IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

AUTONOMOUS DEVICES, LLC,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. 22-1466 (MN)
	)	
TESLA, INC.,	)	
	)	
Defendant.	)	

TESLA'S INITIAL INVALIDITY CONTENTIONS

Pursuant to the Court's Scheduling Order (D.I. 25; D.I. 84; D.I. 91), paragraph 6(d), Defendant Tesla, Inc. ("Tesla") hereby provides the following Initial Invalidity Contentions for U.S. Patent Nos. 11,055,583; 10,452,974; 11,238,344; and 10,607,134 (collectively the "Patents-in-Suit").[1]

I. RESERVATION OF RIGHTS

Tesla provides its Contentions subject to the following objections and reservation of rights:

1. Tesla's investigation regarding the potential grounds of invalidity is ongoing. Tesla's invalidity contentions are given without prejudice to Tesla's right to supplement or amend as additional facts are ascertained, analyses are made, research is completed, contentions are made or amended, and claims are construed. Tesla further reserves the right to modify, supplement, amend, or otherwise alter these disclosures as discovery progresses, as permitted by the Federal Rules of Civil Procedure, by the Default Standard, or by order of the Court. In particular, Tesla reserves the right to modify, supplement, amend, or otherwise alter these disclosures following an

[1] AD has amended its complaint to add an additional patent, U.S. Pat. No. 11,663,474 ("the '474 patent"). Tesla will provide supplemental invalidity contentions directed to the '474 patent per the scheduling order. D.I. 91.

opportunity for expert discovery. These disclosures do not encompass patent unenforceability, which Tesla may allege separately.

2. In the absence of a claim construction order from the Court, Tesla has relied upon ordinary meaning of claim terms, definitions in the patents, and Plaintiff's apparent claim construction positions from Plaintiff's infringement contentions served on August 18, 2023, to the extent any such constructions can be discerned. Tesla's reliance on Plaintiff's claim constructions should not be taken to mean that Tesla in any way agrees with Plaintiff's apparent claim constructions or that Tesla is precluded from propounding alternative claim constructions or requesting Plaintiff's actual claim construction positions in the future. Tesla expressly reserves the right to propose alternative constructions to those advocated by Plaintiff. Furthermore, prior art not included in this disclosure, whether or not known to Tesla, may become relevant depending upon the claim constructions that Plaintiff may assert, explicitly or implicitly, or that the Court may adopt. Tesla's investigation is continuing and is likely to uncover additional art. Tesla will supplement its disclosures at appropriate times in light of changes in claim construction or newly discovered art.

3. The disclosure of a reference as anticipating of a claim includes a disclosure of the reference for obviousness purposes should any element of the claim be determined by the Court to be absent from the reference. Moreover, Tesla is at the present time unaware of the extent, if any, to which Plaintiff will contend that elements of the claims are not disclosed in references identified by Tesla as anticipatory. To the extent that Plaintiff make any such claim with respect to any limitation, Tesla reserves the right to identify other references which may explain the inherency of, or make obvious the addition of, the allegedly missing element.

4. References disclosed as rendering a claim obvious are representative and are not intended to be exhaustive. Other references disclosing the same or similar elements may be substituted for the cited references. Additional obviousness combinations of the references identified below are possible, and Tesla reserves the right to use any such combination(s) in this litigation. Motivation to combine references can be inferred generally for all references within the fields of art of the Patents-in-Suit. Furthermore, where references refer to or cite one another, motivation to combine may be specifically inferred whether or not called out in a claim chart. Lastly, Tesla's identification of motivation to combine references should not be taken as an admission or a representation that Tesla will not rely upon other tests for obviousness in view of *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007). This would include showing any of the following: (1) Combining prior art elements according to known methods to yield predictable results; (2) Simple substitution of one known element for another to obtain predictable results; (3) Use of known technique to improve similar devices (methods, or products) in the same way; (4) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (5) "Obvious to try"—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; (6) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; (7) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention; and (8) any other rationales to support a conclusion of obviousness. *See also* Department of Commerce, Patent and Trademark Office, *Examination Guidelines for*

Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in KSR International Co. v. Teleflex Inc., 72 Fed. Reg. 57,526 (Oct. 10, 2007).

5. The identification of prior art that anticipates and/or renders obvious a particular claim element in these contentions is not an admission that the claim element satisfies the requirements of 35 U.S.C. § 112. Where Tesla asserts that a claim is invalid under 35 U.S.C. § 112 (such as because of a failure to particularly point out and distinctly claim the alleged invention, failure to provide written description support, and/or failure to enable one of ordinary skill in the art to make and use the claimed invention), Tesla has nonetheless provided prior art that anticipates or renders obvious the claim on the assumption that Plaintiff will contend that those claims are definite, supported by an adequate written description, and adequately enabled.

6. In addition to the prior art identified in these contentions, and any future supplement to these contentions, Tesla may rely on relevant portions of the Patents-in-Suit, the prosecution history of the Patents-in-Suit, all references listed in the References Cited portion of the Patents-in-Suit, all references cited, documents filed, or arguments made in related IPRs, and fact and expert testimony about the prior art.

7. As of August 18, 2023, the Asserted Claims of all patents except the ’474 patent are the following:

- Claims 1-16, 18, 19-20 of the ’974 patent;
- Claims 1-17, 19, 20 of the ’344 patent;
- Claims 1-7, 9-19, 22, 24, 25, 27-29, 31, 33, 34 of the ’583 patent; and
- Claims 1-5, 7, 10-15, 18, 19-20 of the ’134 patent.

Tesla’s investigation and analysis of the Patents-in-Suit, the accused technology, and the prior art remain ongoing. AD’s August 18, 2023 infringement contentions are incomplete,

inadequate, and unclear, because, inter alia, they fail to identify specifically where each limitation of each Asserted Claim is found within each accused instrumentality despite having Tesla's core technical production regarding the accused technology.

8. Tesla reserves the right to amend and/or supplement these contentions as fact and expert discovery and claim construction proceed.

II. IDENTIFICATION OF PRIOR ART

Subject to the reservation of rights above, Tesla provides an initial list of prior art that anticipates and/or renders obvious one or more of the Asserted Claims.

Patents and Printed Publications
Abhishek Sharma, Oncel Tuzel, David W. Jacobs, Deep Hierarchical Parsing for Semantic Segmentation, CVPR 2015 (Mar. 30, 2015)
Akansel Cosgun, Lichao Ma, Jimmy Chiu, Jiawei Huang, Mahmut Demir, Alexandre Miranda Anon, Thang Lian, Hasan Tafish, Samir Al-Stouhi, Towards Full Automated Drive in Urban Environments: A Demonstration in GoMentum Station, California, arXiv:1705.01187 (May 2, 2017)
Alex Krizhevsky, Ilya Sutskever, Geoffrey E. Hinton, ImageNet Classification with Deep Convolutional Neural Networks, NIPS (Dec. 3, 2012)
Alexander Kolesnikov, Christoph Lampert, Seed, Expand and Constrain: Three Principles for Weakly-Supervised Image Segmentation, SEC: Seed, Expand and Constrain, ECCV 2016 (Aug. 6, 2016)
Bharath Hariharan, Pablo Arbelaez, Ross Girshick, Jitendra Malik, Hypercolumns for Object Segmentation and Fine-Grained Localization, CVPR 2015 (Apr. 25, 2015)
Brian Paden, Michal Cap, Sze Zheng Yong, Dmitry Yershov, Emilio Frazzol, A survey of motion planning and control techniques for self-driving urban vehicles, arXiv:1604.07446 (Apr. 25, 2016)
Cesar Cadena, Luca Carlone, Henry Carrillo, Yasir Latif, Davide Scaramuzza, Jose Neira, Ian Reid, John J. Leonard, Past, Present, and Future of Simultaneous Localization and Mapping: Toward the Robust-Perception Age (Dec. 2016)
Charles R. Qi, Hao Su, Kaichun Mo, Leonidas J. Guibas, PointNet: Deep Learning on Point Sets for 3D Classification and Segmentation, arXiv:1612.0059 (Apr 10, 2017)
Charles R. Qi, Li Yi, Hao Su, Leonidas J. Guibas, PointNet++: Deep Hierarchical Feature Learning onPoint Sets in a Metric Space, arXiv:1706.02413 (Jun. 7, 2017)

Patents and Printed Publications
Christian Szegedy, Wei Liu, Yangqing Jia, Pierre Sermanet, Scott Reed, Dragomir Anguelov, Dumitru Erhan, Vincent Vanhoucke, Andrew Rabinovich, Going Deeper with Convolutions, CVPR 2015 (Sep. 17, 2014)
Christos Katrakazas, Mohammed Quddus, Wen-Hua Chen, Lipika Dekaa, Real-time motion planning methods for autonomous on-road driving: State-of-the-art and future research directions, Transportation Research Part C: Emerging Technologies Vol. 60, November (Sep. 24, 2015)
Chu, Keonyup, Minchae Lee, and Myoungho Sunwoo, Local path planning for off-road autonomous driving with avoidance of static obstacles, IEEE 2012 (May 22, 2012)
Clement Farabet, Camille Couprie, Laurent Najman, Yann LeCun, Learning Hierarchical Features for Scene Labeling, PAMI 2013 (Oct. 24, 2012)
Clement Farabet, Camille Couprie, Laurent Najman, Yann LeCun, Scene Parsing with Multiscale Feature Learning, Purity Trees, and Optimal Covers, ICML 2012. (Jul. 13, 2012)
Cordts, Marius, Mohamed Omran, Sebastian Ramos, Timo Rehfeld, Markus Enzweiler, Rodrigo Benenson, Uwe Franke, Stefan Roth, Bernt Schiele, The Cityscapes Dataset for Semantic Urban Scene Understanding, CVPR 2016, (Apr. 7, 2016)
Dolgov, Dmitry et. al, Path planning for autonomous vehicles in unknown semi-structured environments (Jan. 25, 2010)
Erico Guizzo, Robots With Their Heads in the Clouds, IEEE Spectrum March 2011 at 16-18 (March 2011) https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5719709
Filipe Mutz, Lucas P.Verones, Thiago Oliveira-Santos, Edilsonde Aguiar, Fernando A.Auat Cheein, Alberto Ferreira De Souza, Large-scale mapping in complex field scenarios using an autonomous car, Expert Systems with Applications V. 46 (Mar. 15, 2016)
Fisher Yu, Vladlen Koltun, Multi-Scale Context Aggregation by Dilated Convolutions, ICLR 2016 (Mar 4, 2016)
Florian Chabot, Mohamed Chaouch, Jaonary Rabarisoa, Celine Teuliere, Thierry Chateau, Deep MANTA: A Coarse-to-fine Many-Task Network for joint 2D and 3D vehicle analysis from monocular image arXiv:1703.07570 (Mar. 22, 2017)
François Chollet, Xception: Deep Learning with Depthwise Separable Convolutions, CVPR 2017 (Apr. 4, 2017)
Gaidon, Adrien et al., “Virtual Worlds as Proxy for Multi-Object Tracking Analysis” (2016)
Gideon P.Stein, Ofer Mano, Amnon Shashua, Vision-based ACC with a Single Camera : Bounds on Range and Range Rate Accuracy, IEEE IV2003 (Jul. 28, 2003)
González, David, et al., A Review of Motion Planning Techniques for Automated Vehicles, IEEE 2016 (Nov. 26, 2015); Paden, Brian, et al., A survey of motion planning and control techniques for self-driving urban vehicles, IEEE 2016 (Mar. 2016)

Patents and Printed Publications
Grefenstette, John et al., "Learning Sequential Decision Rules Using Simulation Models and Competition" (1990)
Guillaume Bresson, Zayed Alsayed, Li Yu, Sébastien Glaser, Simultaneous Localization And Mapping: A Survey of Current Trends in Autonomous Driving (Oct. 12, 2017)
Guosheng Lin, Chunhua Shen, Ian Reid, Anton van dan Hengel, Efficient piecewise training of deep structured models for semantic segmentation, arXiv:1504.01013 (Jun. 6, 2016)
Guosheng Lin, Chunhua Shen, Ian Reid, Anton van den Hengel, Deeply Learning the Messages in Message Passing Inference, arXiv:1508.02108 (Sep. 8, 2015)
Hamid Izadinia, Fereshteh Sadeghi, Santosh Kumar Divvala, Yejin Choi, Ali Farhadi, Segment-Phrase Table for Semantic Segmentation, Visual Entailment and Paraphrasing, ICCV 2015 (Feb. 18, 2016)
Haozhi Qi, Zheng Zhang, Bin Xiao, Han Hu, Bowen Cheng, Yichen Wei, Jifeng Dai, Deformable Convolutional Networks, ICCV COCO Challenge Workshop 2017 (Jun. 5, 2017)
Hengshuang Zhao, Jianping Shi, Xiaojuan Qi, Xiaogang Wang, Jiaya Jia, Pyramid Scene Parsing Network, CVPR 2017 (Apr. 27, 2017)
Holger Caesar, Jasper Uijlings, Vittorio Ferrari, Joint Calibration for Semantic Segmentation, arXiv:1507.01581 (Aug. 12, 2015)
Hu, Xuemin, et al., Dynamic path planning for autonomous driving on various roads with avoidance of static and moving obstacles, Mechanical Systems and Signal Processing Vol. 100 (Aug. 5, 2017)
Hyeonwoo Noh, Seunghoon Hong, Bohyung Han, Learning Deconvolution Network for Semantic Segmentation, arXiv:1505.04366 (May 17, 2015)
Iasonas Kokkinos, Pushing the Boundaries of Boundary Detection using Deep Learning, arXiv:1511.07386 (Jan. 22, 2016)
Igor Cvišić, Josip Ćesić, Ivan Marković, Ivan Petrović, SOFT-SLAM: Computationally Efficient Stereo Visual SLAM for Autonomous UAVs, Journal of Field Robotics (Nov. 2, 2017)
Ji Zhang and Sanjiv Singh, Visual-lidar Odometry and Mapping: Low-drift, Robust, and Fast, IEEE 2015 (Jul. 26, 2015)
Jifeng Dai, Kaiming He, Jian Sun, BoxSup: Exploiting Bounding Boxes to Supervise Convolutional Networks for Semantic Segmentation, arXiv:1503.01640 (May 18, 2015)
Jifeng Dai, Yi Li, Kaiming He, Jian Sun, R-FCN: Object Detection via Region-based Fully Convolutional Networks (Jun 21, 2016)
Jinyong Jeong, Younggun Cho, and Ayoung Kim, Road-SLAM Road Marking based SLAM with Lane-level Accuracy (July 31, 2017)

Patents and Printed Publications
Jonathan Huang, Vivek Rathod, Chen Sun, Menglong Zhu, Anoop Korattikara, Alireza Fathi, Ian Fischer, Zbigniew Wojna, Yang Song, Sergio Guadarrama, Kevin Murphy, Speed/accuracy trade-offs for modern convolutional object detectors, arXiv:1611.10012 (Nov 30, 2016)
Jonathan Long, Evan Shelhamer, Trevor Darrell, Fully Convolutional Networks for Semantic Segmentation, CVPR 2015 (Mar. 8, 2015)
Joseph Redmon, Santosh Divvala, Ross Girshick, Ali Farhadi, You Only Look Once: Unified, Real-Time Object Detection, arXiv:1506.02640 (May 9, 2016)
Junqing Wei, Jarrod M. Snider, Tianyu Gu, John M. Dolan, Bakhtiar Litkouhi, A behavioral planning framework for autonomous driving, IEEE 2014 (Jul. 17, 2014)
Junsoo Kim, Kichun Jo, Dongchul Kim, Keonyup Chu, Myoungho Sunwoo, Behavior and path planning algorithm of autonomous vehicle A1 in structured environments, IFAC Proceedings Volumes Vol. 46 (June 2013)
Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, Deep Residual Learning for Image Recognition (Dec 10, 2015)
Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, Deep Residual Learning for Image Recognition, arXiv:1512.03385 (Dec. 10, 2015).
Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, Delving Deep into Rectifiers: Surpassing Human-Level Performance on ImageNet Classification, arXiv:1502.01852 (Feb. 6, 2015)
Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, Spatial Pyramid Pooling in Deep Convolutional Networks for Visual Recognition, ECCV 2014 (Apr. 23, 2015)
Karel Lenc, Andrea Vedaldi, R-CNN minus R, arXiv:1506.06981 (Jun. 23, 2015); Russell Stewart, Mykhaylo Andriluka, End-to-end people detection in crowded scenes, arXiv:1506.04878 (Jul. 8, 2015)
Karen Simonyan and Andrew Zisserman, Very Deep Convolutional Networks for Large-Scale Visual Recognition, ICLR 2015 (Apr. 10, 2015)
Katrakazas, Christos, et al., Real-time motion planning methods for autonomous on-road driving: State-of-the-art and future research directions, Transportation Research Part C: Emerging Technologies Vol. 60 (Sep. 24, 2015)
Ken Goldberg, Robots With Their Heads in the Clouds, Medium (Aug. 25, 2014) https://medium.com/aspen-ideas/robots-with-their-heads-in-the-clouds-e88ac44def8a
Kye-Hyeon Kim, Sanghoon Hong, Byungseok Roh, Yeongjae Cheon, Minje Park, PVANET: Deep but Lightweight Neural Networks for Real-time Object Detection, arXiv:1608.08021 (Sep. 30, 2016)
Li, Xiaohui, et al., Real-time trajectory planning for autonomous urban driving: Framework, algorithms, and verifications, IEEE 2016 (Oct. 26, 2015)
Liang-Chieh Chen, George Papandreou, Florian Schroff, Hartwig Adam, Rethinking Atrous Convolution for Semantic Image Segmentation, arXiv:1706.05587 (Jun. 17, 2017)

