

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSARA INC.
Petitioner

v.

MOTIVE TECHNOLOGIES, INC.
Patent Owner

Case IPR2025-00574
U.S. Patent No. 11,875,580

PETITIONER’S REPLY TO PATENT OWNER RESPONSE

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1002	Prosecution History of U.S. Patent No. 11,875,580
1003	Declaration of Dr. Trevor Darrell
1004	<i>Curriculum Vitae</i> of Dr. Trevor Darrell
1005	U.S. Publication No. 2020/0410704 to Choe <i>et al.</i> (“Choe”)
1006	Figures of U.S. Patent Application Publication No. 2020/0410704 to Choe <i>et al.</i> , <i>available at</i> the USPTO SCORE Database via Patent Center
1007	Khan <i>et al.</i> , “Lane Detection Using Lane Boundary Marker Network with Road Geometry Constraints,” <i>available at</i> https://ieeexplore.ieee.org/document/9093296 (May 14, 2020) and https://openaccess.thecvf.com/content_WACV_2020/html/Khan_Lane_detection_using_lane_boundary_marker_network_with_road_geometry_WACV_2020_paper.html (Mar. 2020) (“Khan”)
1008	Ali <i>et al.</i> , “Real-Time Vehicle Distance Estimation using Single View Geometry,” <i>available at</i> https://ieeexplore.ieee.org/document/9093634 (May 14, 2020) and https://openaccess.thecvf.com/content_WACV_2020/papers/Ali_Real-time_vehicle_distance_estimation_using_single_view_geometry_WACV_2020_paper.pdf (Mar. 2020) (“Ali”)
1009	He <i>et al.</i> , “Mask R-CNN” Version 3, <i>available at</i> https://arxiv.org/abs/1703.06870 (Jan. 24, 2018) (“He”)
1010	PCT Application Publication No. PCT/EP2019/056356 to Westmacot <i>et al.</i> (“Westmacot”)
1011	Scott Workman and Menghua Zhai and Nathan Jacobs, “Horizon Lines in the Wild,” <i>available at</i> https://arxiv.org/abs/1604.02129 (“Workman”)
1012	L. Jiao, <i>et al.</i> , “A Survey of Deep Learning-Based Object Detection,” IEEE Access vol. 7, p 128,837-128,868, 2019, <i>available at</i> https://arxiv.org/abs/1907.09408 . (“Jiao”)

Exhibit	Description
1013	B. C. Russell and A. Torralba, "Building a database of 3D scenes from user annotations," 2009 IEEE Conference on Computer Vision and Pattern Recognition, Miami, FL, USA, 2009, p 2711-2718 ("Russell")
1014	V. Bartl and A. Herout, "Fully Automatic Horizon Estimation for Surveillance Cameras," 2017 International Conference on Digital Image Computing: Techniques and Applications (DICTA), Sydney, NSW, Australia, 2017, p 1-8 ("Bartl")
1015	W. Rawat and Z. Wang, "Deep Convolutional Neural Networks for Image Classification: A Comprehensive Review," in Neural Computation, vol. 29, no. 9, p 2352-2449, Sept. 2017 ("Rawat")
1016	Declaration of Sylvia D. Hall-Ellis, Ph.D.
1017	Sylvia D. Hall-Ellis, Ph.D. Curriculum Vitae
1018	Attachment 1A to the Hall-Ellis Declaration – MARC Record for Ali
1019	Attachment 1B to the Hall-Ellis Declaration – MARC Record for Ali
1020	Attachment 1C to the Hall-Ellis Declaration – LOC Entry for Computer Vision Congresses
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1022	Attachment 1E to the Hall-Ellis Declaration – IEEE Xplore Page for Ali, <i>available at</i> https://ieeexplore.ieee.org/document/9093634
1023	Attachment 1F to the Hall-Ellis Declaration – IEEE Digital Library Page for Ali, <i>available at</i> https://www.computer.org/csdl/proceedings-article/wacv/2020/09093634/1jPbBO7T7ji
1024	Attachment 1G to the Hall-Ellis Declaration – ResearchGate Page for Ali, <i>available at</i> https://www.researchgate.net/publication/341400645_Real-time_vehicle_distance_estimation_using_single_view_geometry
1025	Attachment 1H to the Hall-Ellis Declaration – SemanticScholar Page for Ali, <i>available at</i> https://www.semanticscholar.org/paper/Real-time-vehicle-distance-estimation-using-single-Ali-Hassan/1d48563e016ef0932c49a977944fafe61c4dea77

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1026	Attachment 1I to the Hall-Ellis Declaration – SJSU Library Page for Ali, <i>available at</i> https://csu-sjsu.primo.exlibrisgroup.com/discovery/fulldisplay?docid=alma991072196389102901&context=L&vid=01CAL_SJO:01CAL_SJO&lang=en&search_scope=MyInst_and_CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,contains,2020%20IEEE%20Winter%20Conference%20on%20Applications%20of%20Computer%20Vision
1027	Attachment 1J to the Hall-Ellis Declaration – WorldCat for Ali, <i>available at</i> https://search.worldcat.org/title/1183029756
1028	Attachment 2A to the Hall-Ellis Declaration – MARC Record for He
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1031	Attachment 2D to the Hall-Ellis Declaration – arXiv Page for He, <i>available at</i> https://arxiv.org/abs/1703.06870
1032	Attachment 2E to the Hall-Ellis Declaration – SJSU Library Page for Ali, <i>available at</i> https://csu-sjsu.primo.exlibrisgroup.com/discovery/fulldisplay?docid=alma991068786465502901&context=L&vid=01CAL_SJO:01CAL_SJO&lang=en&search_scope=MyInst_and_CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,contains,2017%20IEEE%20International%20Conference%20on%20Computer%20Vision%20Workshops
1033	Attachment 2F to the Hall-Ellis Declaration – WorldCat for He, <i>available at</i> https://search.worldcat.org/title/1048182166
1034	He <i>et al.</i> , “Mask R-CNN,” <i>available at</i> https://ieeexplore.ieee.org/document/8237584
1035	Attachment 3A to the Hall-Ellis Declaration – MARC Record for Khan
1036	Attachment 3B to the Hall-Ellis Declaration – MARC Record for Khan

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1037	Attachment 3C to the Hall-Ellis Declaration – IEEE Xplore Page for Khan, <i>available at</i> https://ieeexplore.ieee.org/document/9093296
1038	Attachment 3D to the Hall-Ellis Declaration – ResearchGate for Khan, <i>available at</i> https://www.researchgate.net/publication/341400531_Lane_detection_using_lane_boundary_marker_network_with_road_geometry_constraints
1039	Attachment 3E to the Hall-Ellis Declaration – SJSU Library Page for Khan, <i>available at</i> https://csu-sjsu.primo.exlibrisgroup.com/discovery/fulldisplay?docid=alma991072196389102901&context=L&vid=01CALS_SJO:01CALS_SJO&lang=en&search_scope=MyInst_and_CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,contains,2020%20IEEE%20Winter%20Conference%20on%20Applications%20of%20Computer%20Vision
1040	Attachment 3F to the Hall-Ellis Declaration – WorldCat for Khan, <i>available at</i> https://search.worldcat.org/title/1183029756
1041	Attachment 4A to the Hall-Ellis Declaration – MARC Record for Workman
1042	Attachment 4B to the Hall-Ellis Declaration – LOC Entry for Image Processing Congresses
1043	Attachment 4C to the Hall-Ellis Declaration – LOC Entry for Artificial Intelligence Congresses
1044	Attachment 4D to the Hall-Ellis Declaration – Collection of Abstracts from the British Machine Vision Conference 2016
1045	Attachment 4E to the Hall-Ellis Declaration – Proceedings of the British Machine Vision Conference 2016, <i>available at</i> https://bmva-archive.org.uk/bmvc/2016/toc.html
1046	Attachment 4F to the Hall-Ellis Declaration – Proceedings of the British Machine Vision Conference 2016 Foreword, <i>available at</i> https://bmva-archive.org.uk/bmvc/2016/index.html
1047	Attachment 4G to the Hall-Ellis Declaration – British Machine Vision Conference 2016 Page for Workman, <i>available at</i> https://bmva-archive.org.uk/bmvc/2016/papers/paper020/index.html

