable”).

VII. CONCLUSION

For the foregoing reasons, the Petition for *inter partes* review should be denied.

Respectfully submitted,

Dated: January 23, 2026

By: __/Vincent M. Ferraro/__________

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CERTIFICATION OF COMPLIANCE WITH WORD LIMIT

Pursuant to 37 C.F.R. § 42.24(d), I certify that this preliminary response complies with the type-volume limits of 37 C.F.R. § 42.24(c)(1) because, according to the word-processing system used to prepare this preliminary response, it contains 10,562 words, excluding the parts that are exempted by 37 C.F.R. § 42.24(c) (*i.e.*, table of contents, table of authorities, exhibit list, listing of facts, certificate of service, certificate of compliance with word limit, and appendix of exhibits).

Dated: January 23, 2026

Respectfully submitted,

/Vincent M. Ferraro/
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CERTIFICATE OF SERVICE

The undersigned certifies that on January 23, 2026, a complete and entire copy of this PATENT OWNER'S PRELIMINARY RESPONSE was provided via electronic mail (by consent) to the Patent Owner by serving the correspondence address identified in the Mandatory Notices:

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