Patents and Printed Publications
Liang-Chieh Chen, George Papandreou, Iasonas Kokkinos, Kevin Murphy, Alan L Yuille, DeepLab: Semantic Image Segmentation with Deep Convolutional Nets, Atrous Convolution, and Fully Connected CRFs, arXiv:1606.00915 (Jun. 2, 2016)
Liang-Chieh Chen, George Papandreou, Iasonas Kokkinos, Kevin Murphy, Alan L. Yuille, Semantic Image Segmentation with Deep Convolutional Nets and Fully Connected CRFs, ICLR 2015 (Jun. 7, 2016)
Liang-Chieh Chen, George Papandreou, Kevin Murphy, Alan L. Yuille, Weakly-and semi-supervised learning of a DCNN for semantic image segmentation, arXiv:1502.02734 (Oct. 5, 2015)
Lifeng An, Xinyu Zhang, Hongbo Gao and Yuchao Liu, Semantic segmentation-aided visual odometry for urban autonomous driving (Oct. 30, 2017);
M. Abadi, A. Agarwal, et al., Tensorflow: Large-Scale Machine Learning on Heterogeneous Distributed Systems, arXiv:1603.04467 (Mar. 16, 2016)
Ma, Liang, et al., Efficient sampling-based motion planning for on-road autonomous driving, IEEE 2015 (Feb. 13, 2015)
Marcus Waibel, RoboEarth: A World Wide Web for Robots, IEEE Spectrum (Feb. 5, 2011) https://spectrum.ieee.org/roboearth-a-world-wide-web-for-robots
Mark Everingham, S. M. Ali Eslami, Luc Van Gool, Christopher K. I. Williams, John Winn, Andrew Zisserma, The Pascal Visual Object Classes Challenge – A Retrospective, IJCV (Jan. 1, 2015)
Mohammad O. A. Aqel, Mohammad H. Marhaban, M. Iqbal Saripan and Napsiah Bt. Ismail, Review of visual odometry: types, approaches, challenges, and applications (Oct. 28, 2016)
Mohammadreza Mostajabi, Payman Yadollahpour, Gregory Shakhnarovich, Feedforward Semantic Segmentation With Zoom-Out Features, CVPR 2015 (Dec. 2, 2014)
Moritz Werling, Julius Ziegler, Soren Kammel, Sebastian Thrun, Optimal trajectory generation for dynamic street scenarios in a frenet frame, IEEE 2010 (Jul. 15, 2010)
Net-Scale Technologies, Inc., Autonomous Off-Road Vehicle Control Using End-to-End Learning, Final Technical Report, DARPA-IPTO (July 30, 2004)
Niloufar Pourian, S. Karthikeyan, and B.S. Manjunath, Weakly supervised graph based semantic segmentation by learning communities of image-parts, ICCV 2015 (Feb. 18, 2016)
Oliver Pink, Visual map matching and localization using a global feature map, IEEE 2008 (Jun. 23, 2008)
Pierre Sermanet, David Eigen, Xiang Zhang, Michael Mathieu, Rob Fergus, Yann LeCun, OverFeat: Integrated Recognition, Localization and Detection using Convolutional Networks, ICLR 2014 (Feb. 24, 2014)
Pomerleau, Dean, "Neural Network Perception for Mobile Robot Guidance" (1993)
R. K. Satzoda and Mohan M. Trivedi, Vision-Based Lane Analysis: Exploration of Issues and Approaches for Embedded Realization, IEEE 2013 (Sep. 12, 2013)

Patents and Printed Publications
Ravi Kumar Satzoda and Mohan Manubhai Trivedi, Drive Analysis Using Vehicle Dynamics and Vision-Based Lane Semantics, IEEE 2015 (Sep 25, 2014)
Ross Girshick, Fast R-CNN, arXiv:1504.08083 (Sep. 27, 2015)
Ross Girshick, Jeff Donahue, Trevor Darrell, Jitendra Malik, Rich feature hierarchies for accurate object detection and semantic segmentation, CVPR 2014 (Oct. 22, 2014)
Scott Drew Pendleton, Hans Andersen, Xinxin Du, Xiaotong Shen, Malika Meghjani, You Hong Eng, Daniela Rus, and Marcelo H. Ang Jr., Perception, planning, control, and coordination for autonomous vehicles, Machines 2017 (Feb. 17, 2017)
Sean Bell, C. Lawrence Zitnick, Kavita Bala, Ross Girshick, Inside-Outside Net: Detecting Objects in Context with Skip Pooling and Recurrent Neural Networks (Dec. 14, 2015)
Sebastian Thrun, Michael Montemerlo, The GraphSLAM Algorithm with Applications to Large-Scale Mapping of Urban Structures, Stanford AI Lab (May 1, 2006)
Sergey Ioffe, Christian Szegedy, Batch Normalization: Accelerating Deep Network Training by Reducing Internal Covariate Shift, arXiv:1502.03167 (Mar. 2, 2015)
Sergey Ioffe, Christian Szegedy, Batch Normalization: Accelerating Deep Network Training by Reducing Internal Covariate shift, ICML 2015 (Mar. 2, 2015)
Seunghoon Hong, Hyeonwoo Noh, Bohyung Han, Decoupled Deep Neural Network for Semi-supervised Semantic Segmentation, arXiv:1506.04924 (Jun. 17, 2015)
Seunghoon Hong,Junhyuk Oh, Bohyung Han, and Honglak Lee, Learning Transferrable Knowledge for Semantic Segmentation with Deep Convolutional Neural Network, arXiv:1512.07928 (Dec. 24, 2015)
Shaoqing Ren, Kaiming He, Ross Girshick, Jian Sun, Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks, arXiv:1506.01497 (Jan. 6, 2016)
Shuai Zheng, Sadeep Jayasumana, Bernardino Romera-Paredes, Vibhav Vineet, Zhizhong Su, Dalong Du, Chang Huang, Philip H. S. Torr, Conditional Random Fields as Recurrent Neural Networks, arXiv:1502.03240 (Apr. 13, 2016)
Simon Ulbrich, Andreas Reschka, Jens Rieken, Susanne Ernst, Gerrit Bagschik, Frank Dierkes, Marcus Nolte, Markus Maurer, Towards a Functional System Architecture for Automated Vehicles, arXiv:1703.08557 (Mar. 30, 2017)
Song, Xiaolin, Haotian Cao, and Jiang Huang, Vehicle path planning in various driving situations based on the elastic band theory for highway collision avoidance, Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering Vol. 227, (Feb. 11, 2013)
Takafumi Taketomi, Hideaki Uchiyama, Sei Ikeda, Visual SLAM algorithms: a survey from 2010 to 2016, IPSJ 2017 (Jun. 2, 2017)
U.S. Pat. Pub. No. 2013/0343640
U.S. Pat. Pub. No. 2014/0136013
U.S. Pat. Pub. No. 2015/0283702

Patents and Printed Publications
U.S. Pat. Pub. No. 2008/0207330
U.S. Pat. Pub. No. 2009/0044113
U.S. Pat. Pub. No. 2009/0199095
U.S. Pat. Pub. No. 2015/0269415
U.S. Patent No. 10,022,867
U.S. Patent No. 10,112,113
U.S. Patent No. 10,112,113
U.S. Patent No. 10,181,213
U.S. Patent No. 10,217,261
U.S. Patent No. 10,317,854
U.S. Patent No. 10,350,751
U.S. Patent No. 10,406,441
U.S. Patent No. 10,475,225
U.S. Patent No. 7,090,576
U.S. Patent No. 7,090,576
U.S. Patent No. 7,675,519
U.S. Patent No. 8,142,268
U.S. Patent No. 8,142,268
U.S. Patent No. 8,453,061
U.S. Patent No. 8,639,644
U.S. Patent No. 8,682,485
U.S. Patent No. 8,965,621
U.S. Patent No. 9,008,840
U.S. Patent No. 9,085,080
U.S. Patent No. 9,235,214
U.S. Patent No. 9,346,167
U.S. Patent No. 9,409,051
U.S. Patent No. 9,434,072
U.S. Patent No. 9,604,359
U.S. Patent No. 9,682,481
U.S. Patent No. 9,766,626
U.S. Patent No. 9,766,626
U.S. Patent No. 9,789,605
U.S. Patent No. 9,881,420
U.S. Patent No. 9,978,425
U.S. Reissue Patent No. 45,132
Vijay Badrinarayanan, Alex Kendall and Roberto Cipolla, SegNet: A Deep Convolutional Encoder-Decoder Architecture for Image Segmentation, arXiv:1511.00561 (Oct. 10, 2016)

Patents and Printed Publications
Watt, Alan & Policarpo, Fabio, 3D Games Real-time Rendering and Software Technology, Chapter 7 "Behavior and AI Games" (2001)
Wei Liu, Andrew Rabinovich, Alexander C Berg, ParseNet: Looking Wider to See Better, arXiv:1506.04579 (Nov. 19, 2015)
Wei Liu, Dragomir Anguelov, Dumitru Erhan, Christian Szegedy, Scott Reed, Cheng-Yang Fu, Alexander C. Berg, SSD: Single Shot MultiBox Detector, arXiv:1512.02325 (Mar. 30, 2016)
WO2013119942
Wolfram Burgard,Oliver Brock, Cyrill Stachniss, Map-based precision vehicle localization in urban environments, IEEE 2008 (2008); Ji Zhang, Sanjiv Singh, LOAM: Lidar Odometry and Mapping in Real-time, RSS 2014 (Jul. 2014)
Xiaozhi Chen, Kaustav Kundu, Ziyu Zhang, Huimin Ma, Sanja Fidler, Raquel Urtasun, Monocular 3D Object Detection for Autonomous Driving, CVPR 2016 (Dec. 12, 2016)
Xinxin Du1, Marcelo H. Ang Jr., Daniela Rus, Car Detection for Autonomous Vehicle: LIDAR and Vision Fusion Approach Through Deep Learning Framework, IEEE 2017 (Sep. 24-28 2017)
Yu Xiang, Wongun Choi, Yuanqing Lin, and Silvio Savarese, Subcategory-Aware Convolutional Neural Networks for Object Proposals and Detection, IEEE 2017 (Mar. 9, 2017)
Zhaowei Cai, Quanfu Fan, Rogerio S. Feris, and Nuno Vasconcelos, A Unified Multi-scale Deep Convolutional Neural Network for Fast Object Detection, arXiv:1607.07155 (Jul. 25, 2016)
Ziegler, Julius, et al., Trajectory planning for Bertha—A local, continuous methods, IEEE 2014 (Jul. 17, 2014)
Ziwei Liu, Xiaoxiao Li, Ping Luo, Chen Change Loy, Xiaoou Tang, Semantic Image Segmentation via Deep Parsing Network, arXiv:1509.02634 (Sep. 24, 2015)

Tesla further incorporates by reference all references cited in the Asserted Patents, including any references raised during prosecution of the Asserted Patents.

To the extent any of the above patents, patent applications or publications incorporate by reference any other patents, patent applications, or publications, Tesla reserves the right to rely on those patents, patent applications or publications. In addition, to the extent that any of the above patents, patent applications or publications were disclosed in earlier published patents, patent applications or publications, then Tesla reserves the right to rely on those earlier published patents, patent applications or publications.

In addition to prior art patents and publications, prior art systems/products embodying some or all of the Asserted Claims existed before the applicable priority dates. For example, at least as early as September 2015, Waymo's public use of autonomous cars before the applicable priority dates embodied one or more of the Asserted Claims from the '974, '344, and '583 patents. Among other evidence, the following documents and things describe Waymo's public use:

- https://blog.google/alphabet/self-driving-vehicle-prototypes-on-road/
- https://waymo.com/blog/2016/12/on-road-with-self-driving-car-user.html
- https://www.youtube.com/watch?v=lL16AQItG1g
- https://www.theatlantic.com/technology/archive/2014/05/all-the-world-a-track-the-trick-that-makes-googles-self-driving-cars-work/370871/
- https://www.youtube.com/watch?v=X_d3MCkIvg8
- https://www.youtube.com/watch?v=uCezICQNgJU
- https://www.youtube.com/watch?v=uHbMt6WDhQ8

At least as early as August 17, 2016, Nvidia's public use of autonomous cars embodied one or more Asserted Claims from the '974, '344, and '583 patents. Among other evidence, the following documents and things describe Nvidia's public use:

- https://www.i-programmer.info/news/105-artificial-intelligence/9678-nvidias-neural-network-drives-a-car.html
- https://developer.nvidia.com/blog/deep-learning-self-driving-cars/
- https://arxiv.org/pdf/1604.07316v1.pdf
- https://www.youtube.com/watch?v=e-2St_P46ms
- https://www.youtube.com/watch?v=0rc4RqYLtEU
- https://www.youtube.com/watch?v=NJU9ULQUwng

At least as early as September 14, 2016, Cruise's public use of autonomous cars embodied one or more Asserted Claims from the '974, '344, and '583 patents. Among other evidence, the following documents and things describe Cruise's public use:

- https://techcrunch.com/2016/09/14/cruise-has-around-30-self-driving-test-cars-on-roads-right-now/?guccounter=1
- https://web.archive.org/web/20160202084335/http://www.getcruise.com/technology
- https://www.theverge.com/2016/1/21/10810726/cruise-automation-self-driving-car-accident
- https://techcrunch.com/2015/09/18/cruise-2/
- https://electrek.co/2016/08/09/gms-cruise-testing-autonomous-bolt-ev-scottsdale-arizona/

At least as early as October 25, 2016, Uber's[2] public use of autonomous cargo trucks embodied one or more Asserted Claims from the '974, '344, and '583 patents. Among other evidence, the following documents and things describe Uber's public use:

- https://www.youtube.com/watch?v=sIlCR4eG8_o
- https://web.archive.org/web/20160702084056/http://bigstory.ap.org/article/81b31f2909c943b1a824a3ecb80fa40d/startup-wants-put-self-driving-big-rigs-us-highways
- https://www.forbes.com/sites/alanohnsman/2016/08/01/startup-otto-aims-to-leapfrog-to-first-in-self-driving-vehicles-with-big-trucks/?sh=628a5bfa5e5c
- https://mashable.com/article/otto-uber-self-driving-truck

[2] In 2020, Aurora purchased Uber's self-driving unit.

- https://www.theverge.com/2017/7/5/15924010/uber-otto-self-driving-truck-new-look-lidar

At least as early as December 2, 2014, Amazon deployed autonomous Kiva robots in its warehouses, which embodied one or more Asserted Claims from the ’974, ’344, and ’583 patents. Among other evidence, the following documents and things describe the prior art Kiva robot system:

- https://www.youtube.com/watch?app=desktop&v=g6DIFpaoI6A
- https://www.cnet.com/tech/services-and-software/meet-amazons-busiest-employee-the-kiva-robot/
- https://www.businessinsider.com/kiva-robots-save-money-for-amazon-2016-6
- https://www.aboutamazon.com/news/operations/10-years-of-amazon-robotics-how-robots-help-sort-packages-move-product-and-improve-safety
- https://www.sec.gov/Archives/edgar/data/1018724/000119312512122135/d318297dex991.htm
- https://www.youtube.com/watch?v=cn86KkPNYjk&t=4s
- https://spectrum.ieee.org/three-engineers-hundreds-of-robots-one-warehouse

At least as early as Dec 5, 2000, Codemasters released Colin McRae Rally 2.0 (CMR), which embodied one or more Asserted Claims from the ’134 patent. Among other evidence, the following documents and things describe the prior art CMR system:

- https://www.intechopen.com/chapters/10916
- https://web.archive.org/web/20080330203633/http://www.generation5.org/content/2001/hannan.asp
- http://www.ai-junkie.com/misc/hannan/hannan.html

At least as early as October 5, 2016, Brain Corp. publicly used EMMA (Enabling Mobile Manufacturing Automation), which embodied one or more Asserted Claims from the ’974, ’344, and ’583 patents. Among other evidence, the following documents and things describe Brain Corp’s public use:

- https://www.nbcsandiego.com/news/local/self-driving-robotic-emma-debuts-at-brain-corp-open-house-in-mira-mesa/51855/
- https://braincorp.com/newsroom/brain-corp-launches-its-first-artificial-intelligence-based-product-and-receives-innovation-of-the-year-award/

At least as early as September 17, 2015, iRobot released the Roomba 980, which embodied one or more Asserted Claims from the ’974, ’344, and ’583 patents. Among other evidence, the following documents and things describe the prior art Roomba 980 system:

- https://media.irobot.com/2015-09-16-iRobot-Enters-the-Smart-Home-with-Roomba-980-Vacuum-Cleaning-Robot
- https://spectrum.ieee.org/irobot-brings-visual-mapping-and-navigation-to-the-roomba-980
- https://www.technologyreview.com/2015/09/16/247936/the-roomba-now-sees-and-maps-a-home/
- https://www.youtube.com/watch?v=23fvZme36-g&t=1s

At least as early as 2014, MobileEye’s public use of autonomous cars embodied one or more Asserted Claims from the ’974, ’344, and ’583 patents. Among other evidence, the following documents and things describe MobileEye’s public use:

- https://www.youtube.com/watch?v=ntQf8oSiCPc
- https://www.mobileye.com/technology/eyeq-chip/

- https://media.gm.com/media/us/en/socratv/home.detail.html/content/Pages/news/us/en/2016/Jan/0105-onstar.html#:~:text=Road%20Experience%20Management%20targets%20accuracy%20to%20enable%20fully%20autonomous%20driving&text=DETROIT%20%E2%80%93%20General%20Motors%20is%20exploring,that%20supports%20fully%20autonomous%20driving
- https://www.sec.gov/Archives/edgar/data/1607310/000157104916012024/t1600463_ex99-1.htm

At least as early as December 2016, Udacity released the Self-Driving Car Engineer Nanodegree Program. Both the course materials themselves and the projects submitted to Udacity as part of the program embodied one or more Asserted Claims from the ’134 patent. Among other evidence, the following documents and things describe the course materials and project submissions:

- https://www.udacity.com/course/self-driving-car-engineer-nanodegree--nd0013
- https://chatbotslife.com/using-augmentation-to-mimic-human-driving-496b569760a9#.5dpi87xzi
- https://towardsdatascience.com/behavioural-cloning-applied-to-self-driving-car-on-a-simulated-track-5365e1082230
- https://www.youtube.com/watch?v=k5GWzzE1qaU

At least as early as July 30, 2004, Net-Scale Technologies publicly used an autonomous device, made for the DARPA Autonomous Vehicle (DAVE) project, which embodied one or more Asserted Claims from the ’974, ’344, and ’583 Patents. Among other evidence, the following documents and things describe the prior art DAVE system:

- https://net-scale.com/doc/net-scale-dave-report.pdf

At least as early as October 2016, Take-Two Interactive Software Inc. released various video games using either the Rockstar Advanced Game Engine ("RAGE") or the Eco Motion games engines, including Grand Theft Auto IV, Grand Theft Auto V, Red Dead Redemption, Max Payne 3, Midnight Club: Los Angeles, Eco Motion, NBA 2K14, NBA 2K15, NBA 2K16, NBA 2K17, WWE 2K15, WWE 2K16, and WWE 2K17, which embodied one or more Asserted Claims from the '134 Patent. Among other evidence, the following documents and things describe the prior art game engines:

- https://web.archive.org/web/20121222215453/https://www.rockstargames.com/jobs/position/3e1b31310eba5dfe4d6a0db32321f086/rage
- https://www.youtube.com/watch?v=fruSKeMKNY0
- https://www.youtube.com/watch?v=_oVDegAKxz0
- https://www.giantbomb.com/eco-motion-engine/3015-9061
- https://www.youtube.com/watch?v=5BJR6z1W7Ew

At least as early as July 20, 2004, Visual Concepts released the video game ESPN NFL 2K5, which embodied one or more Asserted Claims from the '134 Patent, at least through use of its VIP system. Among other evidence, the following documents and things describe the prior art system:

- https://www.gamezone.com/reviews/espn_nfl_2k5_ps2_review/
- https://en.wikipedia.org/wiki/ESPN_NFL_2K5
- https://www.youtube.com/watch?v=lv0rZ7ecvmQ

At least as early as March 19, 2014, Epic Games, Inc. released Unreal Engine 4, which embodied one or more Asserted Claims from the '134 Patent. Among other evidence, the following documents and things describe the prior art Unreal Engine 4 system:

- https://www.unrealengine.com/en-US/blog/epic-games-releases-unreal-engine-4-for-all
- https://www.youtube.com/watch?v=evYE7tfWXUY

At least as early as March 2016, Google DeepMind publicly used an autonomous device, made for the DARPA Autonomous Vehicle (DAVE) project, which embodied one or more Asserted Claims from the '974, '344, and '583 Patents. Among other evidence, the following documents and things describe the prior art AlphaGo system:

- https://www.deepmind.com/research/highlighted-research/alphago
- https://www.nature.com/articles/nature16961

In addition, under AD's apparent theories of infringement and claim construction,[3] Tesla's public use of the following prior art systems before the applicable priority dates embodied some or all of the Asserted Claims of the '974, '344, and '583 patents:

- Tesla Vehicles executing Software Version 6 that included Driver Assistance features "designed to intelligently anticipate and react potentially dangerous situations," including features such as Automatic Emergency Braking and Blind Spot Warning. *See, e.g.*, TESLA-0007582; TESLA-0009530; TESLA-0009945; TESLA-0010820. Software Version 6 was released no later than March 19, 2015.