Exhibit	Description
1048	Attachment 4H to the Hall-Ellis Declaration – arXiv Page for Workman, <i>available at</i> https://arxiv.org/abs/1604.02129
1049	Attachment 4I to the Hall-Ellis Declaration – Multimodal Vision Research Laboratory Page for Workman, <i>available at</i> https://mvrl.cse.wustl.edu/datasets/hlw/
1050	Attachment 4J to the Hall-Ellis Declaration – ResearchGate Page for Workman, <i>available at</i> https://www.researchgate.net/publication/317193732_Horizon_Lines_in_the_Wild
1051	Attachment 4K to the Hall-Ellis Declaration – BMVC History and Description, <i>available at</i> https://www.bmva.org/bmvc
1052	Attachment 4L to the Hall-Ellis Declaration – WorldCat for Workman, <i>available at</i> https://search.worldcat.org/title/34231812
1053	Khan YouTube Video (Mar. 20, 2020), <i>available at</i> https://www.youtube.com/watch?v=Lj-FylnEboQ&t=3280s
1054	Khan YouTube Webpage (Mar. 20, 2020), <i>available at</i> https://www.youtube.com/watch?v=Lj-FylnEboQ&t=3280s
1055	Ali YouTube Video (Mar. 20, 2020), <i>available at</i> https://www.youtube.com/watch?v=0RYqfwR5YNk
1056	Ali YouTube Webpage (Mar. 20, 2020), <i>available at</i> https://www.youtube.com/watch?v=0RYqfwR5YNk
1057	U.S. Patent Application Publication No. 2019/0034740 to Kwant <i>et al.</i> (“Kwant1”)
1058	U.S. Patent Application Publication No. 2019/0102674 to Kwant <i>et al.</i> (“Kwant2”)
1059	Complaint, <i>Motive Technologies Inc. f/k/a Keep Truckin, Inc. v. Samsara Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), Dkt. 1, February 15, 2024
1060	Order, <i>Motive Technologies Inc. f/k/a Keep Truckin, Inc. v. Samsara Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), Dkt. 52, June 4, 2024
1061	Transcript of the deposition of Scott Andrews

Exhibit	Description
1062	IEEE Intelligent Vehicles Symposium, <i>available at</i> https://ieeetitss.org/conf/iv/
1063	Mobileye About, <i>available at</i> https://www.mobileye.com/about/ [Including PDF of webpages and screen shots for clarity]
1064	<i>Intel buys driverless car technology firm Mobileye</i> , BBC News (Mar. 13, 2017), <i>available at</i> https://www.bbc.co.uk/news/business-39253422
1065	<i>BMW Group, Intel and Mobileye Team Up to Bring Fully Autonomous Driving to Streets by 2021</i> , BMW Group (Jan. 7, 2016), <i>available at</i> https://www.press.bmwgroup.com/global/article/detail/T0261586EN/bmw-group-intel-and-mobileye-team-up-to-bring-fully-autonomous-driving-to-streets-by-2021
1066	<i>The Road to Autonomous Driving: How BMW and Mobileye are Crowdsourcing Real-Time Data</i> , fxis.ai (Sept. 6, 2014), <i>available at</i> https://fxis.ai/edu/the-road-to-autonomous-driving-how-bmw-and-mobileye-are-crowdsourcing-real-time-data/
1067	F. Wu et al., “Decentralized Vehicle Coordination: The Berkeley DeepDrive Drone Dataset and Consensus-Based Models,” 2025 IEEE International Conference on Robotics and Automation (ICRA), Atlanta, GA, USA, 2025, pp. 2438-2444, doi: 10.1109/ICRA55743.2025.11127341. (https://ieeexplore.ieee.org/abstract/document/11127341)
1068	Fisher Yu and Haofeng Chen and Xin Wang and Wenqi Xian and Yingying Chen and Fangchen Liu and Vashisht Madhavan and Trevor Darrell, “BDD100K: Images 100K Dataset,” (2020) <i>available at</i> https://datasetninja.com/bdd100k
1069	F. Yu et al., “BDD100K: A Diverse Driving Dataset for Heterogeneous Multitask Learning,” 2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Seattle, WA, USA, 2020, pp. 2633-2642, doi: 10.1109/CVPR42600.2020.00271.
1070	Vijay Govindarajan, “Adaptive Prediction and Planning for Safe and Effective Autonomous Vehicles,” EECS Department, University of California, Berkeley, Technical Report No. UCB/EECS-2021-263, December 17, 2021,

Exhibit	Description
	https://www2.eecs.berkeley.edu/Pubs/TechRpts/2021/EECS-2021-263.html
1071	Yang Gao and Trevor Darrell, “End to End Learning in Autonomous Driving Systems,” EECS Department, University of California, Berkeley, Technical Report No. UCB/EECS-2020-5, January 8, 2020, https://www2.eecs.berkeley.edu/Pubs/TechRpts/2020/EECS-2020-5.html
1072	NVIDIA Video (December 7, 2016), <i>available at</i> https://www.youtube.com/watch?v=eeR5xDaNCJ8&pp=ygUOdHJldm9yIGRhcnJlbGw%3D
1073	NVIDIA Webpage (December 7, 2016), <i>available at</i> https://www.youtube.com/watch?v=eeR5xDaNCJ8&pp=ygUOdHJldm9yIGRhcnJlbGw%3D
1074	2017 BEARS: Panel 1 Video (February 21, 2017), <i>available at</i> https://www.youtube.com/watch?v=ltbufoOON8Y
1075	2017 BEARS: Panel 1 Webpage (February 21, 2017), <i>available at</i> https://www.youtube.com/watch?v=ltbufoOON8Y
1076	Harris, Mark, <i>The AI Dashcam App That Wants to Rate Every Driver in the World</i> , IEEE Spectrum (Jun. 15, 2016), <i>available at</i> https://spectrum.ieee.org/the-ai-dashcam-app-that-wants-to-rate-every-driver-in-the-world
1077	Trevor Darrell – EECS at UC Berkeley, <i>available at</i> https://www2.eecs.berkeley.edu/Faculty/Homepages/darrell.html
1078	PATH Directory, https://path.berkeley.edu/people/path-directory/
1079	About Us – PATH, https://path.berkeley.edu/about-us/
1080	PATH – Institute of Transportation Studies, <i>available at</i> https://its.berkeley.edu/research-centers/path
1081	Berkeley DeepDrive, <i>available at</i> https://deepdrive.berkeley.edu/
1082	Berkeley DeepDrive – Institute of Transportation Studies, <i>available at</i> https://its.berkeley.edu/research-centers/berkeley-deepdrive
1083	Mobileye Algorithms Developers, <i>available at</i> https://web.archive.org/web/20161228222811/http://careers.mobileye.com/Job-Search/R-D-Job-Description/Algorithms-

Exhibit	Description
	Developers/28375.aspx [Including PDF of webpages and screen shots for clarity]
1084	Ahmed Elgammal, <i>CS534 – Computer Vision Camera Calibration</i> , Rutgers University, <i>available at</i> https://people.cs.rutgers.edu/~elgammal/classes/cs534/lectures/Calibration.pdf
1085	Declaration of Dr. Trevor Darrell in Support of Petitioner’s Reply

I. INTRODUCTION

Motive’s attempts to distinguish the art using a narrow interpretation of art and “predictive model,” and its expert’s “revised” opinions. In the POPR, Andrews agreed Choe used predictive models for camera calibration, but now he shows a change of heart. *Compare* EX2003, ¶46, *with* POPR EX2003, ¶46.¹ Samsara still prevails because there is no dispute Khan/Ali identifies a horizon line “using” a predictive model. Indeed, both experts agree—Ali’s horizon estimation algorithm *uses* Khan’s CNN (a predictive model). EX1061, 44:16-22 (“[Q] To be clear, Algorithm 1 of Ali would use the CNN of Khan or the CNN of Khan plus the missing boundaries approach of Khan, right? ... [A] Yes.”); EX1003, ¶¶133-35; EX1085, ¶¶88-92. Motive’s remaining arguments fail as Samsara’s expert provides substantial evidence and motivations to combine (MTC). The Board should find all challenged claims unpatentable.