[3] Tesla does not concede that any accused product practices any asserted claim and expressly reserves the right to dispute infringement.

- Tesla Vehicles equipped with HW1 hardware components executing Tesla's 1st generation Autopilot, including features that allowed the vehicles to "identify the road layout by detecting lane markings, curbs, barriers, and other obstacles," and "identify a suitable travel path and speed." No later than September 2014, Tesla engineers and developers publicly tested and used Tesla Vehicles equipped with HW1 hardware components executing Tesla's 1st generation Autopilot technology that embodied the Asserted Claims of the '974, '344, '583, and '474 patents under AD's apparent theories of infringement and claim construction. Model S vehicles built between September 2014 and October 12, 2016 and Model X vehicles built before October 12, 2016 were equipped with Driver Assistance hardware components (i.e., HW1), which enabled Tesla's 1st generation Autopilot technology. *See, e.g.*, TESLA-0008238; TESLA-0008552. In October 2015, Tesla released Tesla Version 7.0 software to customers which represented "the only fully integrated autopilot system involving four different feedback modules: camera, radar, ultrasonics, and GPS. These mutually reinforcing systems offer realtime data feedback from the Tesla fleet, ensuring that the system is continually learning and improving upon itself. Autopilot allows Model S to steer within a lane, change lanes with the simple tap of a turn signal, and manage speed by using active, traffic-aware cruise control. Digital control of motors, brakes, and steering helps avoid collisions from the front and sides, as well as preventing the car from wandering off the road. Your car can also scan for a parking space, alert you when one is available, and parallel park on command." TESLA-0007780. Among other evidence, the following documents and things describe the functionality, operation, and public

use of Tesla's 1st generation autopilot technology: TESLA-SCT-0000592; TESLA-SCT-0000614; TESLA-SCT-0000661; TESLA-SCT-0000692; TESLA-SCT-0000702; TESLA-SCT-0000791; TESLA-SCT-0000800; TESLA-0000043; TESLA-0003100; TESLA-0003103; TESLA-0003106; TESLA-0003371; TESLA-0003894; TESLA-0003936; TESLA-0004772; TESLA-0004774; TESLA-0004786; TESLA-0005176; TESLA-0005198; TESLA-0005199; TESLA-0005250; TESLA-0005428; TESLA-0005433; TESLA-0005572; TESLA-0005675; TESLA-0007586; TESLA-0007724; TESLA-0007741; TESLA-0007780; TESLA-0007785; TESLA-0008093; TESLA-0008095; TESLA-0008238; TESLA-0009333; TESLA-0009407; TESLA-0009420; TESLA-0009424; TESLA-0009443; TESLA-0009447; TESLA-0009449; TESLA-0009512; TESLA-0009530; TESLA-0009534; TESLA-0009555; TESLA-0009557; TESLA-0009563; TESLA-0009567; TESLA-0009572; TESLA-0009576; TESLA-0009579; TESLA-0009590; TESLA-0009593; TESLA-0009599; TESLA-0009604; TESLA-0009606; TESLA-0009610; TESLA-0009613; TESLA-0009615; TESLA-0009640; TESLA-0009650; TESLA-0009662; TESLA-0009667; TESLA-0009697; TESLA-0009707; TESLA-0009708; TESLA-0009710; TESLA-0009712; TESLA-0009717; TESLA-0009720; TESLA-0009776; TESLA-0009795; TESLA-0009797; TESLA-0009802; TESLA-0009945; TESLA-0010014; TESLA-0010086; TESLA-0010106; TESLA-0010289; TESLA-0010319; TESLA-0010322; TESLA-0010324; TESLA-0010345; TESLA-0010363; TESLA-0010385; TESLA-0010388; TESLA-0010421; TESLA-0010459; TESLA-0010484;

TESLA-0010513; TESLA-0010614; TESLA-0010628; TESLA-0010629; TESLA-0010633; TESLA-0010754; TESLA-0010773; TESLA-0010790; TESLA-0010805; TESLA-0010809; TESLA-0010816; TESLA-0010820; TESLA-0010909; TESLA-0010911.

- Tesla Vehicles equipped with HW2 hardware components executing Tesla's 2nd generation Autopilot, including features that allowed the vehicles to "identify the road layout by detecting lane markings, curbs, barriers, and other obstacles," and "identify a suitable travel path and speed." No later than October 2016, Tesla engineers and developers publicly tested and used Tesla Vehicles equipped with HW2 hardware components executing Tesla's 2nd generation Autopilot technology that embodied the Asserted Claims of the '974, '344, and '583 patents under AD's apparent theories of infringement and claim construction. Model S and Model X vehicles built between October 12, 2016 and August 20, 2017 were equipped with Driver Assistance hardware generation 2.0 (HW2) components to enable 2nd generation Autopilot. *See, e.g.*, TESLA-0008351; TESLA-0008552. Among other evidence, and in addition to the documents cited above with respect to Tesla's 1st generation autopilot technology, the following documents and things describe the functionality, operation, and public use of Tesla's 2nd generation autopilot technology: TESLA-SCT-0000374; TESLA-SCT-0000378; TESLA-SCT-0000383; TESLA-SCT-0000388; TESLA-SCT-0000393; TESLA-SCT-0000473; TESLA-SCT-0000495; TESLA-SCT-0000499; TESLA-SCT-0000502; TESLA-SCT-0000505; TESLA-SCT-0000536; TESLA-SCT-0000661; TESLA-SCT-0000681;. TESLA-SCT-0000686; TESLA-SCT-0000733; TESLA-SCT-0000840;

TESLA-SCT-0000843; TESLA-SCT-0000873; TESLA-SCT-0000991; TESLA-0004690; TESLA-0003106; TESLA-0005170; TESLA-0005239; TESLA-0005285; TESLA-0005478; TESLA-0005585; TESLA-0005589; TESLA-0007683; TESLA-0010019; TESLA-0010044; TESLA-0010540; TESLA-0010732.

Discovery is ongoing, and Tesla is in the process of obtaining additional relevant information about these devices, and any other prior art devices that were sold or used before the relevant priority dates. Tesla is pursuing and will continue to pursue evidence of these and other system prior art, including systems potentially identified by AD. Tesla therefore reserves the right to supplement its Contentions based on ongoing third-party discovery and other investigation, as well as lack of clarity, details, and explanation in AD's infringement contentions.

III. STATE OF THE ART AT THE TIME OF THE PATENTS IN SUIT

The Asserted Patents claim no aspect of autonomous driving that was not already known in the art. The prior art is replete with publications that disclose various aspects of autonomous driving prior to the priority date of one or more of the Asserted Patents, including image classification, two-dimensional object detection, three-dimensional object detection, semantic image segmentation, simultaneous localization and mapping (SLAM), vision-based odometry, lane detection, trajectory and path planning, and autonomous decision making.

Image classification was well known in the art prior to the filing of one or more of the asserted patents. *See, e.g.*, Alex Krizhevsky, Ilya Sutskever, Geoffrey E. Hinton, ImageNet *Classification with Deep Convolutional Neural Networks*, NIPS (Dec. 3, 2012); Christian Szegedy, Wei Liu, Yangqing Jia, Pierre Sermanet, Scott Reed, Dragomir Anguelov, Dumitru Erhan, Vincent Vanhoucke, Andrew Rabinovich, *Going Deeper with Convolutions*, CVPR 2015 (Sep. 17, 2014); Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, *Delving Deep into*

Rectifiers: Surpassing Human-Level Performance on ImageNet Classification, arXiv:1502.01852 (Feb. 6, 2015); Sergey Ioffe, Christian Szegedy, *Batch Normalization: Accelerating Deep Network Training by Reducing Internal Covariate Shift*, arXiv:1502.03167 (Mar. 2, 2015); Karen Simonyan and Andrew Zisserman, *Very Deep Convolutional Networks for Large-Scale Visual Recognition*, ICLR 2015 (Apr. 10, 2015); Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, *Deep Residual Learning for Image Recognition*, arXiv:1512.03385 (Dec. 10, 2015).

Two-dimensional object detection was well known in the art prior to the filing of one or more of the asserted patents. *See, e.g.*, Pierre Sermanet, David Eigen, Xiang Zhang, Michael Mathieu, Rob Fergus, Yann LeCun, *OverFeat: Integrated Recognition, Localization and Detection using Convolutional Networks*, ICLR 2014 (Feb. 24, 2014); Ross Girshick, Jeff Donahue, Trevor Darrell, Jitendra Malik, *Rich feature hierarchies for accurate object detection and semantic segmentation*, CVPR 2014 (Oct. 22, 2014); Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, *Spatial Pyramid Pooling in Deep Convolutional Networks for Visual Recognition*, ECCV 2014 (Apr. 23, 2015); Karel Lenc, Andrea Vedaldi, *R-CNN minus R*, arXiv:1506.06981 (Jun. 23, 2015); Russell Stewart, Mykhaylo Andriluka, *End-to-end people detection in crowded scenes*, arXiv:1506.04878 (Jul. 8, 2015); Ross Girshick, Fast R-CNN, arXiv:1504.08083 (Sep. 27, 2015); Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, *Deep Residual Learning for Image Recognition* (Dec 10, 2015); Sean Bell, C. Lawrence Zitnick, Kavita Bala, Ross Girshick, *Inside-Outside Net: Detecting Objects in Context with Skip Pooling and Recurrent Neural Networks* (Dec. 14, 2015); Shaoqing Ren, Kaiming He, Ross Girshick, Jian Sun, *Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks*, arXiv:1506.01497 (Jan. 6, 2016); Wei Liu, Dragomir Anguelov, Dumitru Erhan, Christian Szegedy, Scott Reed, Cheng-Yang Fu, Alexander C. Berg, *SSD: Single Shot MultiBox*

Detector, arXiv:1512.02325 (Mar. 30, 2016); Joseph Redmon, Santosh Divvala, Ross Girshick, Ali Farhadi, *You Only Look Once: Unified, Real-Time Object Detection*, arXiv:1506.02640 (May 9, 2016); Jifeng Dai, Yi Li, Kaiming He, Jian Sun, *R-FCN: Object Detection via Region-based Fully Convolutional Networks* (Jun 21, 2016); Zhaowei Cai, Quanfu Fan, Rogerio S. Feris, and Nuno Vasconcelos, *A Unified Multi-scale Deep Convolutional Neural Network for Fast Object Detection*, arXiv:1607.07155 (Jul. 25, 2016); Kye-Hyeon Kim, Sanghoon Hong, Byungseok Roh, Yeongjae Cheon, Minje Park, *PVANET: Deep but Lightweight Neural Networks for Real-time Object Detection*, *arXiv:1608.08021* (Sep. 30, 2016); Jonathan Huang, Vivek Rathod, Chen Sun, Menglong Zhu, Anoop Korattikara, Alireza Fathi, Ian Fischer, Zbigniew Wojna, Yang Song, Sergio Guadarrama, Kevin Murphy, *Speed/accuracy trade-offs for modern convolutional object detectors*, arXiv:1611.10012 (Nov 30, 2016); Xinxin Du1, Marcelo H. Ang Jr., Daniela Rus, *Car Detection for Autonomous Vehicle: LIDAR and Vision Fusion Approach Through Deep Learning Framework*, IEEE 2017 (Sep. 24-28 2017).

Three-dimensional object detection was well known in the art prior to the filing of one or more of the Asserted Patents. *See, e.g.*, Xiaozhi Chen, Kaustav Kundu, Ziyu Zhang, Huimin Ma, Sanja Fidler, Raquel Urtasun, *Monocular 3D Object Detection for Autonomous Driving*, CVPR 2016 (Dec. 12, 2016); Yu Xiang, Wongun Choi, Yuanqing Lin, and Silvio Savarese, *Subcategory-Aware Convolutional Neural Networks for Object Proposals and Detection*, IEEE 2017 (Mar. 9, 2017); Florian Chabot, Mohamed Chaouch, Jaonary Rabarisoa, Celine Teuliere, Thierry Chateau, *Deep MANTA: A Coarse-to-fine Many-Task Network for joint 2D and 3D vehicle analysis from monocular image* arXiv:1703.07570 (Mar. 22, 2017); Charles R. Qi, Hao Su, Kaichun Mo, Leonidas J. Guibas, *PointNet: Deep Learning on Point Sets for 3D Classification and Segmentation*, arXiv:1612.0059 (Apr 10, 2017); Charles R. Qi, Li Yi, Hao Su, Leonidas J. Guibas,

PointNet++: Deep Hierarchical Feature Learning onPoint Sets in a Metric Space, arXiv:1706.02413 (Jun. 7, 2017).

Semantic image segmentation was well known in the art prior to the filing of one or more of the Asserted Patents. *See, e.g.*, Clement Farabet, Camille Couprie, Laurent Najman, Yann LeCun, *Scene Parsing with Multiscale Feature Learning, Purity Trees, and Optimal Covers*, ICML 2012. (Jul. 13, 2012); Clement Farabet, Camille Couprie, Laurent Najman, Yann LeCun, *Learning Hierarchical Features for Scene Labeling*, PAMI 2013 (Oct. 24, 2012); Mohammadreza Mostajabi, Payman Yadollahpour, Gregory Shakhnarovich, *Feedforward Semantic Segmentation With Zoom-Out Features*, CVPR 2015 (Dec. 2, 2014); Mark Everingham, S. M. Ali Eslami, Luc Van Gool, Christopher K. I. Williams, John Winn, Andrew Zisserma, *The Pascal Visual Object Classes Challenge – A Retrospective*, IJCV (Jan. 1, 2015); Jonathan Long, Evan Shelhamer, Trevor Darrell, *Fully Convolutional Networks for Semantic Segmentation*, CVPR 2015 (Mar. 8, 2015); Abhishek Sharma, Oncel Tuzel, David W. Jacobs, *Deep Hierarchical Parsing for Semantic Segmentation*, CVPR 2015 (Mar. 30, 2015); Bharath Hariharan, Pablo Arbelaez, Ross Girshick, Jitendra Malik, *Hypercolumns for Object Segmentation and Fine-Grained Localization*, CVPR 2015 (Apr. 25, 2015); Hyeonwoo Noh, Seunghoon Hong, Bohyung Han, *Learning Deconvolution Network for Semantic Segmentation*, arXiv:1505.04366 (May 17, 2015); Jifeng Dai, Kaiming He, Jian Sun, *BoxSup: Exploiting Bounding Boxes to Supervise Convolutional Networks for Semantic Segmentation*, arXiv:1503.01640 (May 18, 2015); Seunghoon Hong, Hyeonwoo Noh, Bohyung Han, *Decoupled Deep Neural Network for Semi-supervised Semantic Segmentation*, arXiv:1506.04924 (Jun. 17, 2015); Holger Caesar, Jasper Uijlings, Vittorio Ferrari, *Joint Calibration for Semantic Segmentation*, arXiv:1507.01581 (Aug. 12, 2015); Guosheng Lin, Chunhua Shen, Ian Reid, Anton van den Hengel, *Deeply Learning the Messages in Message*

Passing Inference, arXiv:1508.02108 (Sep. 8, 2015); Liang-Chieh Chen, George Papandreou, Kevin Murphy, Alan L. Yuille, *Weakly-and semi-supervised learning of a DCNN for semantic image segmentation*, arXiv:1502.02734 (Oct. 5, 2015); Wei Liu, Andrew Rabinovich, Alexander C Berg, *ParseNet: Looking Wider to See Better*, arXiv:1506.04579 (Nov. 19, 2015); Seunghoon Hong,Junhyuk Oh, Bohyung Han, and Honglak Lee, *Learning Transferrable Knowledge for Semantic Segmentation with Deep Convolutional Neural Network*, arXiv:1512.07928 (Dec. 24, 2015); Ziwei Liu, Xiaoxiao Li, Ping Luo, Chen Change Loy, Xiaoou Tang, Semantic Image Segmentation via Deep Parsing Network, arXiv:1509.02634 (Sep. 24, 2015); Iasonas Kokkinos, Pushing the Boundaries of Boundary Detection using Deep Learning, arXiv:1511.07386 (Jan. 22, 2016); Hamid Izadinia, Fereshteh Sadeghi, Santosh Kumar Divvala, Yejin Choi, Ali Farhadi, *Segment-Phrase Table for Semantic Segmentation, Visual Entailment and Paraphrasing*, ICCV 2015 (Feb. 18, 2016); Niloufar Pourian, S. Karthikeyan, and B.S. Manjunath, *Weakly supervised graph based semantic segmentation by learning communities of image-parts*, ICCV 2015 (Feb. 18, 2016); Fisher Yu, Vladlen Koltun, *Multi-Scale Context Aggregation by Dilated Convolutions*, ICLR 2016 (Mar 4, 2016); M. Abadi, A. Agarwal, et al., *Tensorflow: Large-Scale Machine Learning on Heterogeneous Distributed Systems,* arXiv:1603.04467 (Mar. 16, 2016); Cordts, Marius, Mohamed Omran, Sebastian Ramos, Timo Rehfeld, Markus Enzweiler, Rodrigo Benenson, Uwe Franke, Stefan Roth, Bernt Schiele, *The Cityscapes Dataset for Semantic Urban Scene Understanding*, CVPR 2016, (Apr. 7, 2016); Shuai Zheng, Sadeep Jayasumana, Bernardino Romera-Paredes, Vibhav Vineet, Zhizhong Su, Dalong Du, Chang Huang, Philip H. S. Torr, *Conditional Random Fields as Recurrent Neural Networks*, arXiv:1502.03240 (Apr. 13, 2016); Liang-Chieh Chen, George Papandreou, Iasonas Kokkinos, Kevin Murphy, Alan L Yuille, *DeepLab: Semantic Image Segmentation with Deep Convolutional Nets, Atrous Convolution, and*

Fully Connected CRFs, arXiv:1606.00915 (Jun. 2, 2016); Guosheng Lin, Chunhua Shen, Ian Reid, Anton van dan Hengel, *Efficient piecewise training of deep structured models for semantic segmentation*, arXiv:1504.01013 (Jun. 6, 2016); Liang-Chieh Chen, George Papandreou, Iasonas Kokkinos, Kevin Murphy, Alan L. Yuille, *Semantic Image Segmentation with Deep Convolutional Nets and Fully Connected CRFs*, ICLR 2015 (Jun. 7, 2016); Alexander Kolesnikov, Christoph Lampert, Seed, Expand and Constrain: Three Principles for Weakly-Supervised Image Segmentation, *SEC: Seed, Expand and Constrain*, ECCV 2016 (Aug. 6, 2016); Vijay Badrinarayanan, Alex Kendall and Roberto Cipolla, *SegNet: A Deep Convolutional Encoder-Decoder Architecture for Image Segmentation*, arXiv:1511.00561 (Oct. 10, 2016); Sergey Ioffe, Christian Szegedy, *Batch Normalization: Accelerating Deep Network Training by Reducing Internal Covariate shift*, ICML 2015 (Mar. 2, 2015); François Chollet, *Xception: Deep Learning with Depthwise Separable Convolutions,* CVPR 2017 (Apr. 4, 2017); Hengshuang Zhao, Jianping Shi, Xiaojuan Qi, Xiaogang Wang, Jiaya Jia, *Pyramid Scene Parsing Network*, CVPR 2017 (Apr. 27, 2017); Haozhi Qi, Zheng Zhang, Bin Xiao, Han Hu, Bowen Cheng, Yichen Wei, Jifeng Dai, *Deformable Convolutional Networks*, ICCV COCO Challenge Workshop 2017 (Jun. 5, 2017); Liang-Chieh Chen, George Papandreou, Florian Schroff, Hartwig Adam, *Rethinking Atrous Convolution for Semantic Image Segmentation*, arXiv:1706.05587 (Jun. 17, 2017).