¹ Mr. Andrews’ POPR and POR declarations are both EX2003. To distinguish between them Samsara refers the POPR declaration as “POPR EX2003” and the “revised” POR declaration as “EX2003.”

II. MOTIVE'S NEW POSA HAS NO IMPACT

Motive's POSA, POR, 8-9, deviates from Samsara's POSA, Pet., 7-8.

Samsara POSA is proper since the '580 patent's Abstract and Summary emphasize machine learning and machine/computer vision. EX1001, (57), 1:18-2:8; EX1085, ¶¶6-20. Motive's POSA does not differ much because two-years of training/experience designing software for cameras/sensors in the automotive industry is similar two-years with machine learning and machine/computer vision algorithms because the automotive industry, and software designers for automotive camera/sensor systems, would have been heavily involved in machine learning and machine/computer vision applications for autonomous vehicles. EX1085, ¶¶6-15; POR, 8; EX1061, 105:10-13 (agreeing the art involved autonomous vehicles and a POSA would have been aware of computer vision techniques); EX1083 (job posting showing an entry-level position requiring these skills). Nor does adding automotive to the POSA rebut the Petition Grounds. If anything, "it is generally easier to establish obviousness under a higher level of ordinary skill in the art." *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1366 (Fed. Cir. 2012); EX1085, ¶¶10-19.

III. CLAIM CONSTRUCTION

Motive implicitly construes “predictive model” to exclude a geometric process (geometry). POR, 3-6. Neither the ’580 patent nor its prosecution history supports this exclusion.

A. “predictive model” does not exclude geometry.

No clear and unequivocal lexicographer or disavowal exists here, so there is no change to the plain and ordinary meaning. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315-16 (Fed. Cir. 2005).

The ’580 patent has no lexicographical definition of “predictive model” excluding geometry. EX1085, ¶¶31-49. Nor does Motive allege. Motive appears to argue disavowal. POR, 27-29.

The ’580 patent does not disavow geometry. Instead, the ’580 patent *encourages* using geometry. EX1085, ¶¶32-36. The Title is: “Camera Initialization for Lane Detection and Distance Estimation *Using Single-View Geometry*.” EX1001, (54) (emphasis added). The Description states “a geometric process can be performed to identify lane and horizon lines.” EX1001, 8:12-14. The ’580 patent incorporates U.S.App.17/173,950 for computing its inverse perspective mapping (IPM). EX1001, 14:34-36. The ’950 application states: “[T]he method estimates the IPM *using scene geometry* in the frames recorded by the camera.” EX2001, 6:6-7 (emphasis added); EX2001, 2:1-6, 6:41-47, 13:48-49, 14:18-26,

FIGS. 2, 8.

The '580 patent states: “[P]revious requirements of having three lane lines in frame (e.g., to geometrically calculate a horizon line) can be relaxed.” EX1001, 8:39-46. But “relaxing” a requirement does not disavow that requirement. The statement *relaxes* the requirement of needing three lane lines visible in the frame, not geometry. EX1085, ¶¶32-34. This is far from clear and unmistakable disavowal.

The '580 patent does not lexicographically define or otherwise limit “predictive model” to exclude geometry.

B. Prosecution does not support exclusion.

Contrary to Motive’s suggestion, the reasons for allowance had nothing to do with the “predictive model.” POR, 29-30. Rather, the Examiner maintained using geometry to identify the horizon line still satisfied this element. EX1002, 0169-70; EX1085, ¶¶37-50; EX1061, 132:14-133:8.

Motive’s Reply argued “Kwant1” did not use a predictive model to identify the horizon line because it predicts lane lines and then uses geometry to identify the horizon line. EX1002, 0145-46. But Motive also argued Kwant1 did not compute camera parameters or transmit an overlaid video to an annotator device for manual review, among other things. EX1085, ¶¶41-46 (citing EX1002, 0145-48).

The Allowance shows “predictive model” had nothing to do with allowance.

EX1085, ¶¶47-49. The reasons for allowance maintained Kwant1’s geometry satisfied “predictive model” but withdrew that Kwant1 disclosed Steps C-E.

EX1085, ¶47; EX1061, 132:14-133:8. The prosecution history does not support Motive’s narrow construction. It shows the opposite—that a predictive model could be satisfied when using geometry.

IV. GROUND 1

Motive’s arguments—that an expert witness cannot testify about how a POSA would have understood the art—are flawed. POR, 16, 21; Section IV.A. Motive improperly alleged that art must disclose claim elements verbatim. A reference may be relied upon for all that it would have reasonably suggested to a POSA, including nonpreferred embodiments. M.P.E.P. § 2123. When Choe’s full disclosure is viewed by a POSA, it teaches or suggests every claim element².

A. Samsara properly relies on expert testimony.

Motive incorrectly alleges a petitioner cannot rely on expert’s to interpret how a POSA would have understood art. POR, 10, 16, 21. “Experts may testify about the teachings of the prior art and how they relate to the patentability of the

² If the claims require a specific predictive model, *see* Choe/Khan/Ali (Grounds 2/5) and Choe/Workman (Grounds 3/6). EX1085, ¶59.

challenged claims.” Consolidated Trial Practice Guide (“CTPG”) at 35.

Motive cites two inapplicable *Qualcomm* cases. POR, 16, 21. These cases determined a Ground cannot be “based on” applicant admitted prior art (“AAPA”). In *Qualcomm*, the Ground was “based on” AAPA being styled “Applicants Admitted Prior Art (AAPA) in view of Majcherczak” and relying on the patent’s figure as the primary reference. *Qualcomm Inc. v. Apple Inc.*, 134 F.4th 1355, 1360 Fed. Cir. 2025). In contrast, this Petition has no AAPA. Nor does it rely on the expert to fill holes in the art, as the art teaches or suggests all the claim features. Rather, Samsara relies on Dr. Darrell to *confirm* the art’s teachings, which is allowable. CTPG at 35.

Motive wrongly alleges, at POR, 9-10, that Dr. Darrell “reports no experience in the automotive industry or the design of automotive sensor systems or any other factual basis to be knowledgeable about such ordinary knowledge or level of skill.” Even a cursory review of Dr. Darrell’s *CV* shows he is an expert in computer vision, artificial intelligence, and their application to the automotive industry. EX1004. For example, he has numerous automotive industry publications, collaborated with industry-leading companies, and directs organizations to develop autonomous driving technologies. EX1085, ¶¶20-30. Motives’s argument is thus belied by the evidence of Dr. Darrell’s qualifications. The Board should credit his testimony and give it the full weight it deserves.

B. Choe “identif[ies] one or more lines in the video using a predictive model, the one or more lines including a horizon line.”

Motive agrees Choe discloses a method “identif[ying] one or more lines ... the one or more lines including a horizon line.” POR, 11. Motive also does not dispute Choe discloses “predictive models.” POR, 13. The dispute is instead whether Choe identifies the horizon line “using a predictive model.”

Motive argues Choe uses “algorithms” instead of “predictive models” to determine the horizon line during calibration. POR, 13. But Motive reads Choe and the ’580 patent too narrowly. In Choe, “machine learning engine 122 generates or trains a set of rules, algorithms, *and/or predictive models 124* for a variety of purposes.” EX1005, [0030] (emphasis added). When referring to camera calibration, Choe refers to “algorithms 124,” EX1005, [0030], but a POSA reading Choe understood predictive models 124 could also supplement or replace algorithms 124 for camera calibration. EX1005, [0030]; EX1085, ¶¶51-53. Indeed, this was Motive’s expert’s initial interpretation of Choe before he changed his mind. *Compare* POPR EX2003, ¶46, *with* EX2003, ¶46.