Simultaneous localization and mapping (SLAM) was well known in the art prior to the filing of one or more of the Asserted Patents. *See, e.g.*, Sebastian Thrun, Michael Montemerlo, *The GraphSLAM Algorithm with Applications to Large-Scale Mapping of Urban Structures*, Stanford AI Lab (May 1, 2006); Oliver Pink, *Visual map matching and localization using a global feature map*, IEEE 2008 (Jun. 23, 2008); Wolfram Burgard,Oliver Brock, Cyrill Stachniss, *Map-based precision vehicle localization in urban environments*, IEEE 2008 (2008); Ji Zhang, Sanjiv Singh,

LOAM: Lidar Odometry and Mapping in Real-time, RSS 2014 (Jul. 2014); Ji Zhang and Sanjiv Singh, *Visual-lidar Odometry and Mapping: Low-drift, Robust, and Fast,* IEEE 2015 (Jul. 26, 2015); Filipe Mutz, Lucas P.Verones, Thiago Oliveira-Santos, Edilsonde Aguiar, Fernando A.Auat Cheein, Alberto Ferreira De Souza, *Large-scale mapping in complex field scenarios using an autonomous car*, Expert Systems with Applications V. 46 (Mar. 15, 2016); Cesar Cadena, Luca Carlone, Henry Carrillo, Yasir Latif, Davide Scaramuzza, Jose Neira, Ian Reid, John J. Leonard, *Past, Present, and Future of Simultaneous Localization and Mapping: Toward the Robust-Perception Age* (Dec. 2016); Takafumi Taketomi, Hideaki Uchiyama, Sei Ikeda, *Visual SLAM algorithms: a survey from 2010 to 2016*, IPSJ 2017 (Jun. 2, 2017); Jinyong Jeong, Younggun Cho, and Ayoung Kim, *Road-SLAM : Road Marking based SLAM with Lane-level Accuracy* (July 31, 2017); Guillaume Bresson, Zayed Alsayed, Li Yu, Sébastien Glaser, *Simultaneous Localization And Mapping: A Survey of Current Trends in Autonomous Driving* (Oct. 12, 2017); Igor Cvišić, Josip Ćesić, Ivan Marković, Ivan Petrović, *SOFT-SLAM: Computationally Efficient Stereo Visual SLAM for Autonomous UAVs*, Journal of Field Robotics (Nov. 2, 2017).

Vision-based odometry was well known in the art prior to the filing of one or more of the Asserted Patents. *See, e.g.*, Gideon P.Stein, Ofer Mano, Amnon Shashua, *Vision-based ACC with a Single Camera : Bounds on Range and Range Rate Accuracy*, IEEE IV2003 (Jul. 28, 2003); Mohammad O. A. Aqel, Mohammad H. Marhaban, M. Iqbal Saripan and Napsiah Bt. Ismail, *Review of visual odometry: types, approaches, challenges, and applications* (Oct. 28, 2016); Lifeng An, Xinyu Zhang, Hongbo Gao and Yuchao Liu, *Semantic segmentation-aided visual odometry for urban autonomous driving* (Oct. 30, 2017).

Lane detection was well known in the art prior to the filing of one or more of the Asserted Patents. *See, e.g.*, R. K. Satzoda and Mohan M. Trivedi, *Vision-Based Lane Analysis: Exploration*

of Issues and Approaches for Embedded Realization, IEEE 2013 (Sep. 12, 2013); Ravi Kumar Satzoda and Mohan Manubhai Trivedi, *Drive Analysis Using Vehicle Dynamics and Vision-Based Lane Semantic*s, IEEE 2015 (Sep 25, 2014).

Trajectory and path planning was well known in the art prior to the filing of one or more of the Asserted Patents. *See, e.g.*, Moritz Werling, Julius Ziegler, Soren Kammel, Sebastian Thrun, *Optimal trajectory generation for dynamic street scenarios in a frenet frame*, IEEE 2010 (Jul. 15, 2010); Dolgov, Dmitry et. al, *Path planning for autonomous vehicles in unknown semi-structured environments* (Jan. 25, 2010); Chu, Keonyup, Minchae Lee, and Myoungho Sunwoo, L*ocal path planning for off-road autonomous driving with avoidance of static obstacles,* IEEE 2012 (May 22, 2012); Song, Xiaolin, Haotian Cao, and Jiang Huang, *Vehicle path planning in various driving situations based on the elastic band theory for highway collision avoidance*, Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering Vol. 227, (Feb. 11, 2013); Ziegler, Julius, et al., *Trajectory planning for Bertha—A local, continuous methods*, IEEE 2014 (Jul. 17, 2014); Ma, Liang, et al., E*fficient sampling-based motion planning for on-road autonomous driving*, IEEE 2015 (Feb. 13, 2015); Katrakazas, Christos, et al., *Real-time motion planning methods for autonomous on-road driving: State-of-the-art and future research directions*, Transportation Research Part C: Emerging Technologies Vol. 60 (Sep. 24, 2015); González, David, et al., *A Review of Motion Planning Techniques for Automated Vehicle*s, IEEE 2016 (Nov. 26, 2015); Paden, Brian, et al., *A survey of motion planning and control techniques for self-driving urban vehicles*, IEEE 2016 (Mar. 2016); Li, Xiaohui, et al., *Real-time trajectory planning for autonomous urban driving: Framework, algorithms, and verifications*, IEEE 2016 (Oct. 26, 2015);Hu, Xuemin, et al., *Dynamic path planning for autonomous driving on various*

roads with avoidance of static and moving obstacles, Mechanical Systems and Signal Processing Vol. 100 (Aug. 5, 2017).

Autonomous decision making was well known in the art prior to the filing of one or more of the Asserted Patents. *See* Junsoo Kim, Kichun Jo, Dongchul Kim, Keonyup Chu, Myoungho Sunwoo, *Behavior and path planning algorithm of autonomous vehicle A1 in structured environments*, IFAC Proceedings Volumes Vol. 46 (June 2013); Junqing Wei, Jarrod M. Snider, Tianyu Gu, John M. Dolan, Bakhtiar Litkouhi, *A behavioral planning framework for autonomous driving*, IEEE 2014 (Jul. 17, 2014); Christos Katrakazas, Mohammed Quddus, Wen-Hua Chen, Lipika Dekaa, *Real-time motion planning methods for autonomous on-road driving: State-of-the-art and future research directions*, Transportation Research Part C: Emerging Technologies Vol. 60, November (Sep. 24, 2015); Brian Paden, Michal Cap, Sze Zheng Yong, Dmitry Yershov, Emilio Frazzol, *A survey of motion planning and control techniques for self-driving urban vehicles*, arXiv:1604.07446 (Apr. 25, 2016); Scott Drew Pendleton, Hans Andersen, Xinxin Du, Xiaotong Shen, Malika Meghjani, You Hong Eng, Daniela Rus, and Marcelo H. Ang Jr., *Perception, planning, control, and coordination for autonomous vehicles*, Machines 2017 (Feb. 17, 2017); Simon Ulbrich, Andreas Reschka, Jens Rieken, Susanne Ernst, Gerrit Bagschik, Frank Dierkes, Marcus Nolte, Markus Maurer, *Towards a Functional System Architecture for Automated Vehicles*, arXiv:1703.08557 (Mar. 30, 2017); Akansel Cosgun, Lichao Ma, Jimmy Chiu, Jiawei Huang, Mahmut Demir, Alexandre Miranda Anon, Thang Lian, Hasan Tafish, Samir Al-Stouhi, *Towards Full Automated Drive in Urban Environments: A Demonstration in GoMentum Station, California,* arXiv:1705.01187 (May 2, 2017).

IV. INVALIDITY BASED ON 35 U.S.C. §§ 102-103

The prior art cited above anticipates and/or renders obvious, alone or in combination with other of the above-identified prior art, one or more of the Asserted Claims of the patents-in-suit.

Tesla identifies below (and in the corresponding claim charts) examples of how the prior art anticipates and/or renders obvious each Asserted Claim. Tesla further expressly incorporates by reference the petitions and exhibits submitted in connection with IPR2023-01054 ('974 Patent), IPR2023-01055 ('344 Patent), IPR2023-01169 ('134 Patent), IPR2023-01172 ('583 Patent), and IPR2023-01173 ('583 Patent).

In addition to the disclosures herein, Tesla has attached exemplary claim charts demonstrating examples of where or how each limitation of the Asserted Claims is found or met. These claim charts are based on Tesla's current understanding of the limitations (and corresponding terms) in AD's Asserted Claims. To the extent that any asserted claim limitation is deemed not to be met exactly by an item of prior art, expressly, implicitly or inherently, Tesla contends that any differences between the claimed invention and the item of prior art would have been obvious to and within the knowledge of one of ordinary skill in the art at the time of the alleged invention. Accordingly, the claimed invention would have been obvious both in light of the item of prior art alone and/or when combined with other identified prior art that discloses or meets the given claim limitation, as explained in detail below and in the attached claim charts.

As a general matter, Tesla relies on all portions and aspects of each item of prior art in support of Tesla's contention that such prior art satisfies each limitation of the Asserted Claims. Tesla has provided, however, specific supporting citations to the prior art, but these citations do not necessarily represent every location, instance, or manner in which a particular claim limitation is satisfied by the prior art. Even where limitations are disclosed at multiple locations within a single item of prior art, Tesla has not necessarily identified every iteration of every such disclosure. Tesla therefore reserves the right to rely on additional, or different, portions/aspects of the prior art other than those specifically cited in the claims chart provided herewith.

Tesla reserves the right to rely on any prior public use, sale, or disclosure by AD itself as invalidating the Asserted Claims of the Asserted Patents. To the extent that AD may have publicly disclosed its purported inventions before their respective priority dates, its later patents may be invalid.

As noted above, to the extent that the prior art does not, standing alone, anticipate any Asserted Claims of the Asserted Patents, those claims would have been obvious based on the combinations detailed in the charts. As the U.S. Supreme Court held in *KSR Int'l Co. v. Teleflex, Inc.*, "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." 550 U.S. 398, 415-16 (2007). The Supreme Court further held:

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

Id. at 1740.

Moreover, the Supreme Court held that "in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 1742. Indeed, the Supreme Court held that it is sufficient that a combination of prior-art elements was "obvious to try":

> When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.

Id.

"In that instance the fact that a combination was obvious to try might show that it was obvious under § 103." *Id.* "Rigid preventative rules that deny factfinders recourse to common sense, however, are neither necessary under our case law nor consistent with it." *Id.* The Supreme Court recognized that "[g]ranting patent protection to advances that would occur in the ordinary course without real innovation retards progress and may, in the case of patents combining previously known elements, deprive prior inventions of their value or utility." *Id.* at 1741.

Each of the above-identified items of prior art is directed to the same or similar fields of endeavor. Accordingly, one of ordinary skill in the art would have recognized that the results of the combinations were predictable, and would have been clearly motivated to modify and combine the prior-art items above to arrive at the alleged inventions of claims of the asserted patents. Indeed, at least the following rationales support a finding of obviousness based on the combinations set forth in detail below:

(A) Combining prior-art elements according to known methods to yield predictable results;

(B) Simple substitution of one known element for another to obtain predictable results;

(C) Use of a known technique to improve similar devices (methods, or products) in the same way;

(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) "Obvious to try"—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) Known work in one field of endeavor that may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; and

(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art or to combine prior-art teachings to arrive at the claimed invention.

See generally KSR Int'l Co., 550 U.S. 398 (2007).

The field of autonomous devices was a crowded one, even at the time of the applications for the patents-in-suit. Indeed, the patents-in-suit all list hundreds of purportedly relevant prior art patents and publications. It is therefore self-apparent that the patents-in-suit reflect, at most, minor, incremental variations on known structures and apparatuses in this field. Moreover, knowledge that a particular element worked within one reference would have motivated one of skill in the art to combine prior-art references to substitute a known element to attain particular results. Further, at the time there was a finite number of solutions, such that it would have been obvious to mix and match different solutions, and one of skill in the art would have expected them to yield predictable results.

Therefore, to the extent that the prior art references on autonomous devices and applications listed above and charted in the attached exhibits do not disclose every limitation of the Asserted Claims of the patents-in-suit, one of skill in the art would have been motivated to combine any one of these references with any of the other references. Tesla reserves the right to contend anticipation or obviousness based on any prior art or combination of prior art identified herein, and based on any knowledge available to one of ordinary skill in the art.

A. The '974 Patent

As detailed in the attached charts, at least the following prior art anticipates and/or renders obvious the Asserted Claims of the '974 patent.

Primary Reference	Claim Chart
U.S. Patent No. 8,639,644 (Hickman)	Exhibit A-1
U.S. Patent No. 8,965,621 (Urmson)	Exhibit A-2
U.S. Patent No. 9,789,605 (Meier)	Exhibit A-3

Primary Reference	Claim Chart
U.S. Patent No. 9,604,359 (Grotmol)	Exhibit A-4
Net-Scale Technologies, Inc., Autonomous Off-Road Vehicle Control Using End-to-End Learning, Final Technical Report, DARPA-IPTO (July 30, 2004) ("DAVE")	Exhibit A-5
U.S. Pat. Pub. No. 2015/0283702 (Izhikevich 702)	Exhibit A-6
U.S. Pat. Pub. No. 2013/0343640 (Buehler 640)	Exhibit A-7
U.S. Pat. Pub. No. 2014/0136013 (Wolverton)	Exhibit A-8
U.S. Patent No. 9,346,167 (O'Connor)	Exhibit A-9
U.S. Patent No. 9,008,840 (Ponulak 840)	Exhibit A-10
U.S. Patent No. 9,235,214 (Anderson)	Exhibit A-11

To the extent AD contends that claims 4, 7, or 11 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Hickman at Abstract, 10:37-40, 11:9-30, 26:57-65, 28:5-18, Fig 1, Fig. 3, Fig. 4; U.S. Patent No. 10,022,867 ("Saboo") at Abstract, 1:36-54, 2:8-56, 4:21-5:6, 8:45-61, Fig. 3; WO2013119942 ("Vestal") at Abstract, 4:5-26, 24:27-25:16, 26:21-27:20, 28:9-24; U.S. Patent No. 9,682,481 ("Lutz") at Abstract, 3:58-4:51, 8:18-43, Fig. 4; Marcus Waibel, *RoboEarth: A World Wide Web for Robots*, IEEE Spectrum (Feb. 5, 2011); Erico Guizzo, *Robots With Their Heads in the Clouds*, IEEE Spectrum March 2011 at 16-18 (March 2011); and/or Ken Goldberg, *Robots With Their Heads in the Clouds*, Medium (Aug. 25, 2014) ("Shared Knowledge References"). A person of ordinary skill in the art would have been motivated to combine the above-charted autonomous systems with the shared knowledge base of the Shared Knowledge References at least because a shared knowledge base could advantageously be paired with an autonomous system in order to facilitate the sharing of learned behaviors. The resulting combination would have been expected and

predictable at least because the shared knowledge based described in the Shared Knowledge References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 1, 4, 7, 9, 10, or 11 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Hickman at 2:48-64, 10:57-11:8, 13:25-35, 13:53-63, 15:28-37, 22:53-23:13; Grotmol at Abstract, 3:27-39, 8:66-9:3, 9:8-22, 10:23-26, 33:59-62, 38:36-58, 39:13-22, 39:23-28, 43:5-9, Figure 8; U.S. Patent No. 9,085,080 (Mian, "Human augmentation of robotic work") at 14:15-41; Wolverton at [0003], [0004], [0005], [0084], [0096], [0097]; Meier at 2:54-3:10, 7:41-62, 8:7-16; and/or Izhikevich at [0092], [0094], [0107] ("Knowledgebase References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations to promote the additional functionalities of a robot. The resulting combination would have been expected and predictable at least because the learning process described in the Knowledgebase References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 1, 6, 11, 18, or 19 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Mian at 7:18-45, 9:3-26, 11:31-57, 12:1-14; U.S. Patent No. 8,682,485 (Anhalt, "Methods and systems for an autonomous robotic platform") at Abstract, 9:26-43, 15:3-20; Buehler 640, at [0007], [0022], [0053]; Ponulak 840 at 3:19-27, 4:23-37, 15:47-51, 19:21-25, 28:59-65, 29:39-45, 38:35-43; Grotmol at 23:3-29, 24:17-20, 35:57-25:5, 33:59-62, 34:50-55; Meier at 2:8-46, 5:31-63, 18:8-28; Izhikevich at Abstract, [0013], [0024], [0083]; and/or Hickman at 3:8-33, 23:36-65, 26:38-56 ("User Operation References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations established at least in

part by a user in order to optimize the knowledgebase and allow for dynamic learning. The resulting combination would have been expected and predictable at least because the learning process described in the User Operation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 3 or 8 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Hickman at 5:3-12, 26:38-56, 27:7-21, 28:58-29:16; Wolverton at [0011], [0069], [0074], [0095]; Meier at 2:36-46, 3:38-39, 8:64-36; and/or Anhalt at 15:3-20, 9:62-10:6 ("Revision Learning References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a system for modifying images or instructions used in the matching process to allow a robot to adapt to changing circumstances. The resulting combination would have been expected and predictable at least because the learning process described in the Revision Learning References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 12, 14, or 15 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Buehler 640 at [0022], [0060], [0065]; Ponulak 840 at 2:20-29, 4:8-11, 9:18-21, 11:33-67, 27:65-28:5, 38:34-41; Hickman at 2:65-3:7, 11:48-52, 13:25-52, 25:14-23; Grotmol at 8:57-9:3, 9:41-52, 38:52-58, Figure 20A; Izhikevich at [0080], [0211]; Urmson at 5:4-27, 5:43-61, 6:1-15, 6:58-7:3, 9:40-46, 10:34-40; and/or U.S. Patent App. 2015/0269415 ("Gelbman") at Abstract, [0001], [0005], [0022], claim 1 ("Object Representation References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase that stores object representations to allow a robot to recognize and interact with different types of objects. The resulting combination would have been expected and predictable at least because the learning

process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 1, 5, 16, 18, 19, or 20 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Izhikevich at [0085], [0236]; and/or Gelbman at Abstract, claim 8, claim 19 ("Threshold References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a method for matching images or circumstances based on surpassing a threshold of similarity in order to optimize robot operation by selecting the best action in response to stimuli. The resulting combination would have been expected and predictable at least because the learning process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 12 or 15 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Meier at 2:54-3:9, 3:23-32; Izhikevich at [0027], [0156], claim 20; and/or Urmson at 1:45-55, 6:58-7:3, 10:49-11:10, 12:47-54 ("Interval References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems to include time information regarding the collection of information or the recognition of a correlation. The resulting combination would have been expected and predictable at least because the learning process described in the Interval References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 2, 7, and/or 13 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Buehler 640 at [0009], [0017], [0025], [0026], [0045], [0046], [0064], [0066], [0068], [0084]; Meier at 7:41-62, 8:7-15, 8:64-9:4; Izhikevich at [0027], [0092], [0150], [0218], [0241]; and/or Urmson at