Motive takes issue with Choe’s use of the “camera’s hardware settings” to determine the horizon line. POR, 11-12. Although Choe states “perception module 302 determines a horizon line based on the camera’s hardware settings,” EX1005, [0048], Choe does not specify the horizon line is based *only on* hardware settings. EX1085, ¶54. Nor does the ’580 patent’s “predictive model” exclude the use of

camera hardware settings. EX1085, ¶57. Claim 1 does not limit inputs the predictive model uses and the precise algorithm performed.

Motive argues Choe’s “predictive models 124” are not “predictive models” because they are based on driving statistics. POR, 13. The ’580 patent does not limit which inputs are used for the predictive model. EX1085, ¶55. Regardless, Choe also does not say predictive models 124 are based *only on* driving statistics, which suggests other inputs could be used. EX1085, ¶¶55-58. Ultimately, as Motive’s expert admitted, Choe does not prohibit image data from training predictive models 124 and does not prohibit predictive models from being used for sensor calibration. EX1061, 76:13-24.

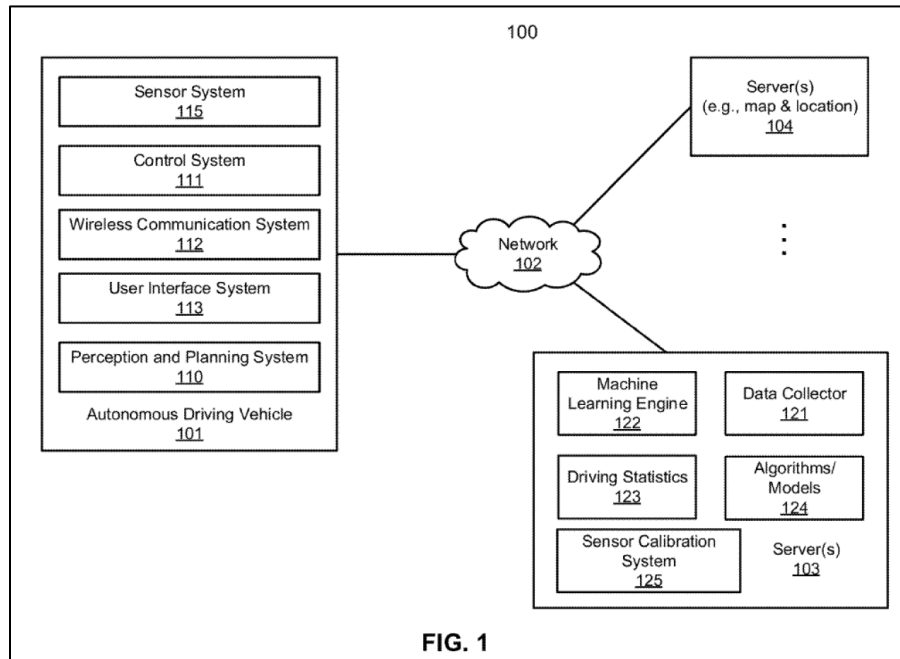
Because Choe uses predictive models various purposes, including camera calibration, a POSA would have understood Choe at least suggests using predictive models to identify the horizon line. EX1003, ¶¶90-97.

C. Choe “receiv[es], over a network from a camera device, a video comprising a set of image frames.”

Motive agrees Choe’s sensor can be a video camera. EX1005, [0022] (“Cameras 211 may be still cameras and/or video cameras.”); EX1061, 98:22-99:1. Motive agrees a video comprises a set of image frames. POR, 16; EX1061, 99:2-3. The dispute appears to be whether Choe receives a video “over a network.” POR, 16-17. It does.

Choe receives a video “over a network” in both its online and offline

calibration processes. When Choe calibrates a video camera 211 offline, a video is received “over a network” because Choe performs offline sensor calibration at server 103. EX1005, [0031], [0044]. Server 103 receives the captured sensor data—in this case a video—over network 102. Pet., 25-26; EX1003, ¶¶87-89.



EX1005, FIG. 1.

During online calibration, a video is also received “over a network.” EX1005, [0017], [0054]. Similar to the ’580 patent’s use of a CAN bus, Choe’s “components 110-115 may be communicatively coupled to each other via a controller area network (CAN) bus.” EX1001, 3:58-60, FIG. 1; EX1005, [0021]. When Choe’s system 110 receives a video from system 115, it would therefore do so over the CAN (a network). EX1061, 122:10-15 (Mr. Andrews admitting the ’580 patent refers to the CAN as a network). Choe therefore discloses this element

for its online calibration.

Motive's argument, POR, 16, that Choe analyzes only single frames is also incorrect. Choe's Figures 6A and 6B show a calibration process on "a set of image frames." EX1003, ¶86. Choe analyzes at least two frames of the video—frames 1109 and 1110. Motive's expert agrees two image frames is a "set" of image frames. EX1061, 103:19-20.



EX1006, FIGs. 6A, 6B (excerpted and annotated).

D. Choe “comput[es] at least one camera parameter based on the one or more lines.”

Motive alleges Choe does not compute a camera parameter based on the horizon line. POR, 17-18. Motive also alleges Choe only computes calibration factors, not camera parameters. POR, 18. Motive is incorrect.

First, Choe uses the initial horizon line to compute a calibration factor for the camera’s pitch angle. Pet., 28. Choe explains: “[a] first calibration factor or first correction value is determined for calibrating a pitch angle of the camera based on a difference between the initial horizon line and the updated horizon line.” EX1005, [0049]. Because this calibration factor is explicitly derived from the difference between the initial and updated horizon lines, it relies and is based on both the initial and updated horizon line. EX1085, ¶63. That calibration factor is used to compute the camera’s pitch angle of the camera. EX1005, [0049]; EX1085, ¶63. Because pitch angle is computed using a calibration factor derived from the initial horizon line, pitch angle itself is also based on the initial horizon line. EX1003, ¶¶43-44, 98; EX1085, ¶63.

Second, calibration factors are “camera parameters” because they relate to the camera itself and are associated with one or more operating characteristics of the camera. EX1085, ¶¶60-62. But even if calibration factors were not camera parameters, Choe uses calibration factors to compute the camera’s pitch, yaw and roll. EX1005, [0049], [0052], [0053]. There is no dispute pitch, yaw, and roll are

“camera parameters.” EX1003, ¶43; EX1085, ¶62; EX1061, 10:1-3; EX1001, claim 10.

E. Choe “generate[s] an overlaid video” and “transmit[s] the overlaid video to an annotator device.”

Motive alleges Choe generates/transmits overlaid images, not video. POR, 18-20. But Motive interprets Choe too narrowly. While Choe is clear *in some embodiments*, the camera captures still images used during calibration, Choe states “[c]ameras 211 may be still cameras *and/or video cameras*.” EX1005, [0022] (emphasis added). A POSA using a video camera understood the calibration process would generate an overlaid video—or at least a set of overlaid video frames. Pet., 29; EX1003, ¶103. The user interface is overlaying frames 1109 and 1110. Two image frames is a “set” of image frames. EX1061, 103:19-20.





EX1006, FIGs. 6A, 6B (excerpted and annotated).

Motive alleges the overlaid video requires a “set” of image frames, POR, 18-19, which Choe discloses.

F. Claim 2

Motive alleges Choe does not disclose a predictive model to identify lane lines. POR, 20-21. But Choe uses a predictive model/algorithm for calibration, which predicts not only the horizon line but also lane lines 621-623. Section IV.B; EX1003, ¶¶113-114.



EX1006, FIG. 6A (excerpted and annotated).

G. Claims 3 and 4

Motive suggests the predictive model(s) must *directly* predict the camera parameter. POR, 21-23. But the claims only require using predictive model(s). Choe teaches this. Pet., 34-35.

Choe uses multiple predictive models to predict the horizon line and camera parameters (claim 4). Choe states: “machine learning engine 122 generates or trains a set of rules, algorithms, and/or *predictive models 124 [(plural)]* for a variety of purposes.” EX1005, [0030] (emphasis added). One of the purposes is to identify the horizon line, which is then used to predict and adjust pitch, yaw, and roll (camera parameters). Sections IV.B and IV.D.

Since Choe uses multiple predictive models (claim 4), Choe’s pipeline also

uses the first predictive model (claim 3).

V. GROUND 2

A. MTC

Contrary to Motive's allegation, POR, 32, Dr. Darrell did not provide merely "conclusory statements" to support the MTC. EX1003, ¶¶121-131. He explained why a POSA would have combined Choe-Khan/Ali and supporting *KSR* rationales. *Id.*

According to Motive, Samsara did not "identify any 'known problem' or shortcoming in Choe for which the Khan/Ali methodologies provide a suitable solution." POR, 34. Not so. Dr. Darrell explained Choe uses predictive models/algorithms for camera calibration. EX1003, ¶93. Since Choe does not explicitly disclose which predictive models it uses, a POSA would have used other references that explain how predictive models were used, especially for camera calibration. EX1003, ¶121. This would have led to Khan/Ali. *Id.* Motive's expert likewise found this shortcoming in Choe: "Choe does not actually describe how 'predictive models' are used for any purpose." EX2003, ¶90; EX1061, 94:3-4 ("It would be nice if [Choe] provided more detail on that, but he doesn't.").

Dr. Darrell explained advantages of using Khan/Ali's predictive models. EX1003, ¶¶123-127. He provided quantitative, reported results from Khan/Ali showing the improvement over other systems. EX1003, ¶123 (+7.8%, +6.8%, and

+1.2% improvement over state-of-the-art datasets). He explained Khan/Ali was advantageous because its system predicts the horizon line for camera calibration even when lane lines were missing. *Id.* And he identified excerpts in Ali that would have motivated a POSA—e.g., the models were “simple, intuitive,” “computationally inexpensive, and [] data-domain invariant.” EX1003, ¶127 (citing EX1008, 1107).

Mr. Andrews’s claim Choe does not care about accuracy is inaccurate. EX1085, ¶69. Contrary to Mr. Andrews’s argument, EX1061, 79:2-17, more accurate lane and horizon predictions were directly pertinent to Choe. EX1085, ¶¶69-73. Choe performs camera calibration “while the vehicle is driving and real-time images are captured.” EX1005, [0017], [0054]. Khan/Ali’s ability to more accurately predict lane and horizon lines would have improved real-time calibration such that the camera would calibrate faster and any manual calibration could be reduced. EX1003, ¶¶123-27; EX1085, ¶64-68. Rather than ignore processes that improved accuracy, a POSA would have been motivated to implement them to improve the safety of Choe’s system. EX1085, ¶¶64-75.

Motive fails to rebut Dr. Darrell’s *KSR* rationales. EX1003, ¶¶128-131. He explained why combining Choe-Khan/Ali would have combined known elements according to known methods to yield predictable results. EX1003, ¶128. The combination would have used a known technique to improve similar devices in the

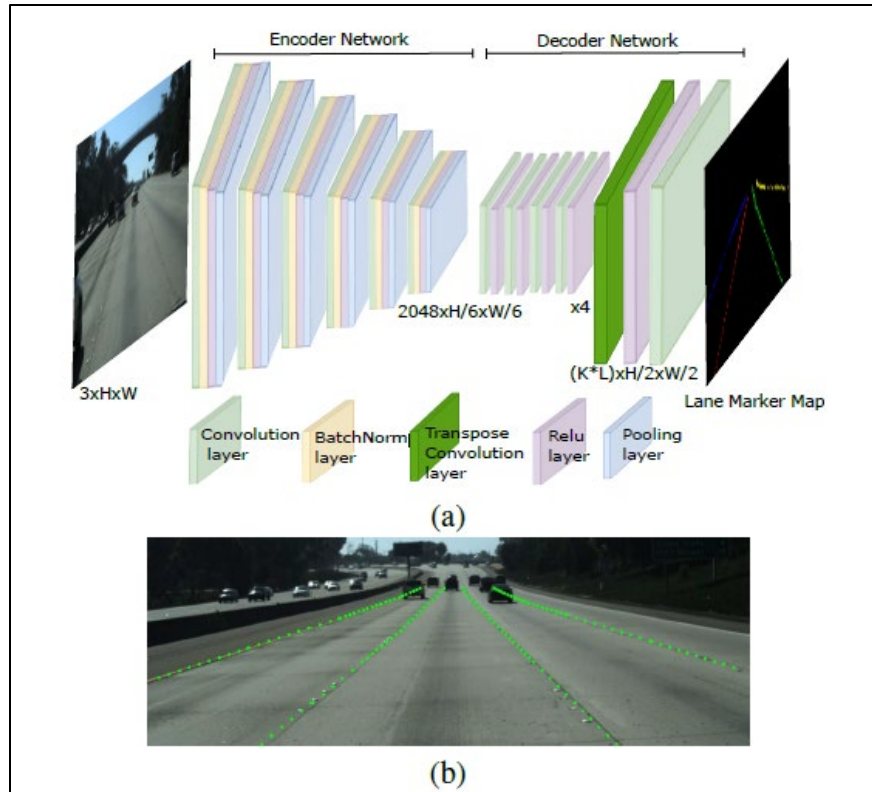
same way. EX1003, ¶129. And Choe's camera calibration process was ready for improvement. EX1003, ¶130.

Motive also argues the Board should discredit Dr. Darrell's MTC because the parties propose different POSAs. POR, 9. But Motive's new POSA does not materially impact Dr. Darrell's analysis. EX1085, ¶75; Section II; *Kinetic Concepts*, 688 F.3d at 1366; EX1085, ¶¶16-19.

B. Choe-Khan/Ali “identif[ies] one or more lines in the video using a predictive model, the one or more lines including a horizon line.”

Motive is incorrect in arguing that Khan/Ali do not disclose a “predictive model” and that “predictive model” excludes geometry. POR, 24; Section III. But even under its narrow construction, Khan/Ali discloses a predictive model used to identify lane lines and a horizon line. EX1085, ¶¶76-110.

Both experts agree Khan's CNN is a “predictive model.” EX1085, ¶¶79-93; EX1061, 28:21-29:1, 31:11-25, 34:2-10. Khan states: “We use a simple encoder-decoder based Convolutional Neural Network (CNN) to detect keypoints or markers (used interchangeably) along the lane boundaries.” EX1007, 1824. Khan's Figure 2 shows a CNN has an encoder network (a backbone) and a decoder network (a head), like the '580 patent. EX1085, ¶¶81-87; EX1061, 33:4-34:10.

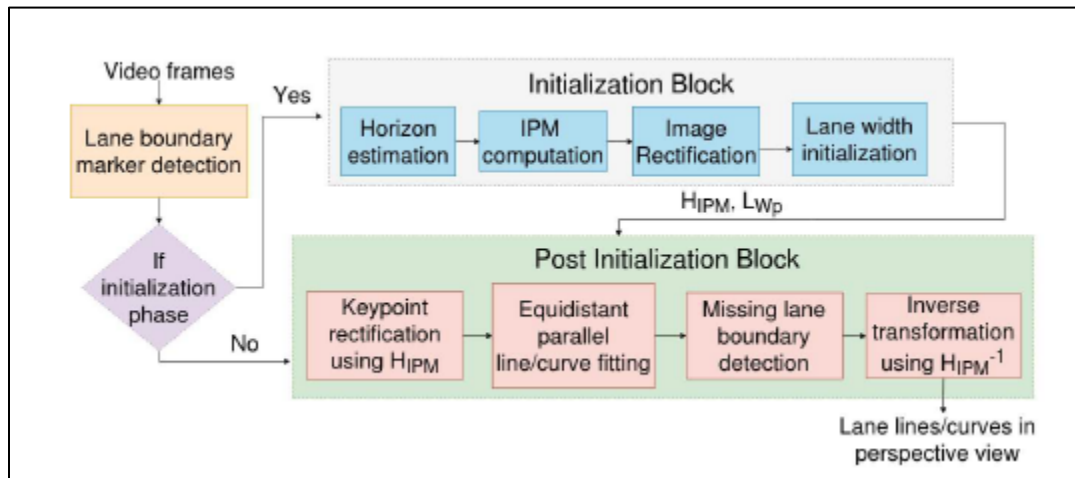


EX1007, FIG. 2.