3:39-57, 7:35-57, 10:49-63, 12:47-54 ("Data Structure References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems to create a centralized, searchable, knowledgebase. The resulting combination would have been expected and predictable at least because the learning process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

B. The '344 Patent

As detailed in the attached charts, at least the following prior art anticipates and/or renders obvious the Asserted Claims of the '344 patent.

Primary Reference	Claim Chart
U.S. Pat. Pub. No. 2015/0283702 (Izhikevich 702)	Exhibit B-1
U.S. Pat. Pub. No. 2014/0136013 (Wolverton)	Exhibit B-2
U.S. Patent No. 8,639,644 (Hickman)	Exhibit B-3
U.S. Patent No. 9,604,359 (Grotmol)	Exhibit B-4
U.S. Patent No. 9,235,214 (Anderson)	Exhibit B-5
U.S. Patent No. 9,346,167 (O'Connor)	Exhibit B-6
U.S. Pat. Pub. No. 2013/0343640 (Buehler 640)	Exhibit B-7
U.S. Patent No. 9,789,605 (Meier)	Exhibit B-8
U.S. Patent No. 9,008,840 (Ponulak 840)	Exhibit B-9
U.S. Patent No. 8,965,621 (Urmson)	Exhibit B-10
Net-Scale Technologies, Inc., Autonomous Off-Road Vehicle Control Using End-to-End Learning, Final Technical Report, DARPA-IPTO (July 30, 2004) ("DAVE")	Exhibit B-11

To the extent AD contends that claims 5, 6, 9, 10, 11, 12, or 15 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view

of the Shared Knowledge References. A person of ordinary skill in the art would have been motivated to combine the above-charted autonomous systems with the shared knowledge base of the Shared Knowledge References at least because a shared knowledge base could advantageously be paired with an autonomous system in order to facilitate the sharing of learned behaviors. The resulting combination would have been expected and predictable at least because the shared knowledge based described in the Shared Knowledge References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 1, 9, 10, 11, 12, 15, 19, or 20 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the Knowledgebase References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations to promote the additional functionalities of a robot. The resulting combination would have been expected and predictable at least because the learning process described in the Knowledgebase References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 1, 9, 10, 11, 19, or 20 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the User Operation References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations established at least in part by a user in order to optimize the knowledgebase and allow for dynamic learning. The resulting combination would have been expected and predictable at least because the learning process described in the User Operation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 7 or 8 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the Revision Learning References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a system for modifying images or instructions used in the matching process to allow a robot to adapt to changing circumstances. The resulting combination would have been expected and predictable at least because the learning process described in the Revision Learning References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 13, 14, or 15 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Wolverton at [0002] [0023], [0024], [0026], [0034], [0080], [0107], [0133] ("Artificial Intelligence System References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with an artificial intelligence system to allow for robust and efficient learning. The resulting combination would have been expected and predictable at least because the learning process described in the Artificial Intelligence System References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claim 2 of the '344 Patent is not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Wolverton at [0070], [0073]; Meier at 7:13-27, 8:64-9:9:3; Izhikevich at [027], [0033], [0034], [0210]; Urmson at 4:63-5:3, 5:4-42; and/or Anhalt at 5:63-6:5 ("State Aware References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with instruction sets including state information to allow the autonomous systems to be situation and surrounding-aware. The resulting combination would have been expected and

predictable at least because the learning process described in the State Aware References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 3, 14, 16, or 17 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the Object Representation References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase that stores object representations to allow a robot to recognize and interact with different types of objects. The resulting combination would have been expected and predictable at least because the learning process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 1, 7, 8, 12, or 17 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view the Threshold References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a method for matching images or circumstances based on surpassing a threshold of similarity in order to optimize robot operation by selecting the best action in response to stimuli. The resulting combination would have been expected and predictable at least because the learning process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claim 16 is not anticipated or rendered obvious by the charted references, such claim would have been obvious at least in view of the Data Structure References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems to create a centralized, searchable, knowledgebase. The resulting combination would have been expected and predictable at least because the learning process described in the

Object Representation References would not have interfered with the above-charted autonomous systems.

C. The ’583 Patent

As detailed in the attached charts, at least the following prior art anticipates and/or renders obvious the Asserted Claims of the ’583 patent.

Prior Art	Claim Chart
U.S. Patent No. 9,235,214 (Anderson)	Exhibit C-1
U.S. Patent No. 9,346,167 (O’Connor)	Exhibit C-2
U.S. Patent No. 8,639,644 (Hickman)	Exhibit C-3
U.S. Pat. Pub. No. 2015/0283702 (Izhikevich 702)	Exhibit C-4
Net-Scale Technologies, Inc., Autonomous Off-Road Vehicle Control Using End-to-End Learning, Final Technical Report, DARPA-IPTO (July 30, 2004) (“DAVE”)	Exhibit C-5
U.S. Patent No. 9,789,605 (Meier)	Exhibit C-6
U.S. Patent No. 9,604,359 (Grotmol)	Exhibit C-7
U.S. Patent No. 9,008,840 (Ponulak 840)	Exhibit C-8
U.S. Patent No. 8,965,621 (Urmson)	Exhibit C-9
U.S. Pat. Pub. No. 2014/0136013 (Wolverton)	Exhibit C-10
U.S. Pat. Pub. No. 2013/0343640 (Buehler 640)	Exhibit C-11

To the extent AD contends that claims 10, 11, 13, 14, 25, or 27 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the Shared Knowledge References. A person of ordinary skill in the art would have been motivated to combine the above-charted autonomous systems with the shared knowledge base of the Shared Knowledge References at least because a shared knowledge base could advantageously

be paired with an autonomous system in order to facilitate the sharing of learned behaviors. The resulting combination would have been expected and predictable at least because the shared knowledge based described in the Shared Knowledge References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 9, 19, 22, 27, or 31 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the Knowledgebase References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations to promote the additional functionalities of a robot. The resulting combination would have been expected and predictable at least because the learning process described in the Knowledgebase References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 9, 10, or 11 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the User Operation References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations established at least in part by a user in order to optimize the knowledgebase and allow for dynamic learning. The resulting combination would have been expected and predictable at least because the learning process described in the User Operation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 15, 16, 17, or 18 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the Revision Learning References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a system for modifying images or instructions used in the

matching process to allow a robot to adapt to changing circumstances. The resulting combination would have been expected and predictable at least because the learning process described in the Revision Learning References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 19 or 22 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the Artificial Intelligence System References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with an artificial intelligence system to allow for robust and efficient learning. The resulting combination would have been expected and predictable at least because the learning process described in the Artificial Intelligence System References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 6, 7, or 29 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of the Object Representation References A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase that stores object representations to allow a robot to recognize and interact with different types of objects. The resulting combination would have been expected and predictable at least because the learning process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 4, 6, 7, 15, 16, 17, 18, 19, 27, or 28 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view the Threshold References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a method for matching images or

circumstances based on surpassing a threshold of similarity in order to optimize robot operation by selecting the best action in response to stimuli. The resulting combination would have been expected and predictable at least because the learning process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claim 3 is not anticipated or rendered obvious by the charted references, such claim would have been obvious at least in view of the Interval References. A person of ordinary skill in the art would have been motivated to combine the above-charted systems to include time information regarding the collection of information or the recognition of a correlation. The resulting combination would have been expected and predictable at least because the learning process described in the Interval References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claim 28 of the ’583 patent is not anticipated or rendered obvious by the charted references, such claim would have been obvious at least in view of Izhikevich at [0087], [0168] and/or Hickman at 13:32-52, 17:1-19, 25:24-46, claim 11 (“Product of Values References”). A person of ordinary skill in the art would have been motivated to combine the above-charted systems to include an improved method of selecting matching images. The resulting combination would have been expected and predictable at least because the learning process described in the Product of Value References would not have interfered with the above-charted autonomous systems.

D. The ’134 Patent

As detailed in the attached charts, at least the following prior art anticipates and/or renders obvious the Asserted Claims of the ’134 patent.

Prior Art	Claim Chart
U.S. Patent No. 9,434,072 (Buehler 072)	Exhibit D-1
U.S. Patent No. 10,112,113 (Krishnamurphy)	Exhibit D-2
Grefenstette, John et al., "Learning Sequential Decision Rules Using Simulation Models and Competition" (1990) (Grefenstette)	Exhibit D-3
Gaidon, Adrien et al., "Virtual Worlds as Proxy for Multi-Object Tracking Analysis" (2016) (Gaidon)	Exhibit D-4
Pomerleau, Dean, "Neural Network Perception for Mobile Robot Guidance" (1993) (Pomerleau)	Exhibit D-5
Watt, Alan & Policarpo, Fabio, 3D Games Real-time Rendering and Software Technology, Chapter 7 "Behavior and AI Games" (2001) (Watt)	Exhibit D-6
U.S. Patent No. 8,142,268 (Thomas)	Exhibit D-7
U.S. Patent No. 9,766,626 (Zhu)	Exhibit D-8
U.S. Reissue Patent No. 45,132 (Caporale)	Exhibit D-9
U.S. Patent No. 7,090,576 (Herbrich)	Exhibit D-10

To the extent AD contends that claims 5, 12, 13, and 14 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of in view of U.S. Patent No. 7,675,519 ("Tobias") at 1:6-8, 2:4-12, 2:18-28, 2:40-3:9, 4:17-51; U.S. Patent No. 8,453,061 ("Bromenshenkel") at 1:40-2:24, 3:1-18, 5:40-48, 6:61-7:64; U.S. Patent No. 10,350,751 ("Guerin") at 6:7-28, 13:35-52, 14:39-48, 16:62-17:3; U.S. 10,406,441 ("Nathan") at Abstract, 1:12-24, 2:43-51, 2:66-3:15, 5:27-43, 7:40-8:14, 10:21-41, 11:1-8, 11:58-12:12, 17:37-47; U.S. Pat. Pub. No. 2009/0044113 ("Jones") at [0009], [0010], [0028], [0034], [0036], [0054], [0062], [0072], [0073], [0074], [0075], [0076], [0088], [0098], [0099], [0102]; U.S. Pat. Pub. No. 2009/0199095 ("Nicol") at Abstract, [0005], [0006], [0019], [0025], [0026], [0027], [0035],

[0036], [0042], [0043], [0049]; U.S. Patent No. 7,090,576 ("Herbrich") at 2:3-13, 3:7-19, 4:9-20, 5:8-13; U.S. Reissue Patent 45,132 ("Caporale") at 3:23-4:34, 5:1-6:8, 8:62-9:46, 10:21-52, 11:10-18, 12:60-13:7; U.S. Patent No. 10,112,113 ("Krishnamurthy") at 4:33-6:15; 9:3-13; 9:35-62; 15:46-61; U.S. Patent No. 8,142,268 ("Thomas") at 4:14-16, 4:45-52, 5:54-58, 7:39-44, 7:50-54, 8:2-7, 8:11-15, 8:38-40; U.S. Patent No. 9,766,626 ("Zhu") at 7:55-8:15, 8:26-11:13, 15:60-16:16; and/or U.S. Pat. Pub. No. 2008/0207330 ("Beale") at [0047], [0049], [0064], [0065], [0080], [0091] ("Simulation Shared Knowledge References"). A person of ordinary skill in the art would have been motivated to combine the above-charted autonomous avatars with the shared knowledge base of the Simulation Shared Knowledge References at least because a shared knowledge base could advantageously be paired with an autonomous avatar in order to facilitate the sharing of learned behaviors. The resulting combination would have been expected and predictable at least because the shared knowledge based described in the Shared Knowledge References would not have interfered with the above-charted autonomous avatars.

To the extent AD contends that claim 4 is not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of in view of Beale at Abstract, [0046], [0047], [0048], [0055], [0058], [0059], [0060], [0061], [0064], [0065], [0066], [0067], [0068], [0069], [0070], [0072], [0073], [0074], [0075], [0076], [0078], [0091]; U.S. Patent No. 10,475,225 ("Park") at Abstract, 1:13-27, 1:53-2:14, 2:30-57, 4:5-12, 4:23-48, 6:49-7:56, 8:12-21; U.S. Pat. Pub. No. 2009/0044113 ("Jones") at [0007], [0010], [0027], [0030], [0034], [0035], [0037], [0052], [0058], [0065], [0066], [0073], [0075], [0079], [0089], [0092], [0098]; U.S. Patent No. 9,881,420 ("Miller") at Abstract, 14:18-27, 15:52-60. 55:29-58, U.S. Patent No. 9,978,425 ("Kirk") at 4:60-67, 10:54-62, 30:55-59, 35:18-26, Claim 22, U.S. Patent No. 10,217,261 ("Li") at Abstract, 2:51-67, 3:11-20, 6:41-8:12, 8:33-47; and/or U.S. Patent No. 10,317,854 ("Nakagwa")

at 2:47-61, 6:26-41, 7:15-63, Claim 3. A person of ordinary skill in the art would have been motivated to combine the above-charted systems to create a centralized, searchable, knowledgebase including connections. The resulting combination would have been expected and predictable at least because the learning process described in the Simulation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 11, 12, 13 and 18 of the ’134 patent are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of in view of Bromenshenkel at Abstract, 1:40-2:24, 9:22-10:3; Nicol at [0025], [0026], [0034], [0035], [0036]; Jones at [0007], [0008], [0023], [0024], [0025], [0026], [0031], [0032], [0033], [0049], [0058], [0059], [0060], [0061], [0078], [0080], [0102], [0103]; Beale at [0007], [0008], [0063], [0064], [0070]; Park at Abstract, 2:15-29, 4:13-23, 5:66-6:12; and/or U.S. Patent No. 9,409,051 (“Kaleal”) at Abstract, 4:17-37, 5:51-6:5, 13:17-41 (“Simulation User Operation References”). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations established at least in part by a user in order to optimize the knowledgebase and allow for dynamic learning. The resulting combination would have been expected and predictable at least because the learning process described in the User Operation References would not have interfered with the above-charted autonomous simulations.

To the extent AD contends that claim 15 of the ’134 Patent is not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of in view of Bromenshenkel at 8:36-9:12, 9:22-10:3; Nicol at [0003], [0019], [0032], [0035], [0036]; Jones at [0064]; Beale at [0045], [0046], [0052], [0053], [0055], [0056], [0059], [0061], [0062], [0066], [0077]; and/or Kaleal at 24:41-53, 46:24-45, 60:50-3 (“Avatar State Aware References”). A person

of ordinary skill in the art would have been motivated to combine the above-charted systems with instruction sets including state information to allow the autonomous systems to be situation and surrounding-aware. The resulting combination would have been expected and predictable at least because the learning process described in the State Aware References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 1, 2, 3, 4, 7, 10, 11, 12, 13, 14, 18, 19 and 20 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of in view of Bromenshenkel at 1:14-27, 2:55-67, 5:1-19, 6:21-7:64, 8:20-35, 9:22-46; Nicol at [0002], [0030], [0036]; Jones at [0004], [0049], [0050], [0052], [0058], [0063], [0086], [0087], [0088], and/or Beale at [0003], [0005], [0008], [0009], [0012], [0013], [0014], [0054], [0056], [0058], [0074], [0077], [0080] ("Simulation Object Representation References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations established at least in part by a user in order to allow an avatar to interact with different types of objects. The resulting combination would have been expected and predictable at least because the learning process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claims 1, 3, 10 and 20 are not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of in view of Bromenshenkel at 3:19-29, 7:19-50, 9:47-10:3; Jones at [0004], [0027], [0029], [0042], [0063], [0069], [0070], [0071], [0076], [0081], [0082], [0083], [0084], [0085], [0094], [0099], Beale at [0048], [0055], [0066], [0068], [0071], [0072], [0075], [0076], [0078], [0079]; Park at Abstract, 2:15-57, 4:23-36; and/or Miller at Abstract, 14:11-17, 15:39-51, 91:7-19 ("Simulation Threshold

References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems with a knowledgebase of correlations established at least in part by a user in order to optimize robot operation by selecting the best action in response to stimuli. The resulting combination would have been expected and predictable at least because the learning process described in the Object Representation References would not have interfered with the above-charted autonomous systems.

To the extent AD contends that claim 7 is not anticipated or rendered obvious by the charted references, such claims would have been obvious at least in view of Bromenshenkel at 8:36-9:12; Jones at [0009], [0028], [0067], [0075], [0091], [0092], [0095], [0097], [0098], [0099]; Beale at [0010], [0078], [0080]; Park at Abstract, 2:15-57, 6:26-48, 6:49-7:56; Kaleal at 4:2-16; 4:62-5:10; 6:65-7:5, 7:56-8:12. 13:60-14:12, and/or Kirk at Abstract, 3:4-15, 4:3-32, 5:21-38, Claim 1 ("Simulation Interval References"). A person of ordinary skill in the art would have been motivated to combine the above-charted systems to include time information regarding the collection of information or the recognition of a correlation. The resulting combination would have been expected and predictable at least because the learning process described in the Interval References would not have interfered with the above-charted autonomous systems.

V. INVALIDITY BASED ON 35 U.S.C. § 112 (INDEFINITENESS)

To the extent that a claim depends on a claim that is invalid under 35 U.S.C. § 112, Tesla contends that the dependent claim is also invalid.

A. The '974 Patent

At least the following terms from the '974 patent are indefinite:

- "knowledgebase" (Claims 1, 2, 4, 7, 9, 10, 11, 18, 19);
- "knowledge cell" (Claim 2);
- "circumstance" (Claims 1, 4, 5, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20);

- "circumstance representation (Claims 1, 4, 5, 7, 9, 10, 11, 13, 14, 15, 16, 18, 19, 20); "portions of [a] circumstance representation" (Claim 5);
- "correlation" (Claims 1, 2, 3, 4, 6, 7, 9, 10, 11, 18, 19); "a portion of [a] correlation" (Claims 1, 4, 9, 10, 11, 18, 19); "an element of [a] correlation" (Claim 3);
- "wherein the one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process correspond to the user's methodology of operating the first device learned in the learning process" (Claim 6);
- "wherein a first connection is generated to connect the first correlation with the second correlation, and wherein a second connection is generated to connect the second correlation with the fourth correlation" (Claim 7); and
- "one or more object representations, or one or more collections of object representations" (Claims 14, 15).

For each term listed above, the corresponding claims, "read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). At least the same terms render the claims invalid for lack of written description and/or lack of enablement under 35 U.S.C. §112.

B. The '344 Patent

At least the following terms from the '344 patent are indefinite:

- "knowledgebase" (Claims 1, 9, 10, 11, 12, 15, 19, 20);
- "circumstance" (Claims 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 19, 20);

- "circumstance representation (Claims 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 19, 20); "modifying . . . [a] circumstance representation" (Claim 8);
- "correlation" (Claim 1);
- "wherein the first one or more instruction sets for operating the first device include one or more information about one or more states of: the first device, or a portion of the first device" (Claim 2);
- "object representations" (Claims 3, 14, 16, 17);
- "artificial intelligence system" (Claims 13, 14, 15); and
- "wherein the first circumstance representation correlated with the first one or more instruction sets for operating the first device include at least a portion of the first one or more object representations connected, using at least one or more connections, with at least a portion of the first one or more instruction sets for operating the first device" (Claim 16).

For each term listed above, the corresponding claims, "read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). At least the same terms render the claims invalid for lack of written description and/or lack of enablement under 35 U.S.C. §112.

C. The '583 Patent

At least the following terms from the '583 patent are indefinite:

- "learning the first one or more digital pictures correlated with the first one or more instruction sets" / "wherein at least a portion of the first one or more digital pictures

or at least a portion of the first one or more instruction sets is learned" (Claims 1, 2, 3, 9, 10, 11, 17, 18, 19, 33, 34);

- "knowledgebase" (Claims 9, 10, 11, 22, 27);
- "modifying at least one of: the first one or more digital pictures, a copy of the first one or more digital pictures, the new one or more digital pictures, or a copy of the new one or more digital pictures" (Claims 16, 17, 18,);
- "the modified the first one or more instruction sets for operating the first device" (Claims 15, 18);
- "artificial intelligence system" (Claims 19, 22);
- "one or more representations of one or more whole digital pictures" (Claim 24);
- "one or more representations of one or more features" (Claim 24);
- "wherein the first one or more digital pictures are: . . . one or more collections of values" (Claim 24);
- "wherein the at least partial match between the new one or more digital pictures and the first one or more digital pictures is at least in part based on a product of one or more values that represent one or more portions of the new one or more digital pictures and one or more values that represent one or more portions of the first one or more digital pictures" (Claim 28);
- "generating one or more representations of the one or more objects; and generating the new one or more digital pictures that include the one or more representations of the one or more objects" (Claim 29); and
- "wherein the generating the first one or more instruction sets for operating the first device includes generating the first one or more instruction sets for operating the

first device as one or more representations of a second one or more instruction sets for operating the first device" (Claim 31).

For each term listed above, the corresponding claims, "read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). At least the same terms render the claims invalid for lack of written description and/or lack of enablement under 35 U.S.C. §112.

D. The '134 Patent

At least the following terms from the '134 patent are indefinite:

- "correlation" (Claims 1, 4, 10, 11, 12, 13, 14, 18, 19);
- "object representation" (Claims 1, 2, 3, 4, 7, 10, 11, 12, 13, 14, 18, 19, 20); "wherein the first one or more object representations include: one object representation, a stream of object representations, a collection of object representations, or a stream of collections of object representations" (Claim 2)
- "knowledgebase" (Claims 4, 11, 12, 13, 14);
- "wherein the first correlation is connected with the third correlation by a connection" (Claim 4);
- "wherein, to correlate the first one or more object representations with the first one or more instruction sets for operating the first avatar of the application, a determination is made that the first one or more instruction sets for operating the first avatar of the application temporally correspond to the first one or more object representations" (Claim 7);

- "wherein the first one or more instruction sets for operating the first avatar of the application include one or more information about one or more states of: the first avatar of the application or a portion of the first avatar of the application" (Claim 15);

For each term listed above, the corresponding claims, "read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). At least the same terms render the claims invalid for lack of written description and/or lack of enablement under 35 U.S.C. §112.

VI. INVALIDITY BASED ON 35 U.S.C. § 112 (WRITTEN DESCRIPTION)

To the extent that a claim depends on a claim that is invalid under 35 U.S.C. § 112, Tesla contends that the dependent claim is also invalid.

"[T]he test for sufficiency is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010).

A. Autonomous Device Patents ('974, '344, '583)

Given the apparent breadth that AD seeks as an interpretation of the Asserted Claims, the specifications of the Autonomous Device Patents fail to enable or describe at least the following:

Learning and Anticipating Instructions for Autonomous Operation Using Artificial Intelligence System

All asserted independent claims recite "learning" correlations and "anticipating" future instruction sets based on "at least a partial match" between old and new circumstance representations or digital pictures. Based on AD's infringement contentions, AD appears to be

interpreting these claims to cover the use of any kind of artificial intelligence system for the learning and anticipating. The specification fails to enable or describe such claim scope. The Asserted Patents provide no guidance as to at least the following critical aspects of the purported inventions:

- Which learning process to use. *E.g.*, '974 Pat. at 103:30-33 ("The disclosed systems, devices, and methods are independent of the artificial intelligence model and/or technique used and any model and/or technique can be utilized to facilitate the functionalities described herein."); '344 Pat. at 103:36-40; '583 Pat. at 95:53-56.
- Which artificial intelligence system and/or neural network architecture(s) to use. *Id.*; *see also* '974 Pat. at 103:33-41 ("Examples of these models and/or techniques include deep learning, supervised learning, unsupervised learning, neural networks (i.e. convolutional neural network, recurrent neural network, deep neural network, etc.), search-based, logic and/or fuzzy logic-based, optimization-based, tree/graph/other data structure-based, hierarchical, symbolic and/or sub-symbolic, evolutionary, genetic, multi-agent, deterministic, probabilistic, statistical, and/or other models and/or techniques. "); '344 Pat. at 103:40-48; '583 Pat. at 95:56-64.
- Which data to use from circumstance representations or digital pictures. *E.g.*, '974 Pat. at 80:4-8 ("In some aspects, any features, functionalities, and embodiments of Camera 92 a/Picture Recognizer 94 a, Microphone 92 b/Sound Recognizer 94 b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615."); *see also* '344 Pat. at 80:11-22;

’583 Pat. at 85:5-7 (“Any features, functionalities, and embodiments of Picture Recognizer 350 (later described) can be utilized for such recognizing.”).

- How to modify instructions to account for new circumstance representations or digital pictures;
- What similarity thresholds to use. *E.g.*, ’974 Pat. at 118:43-46 (“Any other threshold for acceptable percentage difference can be used such as 0.68%, 1%, 3%, 11%, 33%, 69%, 87%, and/or others. The aforementioned thresholds can be defined by a user, by DCADO system administrator, or automatically by the system based on experience, testing, inquiry, analysis, synthesis, or other techniques, knowledge, or input. Other techniques known in art for comparing numbers can be utilized herein.”); *see also* ’344 Pat. at 118:53-61; ’583 Pat. at 103:64-104:25.
- How to learn from operation by any type of “user.” *E.g.*, ’974 Pat. at 68:22-26 (“User 50 (also referred to simply as user or other suitable name or reference) comprises a human user or non-human user. A non-human User 50 includes any device, system, program, and/or other mechanism for operating or controlling Device 98 and/or elements thereof.”); *see also* ’344 Pat. at 68:29-33; ’583 Pat. at 69:11-15.

Although the Autonomous Device Patents purport to cover “any” permutation and combination of the above design choices, not all design choices will yield a working example.

The specifications of the Autonomous Device Patents would not have conveyed to a POSITA that the inventor was in possession of learning and anticipating instructions for autonomous operation using any kind of artificial intelligence system. There is no indication in the intrinsic or extrinsic evidence that the inventor had any idea what combination or permutation of

elements would result in a working device. AD claims that the sole named inventor, Jasmin Cosic, "realized . . . that the only way to achieve the functionality of autonomously driven cars was through the use of a learning system including a neural network and/or other learning techniques embedded in a vehicle with sensors, such as optical cameras or radar." Compl. ¶ 17. Tesla served Interrogatory No. 13 requesting that AD identify the factual bases supporting these assertions, including any supporting documents. AD, to date, has responded only with a regurgitation of the bare "realizations" from its complaint. Tesla also served Request for Production No. 41 requesting that AD produce "All Documents and Things supporting the assertions regarding Jasmin Cosic's 'realiz[ations]' described in paragraphs 17-18 of [AD's] Complaint." AD responded that no documents exist. AD has not identified or produced any research papers, inventor's notes, prior patent drafts, communications, prototypes, or any other documents related to Mr. Cosic, save for Mr. Cosic's CV. AD_00009763. Even if Mr. Cosic had such a "realization"—with no relevant experience or prior success in designing such products—it does not satisfy the written description requirement to merely claim a result (autonomous vehicles using neural networks) without explaining how to achieve that result. *Regents of the University of California v. Eli Lilly & Co.*, 119 F.3d 1559, 1568 (Fed. Cir. 1997) ("The description requirement of the patent statute requires a description of an invention, not an indication of a result that one might achieve if one made that invention.").

"Fleet Learning"

As interpreted by AD, certain dependent claims of the Autonomous Device Patents recite a process of sharing learning between a "first device" and "second device" (and, in some cases, additional devices or users). AD refers to this as "fleet learning." *E.g.*, Compl. ¶ 17. AD appears to be interpreting these claims to cover "fleet learning" with any artificial intelligence system

across a range of non-identical devices in non-identical circumstances. The specification fails to enable or describe such claim scope. The Autonomous Device Patents provide no guidance as to at least the following critical aspects of the purported invention:

- Which learning processes are compatible with "fleet learning." '974 Pat. at 103:30-33 ("The disclosed systems, devices, and methods are independent of the artificial intelligence model and/or technique used and any model and/or technique can be utilized to facilitate the functionalities described herein."); '344 Pat. at 103:36-40; '583 Pat. at 95:53-56.
- Which artificial intelligence and/or neural network architecture(s) are compatible with "fleet learning." *Id.*; *see also* '974 Pat. at 103:33-41 ("Examples of these models and/or techniques include deep learning, supervised learning, unsupervised learning, neural networks (i.e. convolutional neural network, recurrent neural network, deep neural network, etc.), search-based, logic and/or fuzzy logic-based, optimization-based, tree/graph/other data structure-based, hierarchical, symbolic and/or sub-symbolic, evolutionary, genetic, multi-agent, deterministic, probabilistic, statistical, and/or other models and/or techniques."); '344 Pat. at 103:40-48; '583 Pat. at 95:56-64.
- How to combine the knowledge of two or more devices;
- How to modify instructions to account for differences in devices;
- How to share knowledge of operation by any type of "user." *E.g.*, '974 Pat. at 68:22-26 ("User 50 (also referred to simply as user or other suitable name or reference) comprises a human user or non-human user. A non-human User 50 includes any device, system, program, and/or other mechanism for operating or controlling

Device 98 and/or elements thereof."); *see also* '344 Pat. at 68:29-33; '583 Pat. at 69:11-15.

Although the Autonomous Device Patents purport to cover "any" permutation and combination of the above design choices, not all design choices will yield a working example.

The specifications of the Autonomous Device Patents would not have conveyed to a POSITA that the inventor was in possession of "fleet learning" using any artificial intelligence system across a range of non-identical devices in non-identical circumstances. There is no indication in the intrinsic or extrinsic evidence that the inventor had any idea what combination or permutation of elements would result in a working device. AD claims that the sole named inventor, Jasmin Cosic, "realized that the use of fleet learning, where each driver's actions within the fleet would be learned and correlated to the scene around the vehicle along with the vehicle's actions, would address these issues related to how autonomous vehicles addressed a given situation." Compl. ¶ 17. Tesla served Interrogatory No. 13 requesting that AD identify the factual bases supporting these assertions, including any supporting documents. AD, to date, has responded only with a regurgitation of the bare "realizations" from its complaint. Tesla also served Request for Production No. 41 requesting that AD produce "All Documents and Things supporting the assertions regarding Jasmin Cosic's 'realiz[ations]' described in paragraphs 17-18 of [AD's] Complaint." AD responded that no documents exist. AD has not identified or produced any research papers, inventor's notes, prior patent drafts, communications, prototypes, or any other documents related to Mr. Cosic, save for Mr. Cosic's CV. AD_00009763. Even if Mr. Cosic had such a "realization"—with no relevant experience or prior success in designing such products—it does not satisfy the written description requirement to merely claim a result (apply the learning from a first device to a non-identical second device in non-identical circumstances) without

explaining how to achieve that result. *Regents of the University of California v. Eli Lilly & Co.*, 119 F.3d 1559, 1568 (Fed. Cir. 1997) ("The description requirement of the patent statute requires a description of an invention, not an indication of a result that one might achieve if one made that invention.").

B. Autonomous Application Patent ('134)

The contentions above apply with equal force to the Autonomous Application Patent, which contains substantially similar claim elements but applied in an application rather than a device.

In addition, given the apparent breadth that AD seeks as an interpretation of the Asserted Claims, the specifications of the Autonomous Applications Patents fail to enable or describe at least the following:

Artificial Intelligence for an Autonomous Vehicle in a Simulation

All asserted independent claims recite a process whereby "avatars" in an application determine instructions on how to operate based on "at least a partial match" between old and new object representations. Based on AD's infringement contentions, AD appears to be interpreting these claims to cover the use of any artificial intelligence system for an autonomous vehicle within a simulation. The specification fails to enable or describe such claim scope. The Autonomous Application Patent provide no guidance as to at least the following critical aspects of the purported inventions:

- Which artificial intelligence system and/or neural network architecture(s) to use. *Id.*; *see also* '134 Pat. at 105:2-13 ("The disclosed systems, devices, and methods are independent of the artificial intelligence model and/or technique used and any model and/or technique can be utilized to facilitate the functionalities described herein. Examples of these models and/or techniques include deep learning,

supervised learning, unsupervised learning, neural networks (i.e. convolutional neural network, recurrent neural network, deep neural network, etc.), search-based, logic and/or fuzzy logic-based, optimization-based, tree/graph/other data structure-based, hierarchical, symbolic and/or sub-symbolic, evolutionary, genetic, multi-agent, deterministic, probabilistic, statistical, and/or other models and/or techniques. “).

- Which data to use from object representations. *E.g.*, ’134 Pat. at 114:55-59 (“Similarity Comparison 125 can compare Object Properties 630 or portions (i.e. characters, words, numbers, etc.) thereof from one Object Representation 625 with Object Properties 630 or portions thereof from another Object Representation 625.
- Similarity Comparison 125 can compare one or more regions of one Digital Picture 525 with one or more regions of another Digital Picture 525. A region may include a collection of pixels. In some aspects, a region may include detected or recognized content of interest such as an object or person. Such region may be detected using any features, functionalities, and embodiments of Picture Recognizer 350.”).
- How to modify instructions to account for new object representations or digital pictures;
- What similarity thresholds to use. *E.g.*, ’134 Pat. at 119:48-120:23 (“Any other threshold for acceptable percentage difference can be used such as 0.68%, 1%, 3%, 11%, 33%, 69%, 87%, and/or others.”).
- How to create a simulation in which to run the above-referenced artificial intelligence system(s);

- How to learn from operation by any type of "user." *E.g.*, '134 Pat. at 67:65-68:3 ("User 50 (also referred to simply as user or other suitable name or reference) comprises a human user or non-human user. A non-human User 50 includes any device, system, program, and/or other mechanism for operating or controlling Application Program 18, Avatar 605, Computing Device 70, and/or elements thereof..").

Although the Autonomous Application Patent purports to cover "any" permutation and combination of the above design choices, not all design choices will yield a working example.

The specifications of the Autonomous Device Patents would not have conveyed to a POSITA that the inventor was in possession of running any kind of artificial intelligence system for an autonomous vehicle in a simulation. There is no indication in the intrinsic or extrinsic evidence that the inventor had any idea what combination or permutation of elements would result in a working simulation. AD claims that the sole named inventor, Jasmin Cosic, "realized that there were many highly unlikely scenarios that a human driver may face once or twice that an autonomous vehicle may encounter that would need to be accounted for in the learning system." Compl. ¶ 18 "Mr. Cosic realized the crucial importance of autonomous driving simulations that would ensure the safety of the driving knowledge learned from the physical and simulated vehicles before the knowledgebase is released to all fleet vehicles and affects lives." *Id.* Tesla served Interrogatory No. 13 requesting that AD identify the factual bases supporting these assertions, including any supporting documents. AD, to date, has responded only with a regurgitation of the bare "realizations" from its complaint. Tesla also served Request for Production No. 41 requesting that AD produce "All Documents and Things supporting the assertions regarding Jasmin Cosic's 'realiz[ations]' described in paragraphs 17-18 of [AD's] Complaint." AD responded that no

documents exist. AD has not identified or produced any research papers, inventor's notes, prior patent drafts, communications, prototypes, or any other documents related to Mr. Cosic, save for Mr. Cosic's CV. AD_00009763. Even if Mr. Cosic had such a "realization"—with no relevant experience or prior success in designing such products—it does not satisfy the written description requirement to merely claim a result (running an artificial intelligence system for an autonomous vehicle in a simulation) without explaining how to achieve that result. *Regents of the University of California v. Eli Lilly & Co.*, 119 F.3d 1559, 1568 (Fed. Cir. 1997) ("The description requirement of the patent statute requires a description of an invention, not an indication of a result that one might achieve if one made that invention.").