Also like the '580 patent, Khan/Ali uses its CNN to identify the horizon line, not just lane lines. EX1085, ¶¶88-92. Both experts agree Khan/Ali deploys the CNN at the box labeled “Lane boundary marker detection.” EX1085, ¶¶92-93; EX1061, 34:12-21.³ When Khan/Ali performs initialization, the output of the CNN

³ Motive points out Khan/Ali “take motivation from keypoint detection in Mask-RCNN.” EX1007, 1825. Although Khan/Ali does not use the identical Mask-RCNN previously known in the literature, it nonetheless “uses” a CNN (a predictive model) to identify lane and horizon lines. EX1085, ¶¶72-93.

is input into the horizon estimation step to identify the horizon line. EX1085, ¶¶88-92; EX1061, 40:8-41:15, 43:18-44:1, 46:21-25; EX1008, 1104 (Algorithm 1, “Input: Detected markers by lane detector”).



EX1007, FIG. 3.

Andrews agrees Ali’s horizon estimation algorithm “uses” Khan’s CNN: “[Q] To be clear, Algorithm 1 of Ali would use the CNN of Khan or the CNN of Khan plus the missing boundaries approach of Khan, right? ... [A] Yes.” EX1061, 44:16-22. Ali’s horizon estimation algorithm uses the CNN (a predictive model) to identify the horizon line. Therefore, Khan/Ali identifies the horizon line “using a predictive model”.

Dr. Darrell explained why Ali’s horizon estimation algorithm, not just the CNN, is a predictive model under the plain and ordinary meaning. EX1003, ¶137; EX1085, ¶¶94-96. Ali’s algorithm determines the forward and lateral vanishing point for each frame in the video based on markers for the lane lines. EX1085, ¶95;

EX1008, 1104. It uses RANSAC, a well-known predictive modeling tool, to find the best fitting horizon line across the video. EX1085, ¶95; EX1008, 1104. Similar to Khan/Ali, the '580 patent determines markers for the lane lines and “fits one or more lines to the markers.” EX1001, 13:20-21. Khan/Ali’s horizon estimation algorithm works substantially the same as the '580 patent, so there is no justifiable reason to exclude Khan/Ali’s horizon estimation algorithm from the claim. EX1085, ¶96.

Dr. Darrell explained why Khan(/Ali)’s Figure 3 entire End2End algorithm is a predictive model. EX1003, ¶138; EX1085, ¶¶97-106. The '580 patent does not limit the recited predictive model to a single step/algorithm. EX1085, ¶100. Nor does the '580 patent exclude pre- or post-processing from the predictive model. EX1085, ¶¶101-106. Accordingly, the algorithm is also a model that predicts the lane lines and the horizon line. EX1085, ¶¶97-106; EX1007, FIG. 3.

The predictive model is satisfied by: (1) Khan’s CNN; (2) Ali’s horizon estimation algorithm; and (3) Khan/Ali’s End2End algorithm.

C. Choe-Khan/Ali discloses the other disputed elements.

Motive is incorrect that “Petitioner relies exclusively on Choe with respect to the other limitations of claim 1.” POR, 31. Samsara relied on Choe-Khan/Ali for every limitation because, under obviousness, grounds of unpatentability are based on combinations—not references in isolation. *In re Keller*, 642 F.2d 413 (CCPA

1981); Pet., 36-46.

For example, Choe-Khan/Ali would receive a video over a network and then use a predictive model to identify a horizon line in the video because Khan/Ali—like Choe—performs its process on a video. EX1007, 1827 (“[e]stimation of horizon and IPM on a short video clip”); EX1008, 1104 (Algorithm 1, finding the horizon line on each frame in a video); EX1061, 49:1-4, 52:20-53:1; EX1085, ¶¶111-114. Choe-Khan/Ali would compute a camera parameter based on the identified lines because Khan/Ali computes camera parameters using the same equations as the ’580 patent. *Compare* EX1007, 1826, *with* EX1001, 14:20-33; EX1061, 51:20-24, 58:8-13, 59:6-15, 60:2-61:17.

D. Claim 2

Motive incorrectly characterizes Samsara’s position as requiring *Ali*’s horizon estimation algorithm to identify lane lines by itself. POR, 36-37. This is not Samsara’s position. Samsara presented two ways Khan/Ali satisfies claim 2. Pet., 41-43.

First, Khan/Ali’s lane boundary marker detection algorithm, inspired by Mask-RCNN, is a predictive model identifying lane lines. Pet., 41-43; EX1007, FIG. 2. That same predictive model is used to identify a horizon line because the output is used as an input to Ali’s horizon estimation algorithm. Pet., 41. Namely, horizon prediction could not occur without using the lane detection model. The

predictive model is therefore used to identify both lane lines and the horizon line.

EX1003, ¶¶133-36; EX1085, ¶¶88-93. Indeed, Motive's expert agrees Ali's horizon estimation algorithm uses Khan's CNN. EX1061, 44:16-22.



```
Algorithm 1: Best fitting Horizon ( $l_h$ ) estimation

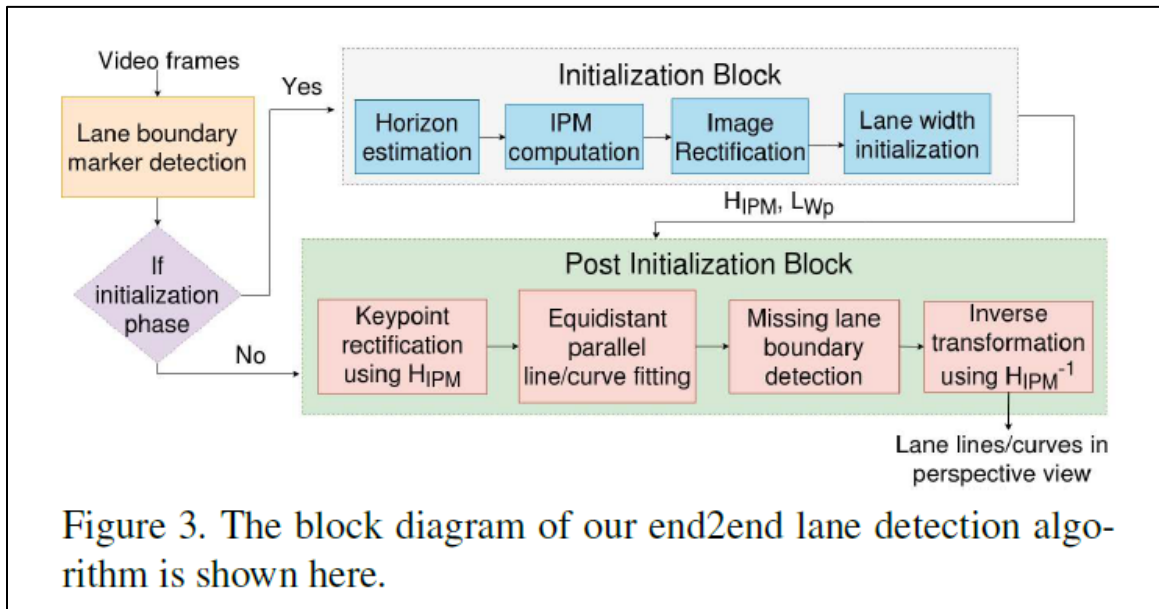

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Input: Detected markers by lane detector
Output: Estimated Horizon line
1 Find forward and lateral VP for each frame in a video:
2 initialize;
3 for  $i \leq \text{num\_frames in video}$  do
4   Fit lines to keypoints ( $B = \text{num\_lines}$ ) ;
5   if  $B \geq 2$  then
6     for  $j \leq {}^B C_2$  do
7        $\text{forward\_vp}_{i_j} = \text{crossprod}(\text{line}_1, \text{line}_2)$ 
8     end
9   end
10  if  $B \geq 3$  then
11    for  $k \leq {}^B C_3$  do
12      Get  $\text{lateral\_vp}_{i_k}$  using cross ratios as described
        in Section 3.2.2
13    end
14  end
15 end
16 RANSAC for best fitting horizon across video:
17 initialize;
18  $s = \text{random\_int between 1 to num\_forward\_vps}$ ;
19  $t = \text{random\_int between 1 to num\_lateral\_vps}$ ;
20 while  $\text{iterations} \leq t$  OR  $\text{num\_inliers} \leq \text{max\_inliers}$  do
21   Fit line  $l_h$  to  $\text{forward\_vp}(s)$  and  $\text{lateral\_vp}(t)$ ;
22   if  $\text{dist}(l_h, \text{forward\_vp}(s)) \leq \text{threshold}_s$  &
      $\text{dist}(l_h, \text{lateral\_vp}(t)) \leq \text{threshold}_t$  then
23     record and count inlier points
24   end
25 end
```