VII. INVALIDITY BASED ON 35 U.S.C. § 112 (ENABLEMENT)

To the extent that a claim depends on a claim that is invalid under 35 U.S.C. § 112, Tesla contends that the dependent claim is also invalid.

"Claims are not enabled when, at the effective filing date of the patent, one of ordinary skill in the art could not practice their full scope without undue experimentation." *Wyeth and Cordis Corp. v. Abbott Laboratories*, 720 F.3d 1380, 1384 (Fed. Cir. 2013)

> If a patent claims an entire class of processes, machines, manufactures, or compositions of matter, the patent's specification must enable a person skilled in the art to make and use the entire class. In other words, the specification must enable the full scope of the invention as defined by its claims. The more one claims, the more one must enable.

Amgen Inc. v. Sanofi, 143 S. Ct. 1243, (2023).

The field of autonomous devices was a crowded one, even at the time of the applications for the patents-in-suit, and the idea of using neural networks and/or "fleet learning" to learn and anticipate instructions was not new. But the design and implementation of artificial intelligence, including neural networks, for such purposes is non-trivial. Tesla, for example, has invested over a billion dollars in research and development for its autonomous vehicles, including the

development of simulations to validate its designs. Tesla employs teams of engineers who devoted at least tens of thousands of man hours to the same. Before and after the filing of the Asserted Patents, several other companies have tried to develop and train neural networks to enable autonomous vehicles with varying degrees of success. The Asserted Claims preempt entire fields of effort while taking for granted the tremendous amount of experimentation necessary to develop a working example of what is claimed.

The Federal Circuit has articulated eight factors that can be considered in the enablement analysis: "(1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims." *In re Wands*, 858 F.2d 731, 737, 8 U.S.P.Q.2d 1400 (Fed. Cir. 1988). A POSITA would not have been able to practice the full scope of the Asserted Claims without undue experimentation. All *Wands* factors weigh in favor of a lack of enablement.

1. The specifications provide no guidance as to critical aspects of the purported invention, as discussed above with respect to written description.
2. Mr. Cosic has neither described nor has produced any working examples of his purported inventions.
3. Autonomous vehicles are a relatively new and experimental area of research, as are simulations for autonomous vehicles.
4. At the time the Asserted Patents were filed, there were few examples of functioning autonomous vehicles, let alone simulations for autonomous vehicles.

5. The skill of those in the art alleged by AD is low—especially compared to those who actually work in the field—"(1) a bachelor's degree in electrical and/or computer engineering, or computer science (or equivalent course work) with two to three years of work experience in computer vision, image/video processing and the design and development of neural networks; or (2) a master's degree in electrical and/or computer engineering, or computer science (or equivalent course work) with a focus in computer vision, image/video processing and the design and development of neural networks." Compl., Ex. G ¶ 17.
6. The design and implementation of artificial intelligence systems, including neural networks, is an unpredictable art.
7. The claims are broad, effectively preempting the field of artificial intelligence for autonomous devices and applications.

Thus, the Asserted Claims are invalid as not enabled under 35 U.S.C. § 112.

VIII. INVALIDITY BASED ON 35 U.S.C. § 101

All Asserted Claims are ineligible under 35 U.S.C. § 101. Tesla incorporates by reference its motion to dismiss, filed January 13, 2023 and all related filings. *E.g.*, D.I. 12; D.I. 16.

"An idea of itself is not patentable." *Alice Corp. Pty. v. CLS Bank Int'l*, 573 U.S. 208, 218, (2014) (internal quotation marks and citations omitted). The Supreme Court has set forth a two-part test for determining patent eligibility:

> First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. If so, we then ask, "[w]hat else is there in the claims before us?" To answer that question, we consider the elements of each claim both individually and "as an ordered combination" to determine whether the additional elements "transform the nature of the claim" into a patent-eligible application.

Id. at 217 (internal citations omitted).

The Asserted Claims are directed to an abstract idea, i.e., a patent-ineligible concept, under *Alice* Step 1, and the Asserted Claims lack an inventive concept under *Alice* Step 2 necessary to transform the abstract idea into patent-eligible subject matter. Thus, all Asserted Claims are patent ineligible under the *Alice* framework.

A. *Alice* Step 1

All Asserted Claims are directed to the abstract idea of performing an autonomous task based on matching a current circumstance with a previous learned circumstance. The Asserted Claims broadly recite the functions of learning instructions for specific circumstances, comparing a current circumstance with those previous circumstances, and performing the learned instructions. In this case, unlike cases where the Federal Circuit has found claims patent eligible, "the focus of the claims is not on such an improvement in computers as tools, but on certain independently abstract ideas that use computers as tools." *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016). Here, the asserted claims do not recite any "inventive technology for performing [the claimed] functions." *Id*. Indeed, the Asserted Patents highlight that the disclosed systems "comprise[] ***any hardware, programs, or combination thereof***," '974 Pat. at 68:4-5, 80:50-54 (emphasis added),[4] and that "[t]he disclosed systems, devices, [and] methods are ***independent of the artificial intelligence model and/or technique used and any model and/or technique can be utilized*** to facilitate the functionalities described," *id.* at 103:30-33 (emphasis added).

The '974, '344, and '583 patents claim autonomous operation of a "device," while the '134 patent claims autonomous operation of a digital "object" of an application rather than a physical

[4] There is substantial overlap between the specifications of the Asserted Patents. Citations herein will be made to the '974 patent for the Autonomous Device Patents and/or the '134 patent, as the sole Autonomous Application Patent.

device. D.I. 1 ("Compl."), ¶¶ 44-45, 58-60, 73. The Asserted Patents further claim different learned correlations. These differences are summarized in the table below.

	'974 and '344 Patents	'583 patent	'134 patent
Learned Correlation	Circumstances with instructions	Digital pictures with instructions	Object representations with instructions
Autonomous Operation	Device	Device	Avatar

Figure 32 of the '974 patent, reproduced below, illustrates the claimed functionality: **1)** correlating circumstances (in this case, object representations) with instructions and storing those correlations (i.e., learning); **2)** receiving a circumstance; **3)** comparing the new circumstance with the stored circumstance; and **4)** executing an instruction for operating the device (i.e., imitation). The '583, '344, and '134 patents have a substantially similar figure illustrating the claimed functionality. '583 Patent, Fig. 31; '344 Patent, Fig. 32; '134 Patent, Fig. 30.

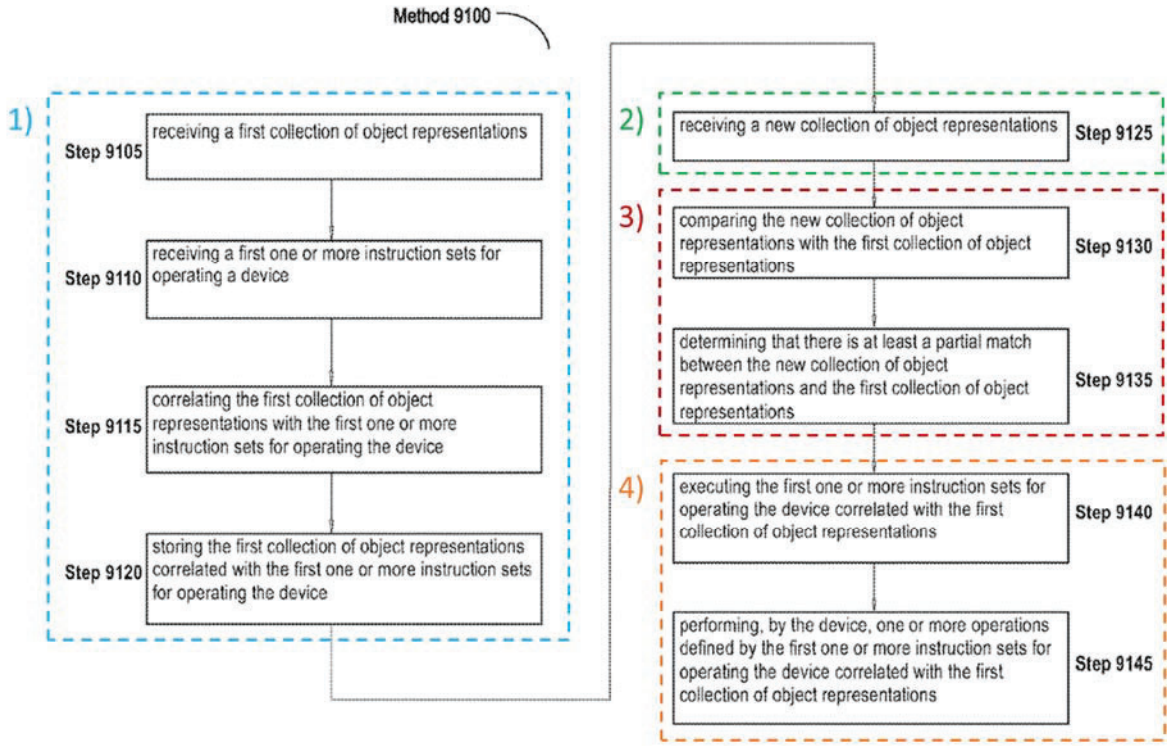

FIG. 32

’974 Pat. at Fig. 32 (annotated)

The’583 patent claims “digital pictures” correlated with instructions, whereas the ’134 patent claims “object representations” correlated with instructions, and the ’974 and ’344 patents claim “circumstances” correlated with instructions. *See* ’583 Patent, 160:52-54;’974 Patent, 169:40-42; ’344 Patent, 174:37-39; ’134 Patent, 171:48-50.

The Asserted Patents also refer to a Unit 100 that “comprises learning, anticipating, decision making, automation, and/or other functionalities disclosed herein.” ’974 Pat. at 81:5-7; *see also* ’583 Pat. at 70:64-66; ’134 Pat. at 82:36-38. The Unit 100 “comprises ***any hardware, programs, or a combination thereof***.” ’974 Pat. at 80:50-52; *see also* ’583 Pat. at 70:45-46; ’134 Pat. at 82:4-6. Each patent also provides a nearly identical description of a generic learning/comparison unit called an “Artificial Intelligence Unit 110” that is part of the Unit 100, and “comprises the functionality for learning one or more digital pictures correlated with any instruction sets, data, and/or other information … [and] the functionality for anticipating one or more Instruction Sets 526 to be used or executed in Device’s 98 autonomous operation.” ’974 Pat. at 96:27-52; *see also* ’583 Pat. at 88:62-89:19; ’134 Pat. at 98:14-55. The Asserted Patents explain that the Artificial Intelligence Unit can include “***any data structure or arrangement capable of storing the knowledge*** of a device’s operation in circumstances including objects with various properties.” ’974 Pat. at 102:8-12 (emphasis added). Furthermore, the Asserted Patents do not claim any specifics of the Artificial Intelligence Unit because “[t]he disclosed systems, devices, and methods are ***independent of the artificial intelligence model and/or technique used and any model and/or technique can be utilized*** to facilitate the functionalities described herein.” ’974 Pat. at 103:30-33 (emphasis added).

The Asserted Claims fail *Alice* step one because they are directed to the abstract idea of performing an autonomous task based on matching a current circumstance with a previous learned circumstance. As discussed above, the Asserted Patents broadly recite: **1)** learning by correlating circumstances (or pictures or object representations) with instructions and storing those correlations; **2)** receiving a new circumstance (or picture or object representation); **3)** comparing the new circumstance (or picture or object representation) with the stored circumstances (or pictures or object representations); and **4)** executing an instruction for operating a device or avatar. This characterization of what the claims are "directed to" is precisely how Plaintiff characterizes the claims in the Complaint. *See* Compl., ¶¶ 44-45, 58-60.

Taking claim 1 of the '974 patent as a representative example,[5] limitations **1** and **2** of claim 1 require collecting and storing data (i.e., circumstances), which courts have routinely held to be an abstract concept. "The concept of data collection, recognition, and storage is undisputedly well-known. Indeed, humans have always performed these functions." *Content Extraction*, 776 F.3d at 1347; *see also SynKloud Techs., LLC v. HP Inc.*, 490 F. Supp. 3d 806, 814 (D. Del. 2020) ("The Federal Circuit has established that the storage and retrieval of information is an abstract concept.") (collecting cases). That the claims are directed to a particular type of data—"digital pictures" or "circumstances"—does not change that they are directed to abstract ideas. *See Elec. Power Grp.*, 830 F.3d at 1353 ("[W]e have treated collecting information, including when limited to particular content (which does not change its character as information), as within the realm of abstract ideas.").

[5] Substantially similar elements to those described below exist in all Asserted Claims. *See generally* D.I. 12; D.I. 16.

Limitation **1** of claim 1 of the ’974 patent also recites “wherein at least a portion of the first correlation and at least a portion of the second correlation are *learned in a learning process that includes operating the first device at least partially by a user*.” ’974 Pat. at Claim 1 (emphasis added). The claim does not limit what “learn[ing] in a learning process” entails beyond that it includes operation of the physical device by a user. The specification describes that “learning” may comprise “correlating the first collection of object representations with the first one or more instruction sets for operating the device.” ’974 Pat. at 7:16-21. The specification further describes that correlation may comprise identifying that an action was performed at around the same time as a circumstance. *See* ’974 Pat. at 4:4-35, 99:11-14. The “learning” of limitation 1 thus encompasses, but is not limited to, matching two sets of data (action and circumstance) due to the same timestamp, i.e., the abstract idea of “determining … whether [a first set of data] matches a characteristic of [a second set of data].” *PersonalWeb Techs. LLC v. Google LLC*, 8 F.4th 1310, 1317 (Fed. Cir. 2021).

Limitation **3** of claim 1 of the ’974 patent recites “anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation.” This step merely recites comparing two circumstances to determine whether they satisfy a threshold level of similarity. As shown in the below excerpt from *PersonalWeb Techs. LLC v. Google LLC*, the Federal Circuit has held that comparing information for matching or similar characteristics is an abstract concept:

> [T]he step of comparing the content-based identifier against other values … is also abstract. For example, the *Symantec* claims required “determining … whether each received content identifier matches a characteristic of other identifiers.” [*Intell. Ventures I LLC v. Symantec Corp.*,] 838 F.3d [1307,] 1313 [Fed. Cir. 2016]. There, as here, this is the “abstract idea of 1) collecting data[ ] [and] 2) recognizing certain

> data within the collected data set." *Id.* at 1314–15 (quoting *Content Extraction*, 776 F.3d at 1347). That's a mental process.

8 F.4th at 1317.

Limitation **4** requires executing an instruction to autonomously perform operation of a device. '974 Patent, claim 1 ("at least in response to the anticipating, *executing the first one or more instruction sets* for operating the first device learned in the learning process, wherein the first device or the second device *autonomously* performs one or more operations defined by the first one or more instruction sets . . . .") (emphasis added). As described in the specification, the "instruction sets for operating the [first physical] device"—i.e., the action—"includes *any* operation … *with or by* a computing enabled machine." '974 Pat. at 13:36-40 (emphasis added); *see also id.* ("[W]hile all possible variations of operations on a device are too voluminous to list and limited only by the device's design and/or user's utilization, other operations are within the scope of this disclosure in various implementations."). Thus, limitation **4** merely entails the abstract idea of automating a manual process. *See Credit Acceptance Corp. v. Westlake Servs.*, 859 F.3d 1044, 1055 (Fed. Cir. 2017) ("Our prior cases have made clear that mere automation of manual processes using generic computers does not constitute a patentable improvement in computer technology.").

The present claims are similar to those found ineligible in *S.I.SV.EL. Societa Italiana per lo Sviluppo Dell'Elettronica S.p.A v. Rhapsody Int'l Inc.*, No. CV 18-69-MN-CJB, 2019 WL 1102683 (D. Del. Mar. 8, 2019). In *Societa*, the challenged claims recited a method of recommending an item to a user, comprising the steps of "*observing* one or more environmental characteristics," "*learning* preferences of said user for each item … under said one or more observed environmental characteristics," and "*generating* a recommendation score for said item based on … said learned preferences of said user under said one or more observed environmental

characteristics." *Id.* at *5 (emphasis added). The court concluded that the claims were directed to the abstract idea of "recommending an item based on a user's environment." *Id.* at *6. The court noted that "with the exception of generic computer-implemented steps, there is nothing in the claims themselves that foreclose them from being performed by a human, mentally or with pen and paper." *Id.* at *7 (quoting *Symantec*, 838 F.3d at 1318). Here, too, the claims merely recite correlating circumstances with instructions (i.e., learning) and executing those instructions on generic computer components when encountering similar circumstances (i.e. imitation), which humans have always performed. *See Alice*, 573 U.S. at 223 ("[T]he mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention.").

Notably, the specifications confirm that the Asserted Patents do not provide any technological improvement to the way in which the learning is performed by the generic computer components. *See* '974 Pat. at 103:26-33 ("Referring to FIG. 17, the disclosed artificially intelligent systems, devices, and methods for learning and/or using visual surrounding for autonomous device operation may include various artificial intelligence models and/or techniques. The disclosed systems, devices, and methods are ***independent of the artificial intelligence model and/or technique used and any model and/or technique can be utilized*** to facilitate the functionalities described herein.") (emphasis added). Although the background of the patents contends that existing systems "lack a way to learn operation of a device or system and enable autonomous operation of a device or system" (*e.g.*, '344 Patent at 1:44-48), the asserted ***claims*** do not recite any technological improvement to the way in which learning is performed. Rather, the claims are "directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery." *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1241 (Fed. Cir. 2016).

Plaintiff asserts that the claims are directed to non-abstract ideas because they "provide technical solutions" to problems related to "coded responses, lack of training set diversity, and user operation corresponding to the correlated circumstances and instructions in the knowledgebase." Compl., ¶¶ 49, 64 (citing Saber Decl., ¶¶ 44, 56). As explained below, Plaintiff's position is contrary to the claim language and specification, and conflates novelty with subject matter eligibility.