EX1008, 1104 (annotated).

Second, the entire End2End detection algorithm is the “predictive model” because it identifies lane lines and a horizon line. Pet., 43. Although Motive's expert alleges the entire pipeline cannot be a single model, he cites nothing to

support this narrow interpretation. EX2003, ¶95.



EX1007, FIG. 3.

Nor does Motive’s expert show a “model” cannot have initialization and/or post-initialization steps. EX2003, ¶95. In fact, the ’580 patent specifies the “model” has steps to determine lane lines and a horizon line with other pre- and post-initialization steps. EX1001, 2:21-23, 4:47-57, FIG. 3B. These steps are not excluded from the scope of “model.”

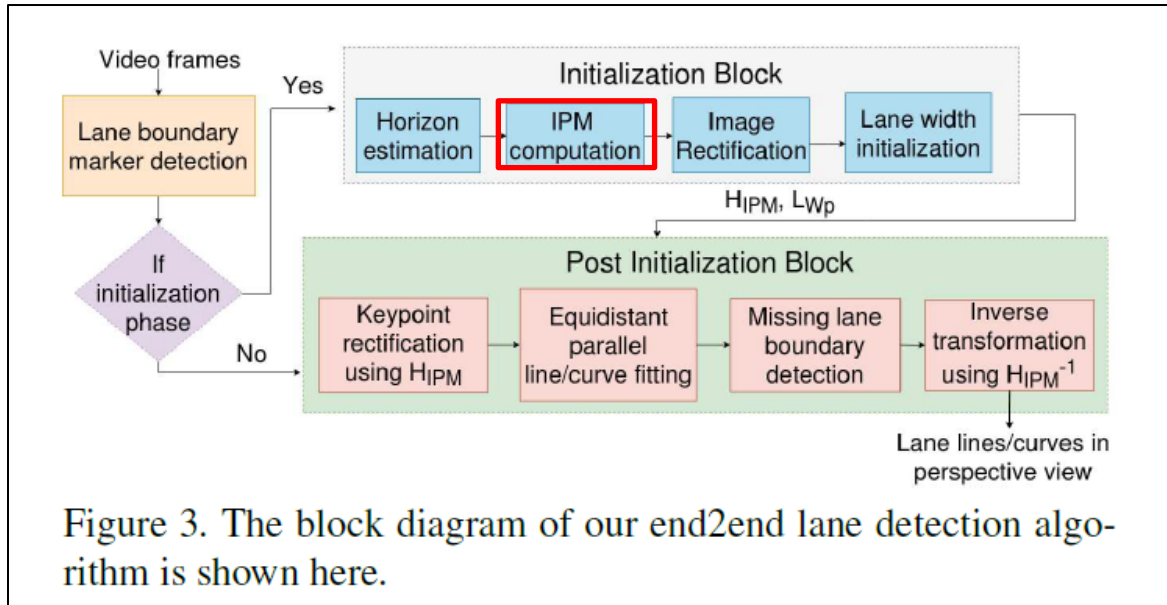
E. Claim 3

Motive argues that Samsara relies on IPM, but “IPM is not mentioned as part of the ‘predictive model’ identified for limitation [1B]: Mask-RCNN or RANSAC.” POR, 37. Again, this mischaracterizes Samsara’s argument and the claims. Similar to claim 2, Samsara relied on two alternative arguments.

First, Khan/Ali’s lane detection and horizon estimation include at least one

predictive model. Pet., 41-43. The output from these predictive model(s) is input to the IPM computation, which computes camera parameters. Pet., 42. Because the predictive models are necessary for the IPM computation, Khan/Ali *uses* the predictive model(s) to predict camera parameters.

Second, if the End2End detection algorithm is a predictive model, that predictive model would also identify the camera parameters because the IPM computation is part of the End2End detection algorithm.



EX1007, FIG. 3 (annotated).

F. Claim 4

No POR arguments for claim 4.

G. Claim 5

Contrary to Motive's argument at POR, 38, Samsara did not fail to account for the dependency of claim 5. Samsara showed Khan/Ali's IPM computation

predicts “a camera height and road plane normal.” Pet., 44-45. Consistent with claim 1, these camera parameters are computed “based on the one or more lines” because the IPM computation is “*after*, and based on, the lane boundary marker detection and horizon estimation.” Pet., 45; EX1007, 0005; EX1061, 51:20-24, 58:11-13, 59:6-15. In fact, Khan uses the same equations for IPM as the ’580 patent. *Compare* EX1007, Section 3.2.2, *with* EX1001, 14:20-33; EX1061, 60:2-61:17.

Motive is also incorrect Samsara did not show the combination would transmit data representing the camera height and road plane normal to the camera. POR, 38. A purpose of both Choe and Khan/Ali is to calibrate/initialize a camera based on the computed camera parameters. *E.g.*, EX1005, [0001]; EX1007, 0004-05; EX1008, 0004-06. And Choe explains data representing the calibration parameters are transmitted back to the camera. EX1005, [0031], [0044], [0047], Pet., 43; EX1003, ¶¶111-12. In the combination, data representing the camera height and road plane normal would therefore be transmitted to the camera device. EX1003, ¶¶111-12.

VI. GROUND 3

A. MTC

Motive's arguments against the MTC fail for similar reasons as Ground 1—Dr. Darrell's MTC is supported and grounded in record evidence. EX1003, ¶¶146-150.

Motive argues a POSA would not have looked for other references because Samsara did not identify any shortcoming in Choe. POR, 43. Not so. Dr. Darrell explains Choe uses predictive models/algorithms for camera calibration. EX1003, ¶93. But Choe does not explicitly disclose which predictive models it uses, so a POSA would have used other references explaining how predictive models were used, especially for camera calibration. EX1003, ¶121. This would have led to Workman. *Id.* Motive's expert likewise found this shortcoming in Choe: "Choe does not actually describe how 'predictive models' are used for any purpose." EX2003, ¶90; EX1061, 94:3-4 ("It would be nice if [Choe] provided more detail on that, but he doesn't.").

Motive incorrectly argued "[the expert] relied on the ... patent itself as [his] roadmap for putting ... pieces of a 'jigsaw puzzle' together." POR, 44 (changes in original). Rather than using the '580 patent, Dr. Darrell cites Choe-Workman. EX1003, ¶¶146-150. He explains how Choe does not provide full details on its predictive models or precisely how Choe identifies the horizon line. EX1003,

¶¶146-49. To better understand how this process was performed, a POSA would have searched for references and found Workman, which identifies the horizon line faster than the state-of-the-art methods. EX1003, ¶¶146-149. In fact, Workman explains its process is “several orders of magnitude faster than current state-of-the-art methods” and requires “only milliseconds per image” while still being accurate. EX1011, 1-2.

Motive alleges Choe does not care about speed - untrue. EX1085, ¶¶123-126. Contrary to Motive’s argument, POR, 47-49, faster image processing is directly pertinent to Choe. EX1085, ¶¶124-128. Choe performs camera calibration “while the vehicle is driving and real-time images are captured.” EX1005, [0017], [0054]. Workman’s ability to predict horizon lines faster would have therefore sped up Choe’s real-time calibration process. EX1003, ¶¶148-149; EX1085, ¶126. Rather than ignore faster processes, a POSA would have been motivated to implement them to improve the safety of Choe’s autonomous vehicle. EX1085, ¶126.

Motive incorrectly states “[t]he Workman paper does not mention or compare its performance with Choe or any similar camera calibration system.” POR, 47. Workman states its process is “several orders of magnitude faster than current state-of-the-art methods *which focus on vanishing points*.” EX1011, 1 (emphasis added). This comparison is directly relevant to Choe, which focuses on

the vanishing point for the horizon line. EX1005, [0015], [0044], [0048], [0058], FIG. 7, claim 1, Abstract. Samsara's expert explains a POSA would have appreciated Workman's faster process and understood it could be implemented in other systems, such Choe's. EX1003, ¶¶148-149; EX1085, ¶¶115-127.

Next, Motive argues the Board should discredit Dr. Darrell's MTC because of the competing POSAs. POR, 45. Motive's is wrong. EX1085, ¶128. Section II, V.A.

Finally, Motive's argument that Workman does not relate to the automotive industry is incorrect. POR, 46. The second sentence of Workman's introduction states: "[k]nowledge of the horizon line enables a wide variety of applications, including: ... geometrically biased pedestrian and vehicle detection." EX1011, 1. Workman's figures also show it applies to vehicles:



EX1011, FIG. 5 (excerpted).

Regardless, Motive does not dispute Workman is analogous art published before the claims. The knowledge contained therein would have been available to a POSA to combine with Choe, and there is substantial evidence supporting the combination. EX1003, ¶¶146-50; EX1085, ¶¶118-122.

B. Choe-Workman identify a horizon line in a video.

Motive does not dispute Workman uses a predictive model to identify a horizon line. POR, 49-50. Motive instead argues Workman's predictive model does not identify the horizon line *in a video*. POR, 49-50. But one cannot show non-obviousness by attacking references individually. *Keller*, 642 F.2d 413.

When combined with Choe, *the combination* uses a predictive model on a video because Choe performs camera calibration on videos and video frames. Section IV.C; EX1005, [0022]; EX1006, FIGs. 6A, 6B. When using Workman's predictive model on Choe's video frames, the combination would perform step [1B]. EX1085, ¶125.

C. Claims 2-4

Motive alleges the Petition did not show Choe-Workman uses "the" predictive model to identify a lane line (claim 2) or a camera parameter (claims 3 and 4). POR, 52. Choe uses the horizon line to identify lane lines and camera parameters. Section IV.B; EX1005, [0015]-[0016], [0048]-[0049]; Pet., 33-35. Since determining the lane lines and camera parameters are downstream in Choe's

pipeline that depend on the initial horizon line, the predicted lane lines and camera parameters are identified “using” the predictive model that identifies the horizon line.

VII. GROUND 4

A. MTC

Motive’s argument that a POSA would not have combined Choe-Westmacot because “*Westmacot* teaches away for [sic] doing any camera calibration” is misplaced. POR, 56 (emphasis added); EX1085, ¶¶129-140.

First, Westmacot does not teach away from camera calibration—it merely has a *preference* for not requiring calibration, stating: “*Preferably* the expected road structure is determined ... without any requiring any [sic] calibration of the image capture device.” EX1010, 5:25-31; EX1085, ¶¶133-134. “[A] reference does not teach away if it merely expresses a general preference for an alternative invention but does not criticize, discredit or otherwise discourage investigation into the claimed invention.” *UCB, Inc. v. Actavis Labs, UT, Inc.*, 65 F.4th 679, 692 (Fed. Cir. 2023).

Second, Westmacot’s preference for not requiring calibration is specific to calibrating intrinsic properties of the camera, such as the camera’s focal length and other specific calibration required for the internal characteristics of a camera. EX1085, ¶¶129-132. Westmacot is *not* teaching away from calibrating extrinsic

properties of the camera, such as the camera's pose relative to the road plane normal. EX1085, ¶131. In fact, Westmacot explicitly states systems should “measur[e] a relative rotational orientation of an image capture device within a vehicle.” EX1010, 9:4-5.

Third, *Choe* does not teach away from computing camera height and the road plane normal, as taught by Westmacot. EX1085, ¶¶136-139. Nor does Motive allege. As Dr. Darrell explained, Westmacot provides the math and explains the camera height and road plane normal are required. EX1003, ¶161. Nothing in *Choe* states the camera height and road plane normal should not be calculated.

Fourth, Westmacot's ability to use only image data to annotate video frames with lane and horizon lines *supports* the motivation to combine, not rebut it. EX1085, ¶135. Westmacot explains using image processing instead of conventional calibration techniques would enable the system to use “inexpensive and un-calibrated equipment, such as a mobile phone or dash-cam costing a few hundred pounds[/dollars].” EX1010, 37:10-13. If Choe had a similar feature, this would decrease the cost of the system.

In addition to this MTC, Dr. Darrell provided ample evidence to support the MTC. EX1003, ¶¶159-74; EX1085, ¶¶139-140.

B. Claims 5-7

The Choe-Westmacot combination also discloses the additional elements in claims 5-7. Pet., 61-73.

For claim 5, Motive alleges Westmacot does not compute the camera height and road plane normal based on the lane lines or horizon line. POR, 57. But Motive again attacks references individually instead of the combination. POR, 57-58 (attacking Westmacot individually).

Choe computes camera parameters based on the lane and horizon lines and transmits those parameters back to the camera. Pet., 28. In combination, these camera parameters include camera height and road plane normal, as taught in Westmacot, because those parameters are needed to accurately determine the camera's position relative to the road. Pet., 62. *The combination* discloses the elements in claim 5.

No POR arguments for claims 6 and 7.

VIII. GROUND 5

Motive alleges “Petitioner fails to provide any motivation of why a POSA would combine Choe, Westmacot, Khan, and Ali all together.” POR, 58. Not so. The motivation to use Khan/Ali's predictive model in Choe is articulated in Ground 2. Pet., 36-40. And the motivation to compute the camera height and road plane normal in Choe's system, as described in Westmacot, is articulated in

Ground 4. Pet., 53-60. These rationales are independent and relate to different parts of Choe's system. EX1085, ¶¶141-143. If a POSA were to make both combinations, the result would disclose every element of the challenged claims. EX1085, ¶¶141-143.

IX. GROUND 6

Motive alleges "Petitioner fails to provide any motivation of why a POSITA would combine Choe with both Westmacot and Workman." POR, 59. Not so. The motivation to use Workman's predictive model in Choe is articulated in Ground 3. Pet., 47-49. And the motivation to compute the camera height and road plane normal in Choe's system, as described in Westmacot, is articulated in Ground 4. Pet., 53-60. These rationales are independent and relate to different parts of Choe. EX1085, ¶¶141-143. If a POSA were to make both combinations, the result would disclose every element of the challenged claims. EX1085, ¶¶141-143.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))

1. This Petitioner's Reply complies with the type-volume limitation of 5,600 words, comprising 5,535 words, excluding the parts exempted by 37 C.F.R. § 42.24(c).

2. This Petitioner's Reply complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word 2016 in 14-point Times New Roman font.

Respectfully submitted,

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CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e))

I certify that the above-captioned **PETITIONER'S REPLY TO PATENT OWNER RESPONSE** and associated Exhibits 1061-1085 were served in their entirety upon the Patent Owner on February 11, 2026, upon the following parties via email:

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