Regarding the first alleged technical solution to "coded responses" the Complaint quotes the specification describing that prior art systems "lack[ed] a way to learn [the] operation of a device or system and enable autonomous operation of a device or system."[6] Compl., ¶ 41 (quoting '344 Patent, 1:39-47); *see also* Saber Decl., ¶ 29 (discussing the same quote). The claims, however, do not recite a "way" to learn, and instead generically recite that the circumstances correlated with instructions are "learned in a learning process." *E.g.*, '974 Pat. at Claim 1. Learning the operation of a device or system is not a technical problem; it is an abstract idea, an entire field of study that the Asserted Patents have laid claim to, pre-empting any *actual, concrete* implementations of learning to perform autonomous operation. Although Plaintiff focuses on autonomous vehicles, the asserted claims extend to *any* device automating *any* task. Where "claims are not limited to any particular subject matter" and "effectively cover any solution to an identified problem," it raises preemption concerns. *Societa*, 2019 WL 1102683, at *10 (citing *Elec. Power Grp.*, 830 F.3d at 1356); *see also Alice*, 573 U.S. at 216 (describing the "concern that drives th[e] exclusionary principle [of § 101] as one of pre-emption").

The second alleged technical solution to "lack of training set diversity" is neither discussed in the Asserted Patents nor solved by the claims. Plaintiff cites to Dr. Saber's declaration stating

[6] Dr. Saber describes such prior art systems as using "pre-coded responses." Saber Decl., ¶ 34.

that "the prior art systems lacked the ability to *learn from a driver's response to a circumstance and share learned responses across a fleet of vehicles so that those vehicles can respond autonomously to a similar situation.*" Compl., ¶ 57 (citing Saber Decl., ¶ 35) (emphasis in original). But even accepting Dr. Saber's statement regarding the prior art as true, the claims do nothing more than claim the bare concept that digital pictures (or circumstances) correlated with instructions are "learned in a learning process." Thus, the claims do not "focus on a specific means or method that improves the relevant technology," but rather are "directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery." *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1241 (Fed. Cir. 2016).

Finally, Plaintiff relies on the Notices of Allowance in the prosecution histories, in which the examiner concluded that certain elements were missing from the prior art of record. Compl., ¶¶ 41, 56 (citing Saber Decl., ¶¶ 30-32). The purported novelty of the claims, however, is not the relevant inquiry for a § 101 analysis. *Diamond v. Diehr*, 450 U.S. 175, 188-89 (1981) ("The 'novelty' of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter.").

B. *Alice* Step 2

The Asserted Claims lack an inventive concept under *Alice* Step 2. None of the Asserted Claims has "an element or combination of elements that is 'sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.'" *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 217-218 (2014) (citing *Mayo Collaborative Servs. v. Prometheus Lab'ys., Inc.*, 566 U.S. 66, 72-73 (2012)). "The claims in this case do not [] require a new source or type of information, or new techniques for analyzing it … [and] do not invoke any assertedly inventive programming." *Elec. Power Grp.*, 830 F.3d at 1355. Rather, the asserted

claims in this case "merely call for performance of the claimed [learning, comparing, and autonomous operation] functions 'on a set of generic computer components.'" *Id*.

1. The Claim Elements Recite Conventional Computer Components Performing Their Routine Functions

The recited components are all conventional computer components performing their routine functions. The Asserted Claims recite the following components.

Processor / Processor Circuits (e.g., '974 patent claims 1, 18, 20; '344 patent claims 1, 7, 8, 12, 19; '583 patent claims 1, 2, 4, 16, 17, 18, 27, 33; '134 patent claims 1, 10, 20) – The specifications describe a "Processor 11" as "any combination of hardware and/or processing techniques or capabilities for executing or implementing logic functions or programs." *E.g.*, '974 Pat. at 55:58-59:32. Courts have found processors to be a "well-known, generic component[]." *See Universal Secure Registry LLC v. Apple Inc.*, 10 F.4th 1342, 1352 (Fed. Cir. 2021) (quoting district court in affirmance).

Memory (e.g., '974 patent claims 1, 18, 19; '344 patent claims 1, 19, 20; '134 patent claims 10, 19) – The specifications describe a "Memory 12" as "one or more circuits or devices capable of storing data." *E.g.*, '974 Pat. at 59:33-51. Courts have found memory to be a "generic component[]." *SynKloud*, 490 F. Supp. 3d at 818.

Optical Camera / Sensor / Picture Capturing Apparatus (e.g., '974 patent claims 1, 4, 9, 10, 11, 12, 18, 19; '344 patent claims 1, 4, 5, 9, 10, 11, 12, 19, 20; '583 patent claims 2) – The specifications describe a "Picture Capturing Apparatus 90" that "may capture any light … across the electromagnetic spectrum onto a light-sensitive material." *E.g.*, '974 Pat. at 69:61-65. The specifications further describe a sensor functionally as a component that "comprises the functionality for obtaining or detecting information about its environment, and/or other functionalities." *E.g.*, '974 Pat. at 69:4-44 (listing types of sensors, including a camera). Courts

have found sensors to be generic computer components. *iLife Techs., Inc. v. Nintendo of Am., Inc.*, 839 F. App'x 534, 538 (Fed. Cir. 2021).

"Artificial intelligence system" ('344 patent claims 13-15; '583 patent claims 19, 22) – Neither the claims nor the specifications describe what hardware the "artificial intelligence system" comprises, but the specifications depict an artificial intelligence unit as part of the "Unit 100," which "comprises ***any hardware, programs, or a combination thereof***" and "comprises the functionality for learning the operation of Device 98 in in circumstances including objects with various properties." *E.g.*, '974 Pat. at 80:50-54 (emphasis added). The artificial intelligence unit is otherwise described functionally. *E.g.*, '974 Patent, 96:27-52. Moreover, the specification confirms that there is no inventive concept with respect to the "artificial intelligence system." *See, e.g.*, '974 Pat. at 102:8-12 ("In general, Knowledgebase 530 may be or include ***any data structure or arrangement capable of storing the knowledge*** of a device's operation in circumstances including objects with various properties."), 103:26-33 ("The disclosed systems, devices, and methods are ***independent of the artificial intelligence model and/or technique used and any model and/or technique can be utilized*** to facilitate the functionalities described herein.") (emphasis added). Courts have found similar claim elements to be ineligible under § 101.

> The specification states that neural networks were well-known in the art, and the inventors stated that the alleged invention is not limited to neural networks but rather to "any artificial intelligence agent." Courts have previously found that claims reciting neural networks to be unpatentable for failing to recite more than an abstract idea. *See Neochloris, Inc. v. Emerson Process Mgmt LLLP*, 140 F. Supp. 3d 763, 773 (N.D. Ill. 2015) (finding patent claims including "an artificial neural network module" invalid under § 101 because neural network modules were described as no more than "a central processing unit – a basic computer's brain").

Hyper Search, LLC v. Facebook, Inc., 2018 WL 6617143, at *10 (D. Del. Dec. 17, 2018) (some internal citations omitted).

Server ('344 patent claims 6; '583 patent claim 25) – "Server 96 may be or include any type or form of a remote computing device such as an application server, a network service server, a cloud server, a cloud, and/or other remote computing device. Server 96 may include any features, functionalities, and embodiments of the previously described Computing Device 70. It should be understood that Server 96 does not have to be a separate computing device and that Server 96, its elements, or its functionalities can be implemented on Device 98." *E.g.*, '974 Pat. at 95:37-46. Courts have found servers to be generic computer components. *Hyper Search, LLC v. Facebook, Inc.*, 2018 WL 6617143, at *10 (D. Del. Dec. 17, 2018) ("Claim 1 of the '412 patent recites generic computer functionality such as a 'neural network module' and a 'server.'").

Furthermore, the functions performed by these generic computer components—collecting, associating, and comparing data—are among the most routine functions of computers. *See, e.g.*, *Versata Dev. Grp., Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1335 (Fed. Cir. 2015) ("The steps in [Plaintiff's] claims (e.g., arranging, storing, retrieving, sorting, eliminating, determining) are conventional, routine, and well-known. They involve the normal, basic functions of a computer."); *see also RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1327 (Fed. Cir. 2017) (finding claims ineligible that were similar to claims "directed to the abstract idea of organizing information through mathematical correlations."); *Blix Inc. v. Apple, Inc.*, C.A. No. 19-1869-LPS, 2020 WL 7027494, at *5 (D. Del. Nov. 30, 2020) ("Claim 17's method for 'controlled pre-interaction' merely recites the conventional steps of gathering, categorizing, organizing, and comparing data." (citing *Versata*, 793 F.3d at 1335)).

Plaintiff relies on the declaration of Dr. Saber, who opines that claimed features were not "well-understood, routine, or conventional" sixteen times in his declaration. Saber Decl., ¶¶ 41-43, 45-46, 50-53, 54-55, 62- 65, 68-69. But in almost every case, Dr. Saber just repeats the claim

language followed, without more, by the conclusory assertion that the claimed features "were not well-understood, routine, or conventional." In the remaining cases, Dr. Saber discusses embodiments from the specification followed, without more, by the same conclusory assertion. *Id.* ¶¶ 43, 53, 65. "This bald assertion does not satisfy the inventive concept requirement." *Move, Inc. v. Real Est. All. Ltd.*, 721 F. App'x 950, 957 (Fed. Cir. 2018) (rejecting expert testimony that a step was "neither routine nor conventional" as conclusory); *see also Societa*, 2019 WL 1102683, at *9 (finding that conclusory expert testimony "cannot be enough to create a genuine issue of material fact with regard to unconventionality").

2. The Ordered Combinations Merely Apply the Abstract Idea in a Technological Environment

Viewed as a whole, the Asserted Claims are nothing more than an attempt to claim the abstract idea of learning to perform autonomous operation of a device or application. The purpose of the "inventive concept" requirement is to "ensure that the claim is more than a drafting effort designed to monopolize the abstract idea." *Alice*, 573 U.S. at 221 (internal quotation marks, citation, and brackets omitted). As such, the inventive feature in a patent cannot be the abstract idea itself. *See Mayo*, 566 U.S. at 72-73 (explaining the inventive concept must be "significantly more" than the abstract idea itself); *see also BSG Tech LLC v. Buyseasons, Inc.*, 899 F.3d 1281, 1290 (Fed. Cir. 2018) (noting that "a claimed invention's use of the ineligible concept to which it is directed cannot supply the inventive concept").

The asserted claims effectively cover any implementation of learning to autonomously operate an electronic device or application, monopolizing the abstract idea. The claims recite result-based, functional limitations—such as "learn[ing]," "anticipat[ing]," "match[ing]," and "correlat[ing]"—without specifying how the results must be achieved. The specification of the '974 patent states that "[t]he disclosed systems, devices, and methods are ***independent of the***

artificial intelligence model and/or technique used and any model and/or technique can be utilized to facilitate the functionalities described herein." *E.g.*, '974 Pat. at 103:30-33 (emphasis added).

As discussed above, the asserted claims are not limited in subject matter, covering any device or application performing any operation. And although individual claims may be limited to evaluating a specific type of data (e.g., digital pictures), other claims encompass evaluating any "circumstance" or "object representation." The Federal Circuit "has noted that claims that are 'so result-focused, so functional, as to effectively cover any solution to an identified problem' are frequently held ineligible under section 101." *Affinity Labs of Texas, LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1265 (Fed. Cir. 2016).

C. The Asserted Dependent Claims Add No Technological Solution under *Alice* Step 1 or Inventive Step under *Alice* Step 2

The asserted dependent claims recite elements that can be divided into the following categories:

1. Collecting data from multiple users or devices, or executing instructions on multiple devices (what AD calls "Fleet Learning");
2. Recitation of generic data structures;
3. Recitation of generic data manipulation;
4. Recitation of generic data collection;
5. Recitation of generic data comparison;
6. Repetition of steps.

As discussed below, these dependent claims add neither a technological solution nor an inventive step. Elements reciting generic computer components (e.g., '344 patent claims 5, 13, 14, 15; '583 patent claims 2, 19, 22, 25) and elements already present in the independent claims (e.g., '974

patent claims 5, 20; ’344 patent claim 4; ’583 patent claims 4, 5, 9; ’134 patent claims 3, 18, 20) are discussed above.

1. “Fleet Learning”

At least the following dependent claims recite performance of a claim limitation by an additional user, device, or avatar:

- ’974 patent claims 10 (another user), 11 (second device and another user);
- ’344 patent claims 5, 6, (second device), 10 (another user), 11, 12 (third device);
- ’583 patent claims 10 (second user), 11 (third device and second user), 13 (second device), 25 (second device), 27 (third device);
- ’134 patent claims 5 (second avatar), 12 (another user), 13 (third avatar), 14 (another application).

AD describes the use of multiple devices, avatars, or users as “fleet learning.”

The fleet learning claims are directed to the same abstract idea as the independent claims—i.e., performing an autonomous task based on matching a current circumstance with a previous learned circumstance—but further recite that the learning can be across multiple users or devices. However, neither the claims nor the specification disclose *how* to share learning.

The Federal Circuit has repeatedly held that “to avoid ineligibility, a claim must have the specificity required to transform the claim from one claiming only a result to one claiming a way of achieving it.” *Realtime Data LLC v. Array Networks Inc.*, 2023 WL 4924814, at *8 (Fed. Cir. Aug. 2, 2023) (internal quotation marks and citations omitted). “[T]here is a critical difference between patenting a particular concrete solution to a problem and attempting to patent the abstract idea of a solution to the problem in general.” *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1356 (Fed. Cir. 2016). The Asserted Patents do not identify problems associated with autonomous

operation generally or fleet learning specifically, let alone propose technological solutions to such problems. As discussed above in Sections VI and VII, the Asserted Patents provide no guidance as to critical aspects of fleet learning, such as which learning processes are compatible with "fleet learning," which neural network architecture(s) are compatible with "fleet learning," how to combine the knowledge of two or more devices/avatars, or how to modify instructions to account for differences in devices/avatars.

Moreover, although the Asserted Patents are devoid of guidance as to how to share learning, there were several well-known and routine techniques in the art for collecting knowledge from multiple sources and applying that knowledge to multiple autonomous devices at the time of the filing of the Asserted Patents. *See supra* Section IV ("Shared Knowledge References" and "Simulation Shared Knowledge References").

2. Recitation of Generic Data Structures

At least the following dependent claims recite generic data structures:

- '974 patent claims 2 ("knowledge cells"), 7 ("connections" and "connectors"), 13 ("circumstance representation is a data structure"), 14, 15 (reciting contents of "object representation");
- '344 patent claims 3 (reciting contents of "object representation"), 15 ("knowledgebase" or "neural network"), 16 ("connectors");
- '583 patent claims 22 ("knowledgebase" or "neural network"), 24 (reciting types of digital pictures), 27 ("knowledgebase"), 29 (generating "representations of the one or more objects"), 31 (generating "representations of" instruction sets);
- '134 patent claims 2 ("object representations"), 4, 11-14 ("knowledgebase" and "object representations").

The specifications describe these data structures in generic terms. *E.g.*, '974 Pat. at 98:52-54 ("Knowledge Cell 800 may include any data structure or arrangement that can facilitate such storing."); *id.* at 154:16-19 ("In general, knowledgebase may be or include any data structure or arrangement, and/or repository capable of storing the knowledge of a device's operation in in circumstances including objects with various properties."); *id.* at 39:12-14 ("The connection may include or is associated with at least one of: an occurrence count, a weight, a parameter, or a data."); *id.* at 71:56-59 ("Object Representation 625 may include an electronic representation of an object . . . ."); *id.* at 70:16-17 ("A digital picture may include a collection of color encoded pixels or dots.").

Courts have found the mere use of generic data structures to be patent ineligible. *E.g.*, *CG Technology Development, LLC v. Fanduel, Inc.*, 2020 WL 1064863, *3-*5 (D. Del. 2020); *Hewlett Packard Company v. ServiceNow, Inc.*, 2015 WL 1133244, *10-*11 (N.D. Cal. 2015); *Datatrak International, Inc. v. Medidata Solutions, Inc.*, 2015 WL 6870109, *5-*7 (N.D. Ohio 2015). Courts have further found that a neural network is "generic computer functionality." *Hyper Search, LLC v. Facebook, Inc.*, 2018 WL 6617143, at *10 (D. Del. Dec. 17, 2018). Indeed, the use of neural networks and object detection in autonomous devices was a well-known and routine technique. *See supra* Section III (State of the Art).

3. Recitation of Generic Data Manipulation

At least the following dependent claims recite generic data manipulation without further guidance as to why or how the data should be manipulated:

- '974 patent claims 3 ("creating, inserting, deleting, modifying, or manipulating an element"), 8 (modifying instruction sets);

- ’344 patent claims 7 (modifying instructions), 8 (modifying circumstance representations);
- ’583 patent claims 14, 15 (modifying instructions), 16, 17 (modifying digital pictures), 18 (modifying instructions and digital pictures), 28 (“wherein the at least partial match . . . is at least in part based on a product of one or more values”).

“The Federal Circuit has explained repeatedly that claims directed to the manipulation of data are abstract absent additional features, because ‘information as such is an intangible.’” *Zyrcuits IP LLC v. Acuity Brands, Inc.*, 2021 WL 3287801, at *3 (D. Del. Aug. 2, 2021) (quoting *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016)).

The use of computers to create, insert, delete, modify, and/or manipulate data was a well-known and routine technique in the art at the time of the filing of the Asserted Patents. Indeed, these steps “involve the normal, basic functions of a computer.” *Versata Dev. Grp., Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1335 (Fed. Cir. 2015).

4. Recitation of Generic Data Collection

At least the following dependent claims recite generic data collection without further guidance as to why or how to collect the data:

- ’974 patent claims 6 (collecting instruction sets that “correspond to the user’s methodology of operating the first device”), 12 (collecting circumstances at different times);
- ’344 patent claim 2 (“wherein the first one or more instruction sets for operating the first device include one or more information about one or more states of: the first device, or a portion of the first device”);

- ’583 patent claims 12, 14 (“wherein the new one or more digital pictures depict at least a portion of the first device's surrounding”);
- ’134 patent claim 2 (collecting object representations at different times).

“The concept of data collection, recognition, and storage is undisputedly well-known. Indeed, humans have always performed these functions.” *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1347 (Fed. Cir. 2014).

The use of computers to collect data was a well-known and routine technique in the art at the time of the filing of the Asserted Patents. Indeed, these steps “involve the normal, basic functions of a computer.” *Versata Dev. Grp., Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1335 (Fed. Cir. 2015).

5. Recitation of Generic Data Comparison

At least the following dependent claims recite generic data comparison without further guidance as to how the data should be compared:

- ’974 patent claims 15 (“a determination is made that the first one or more instruction sets for operating the first device temporally correspond to the first circumstance representation”), 16 (comparing first and third circumstance representations);
- ’344 patent claim 17 (comparing object representations);
- ’583 patent claims 3 (“determining that the first one or more instruction sets for operating the first device temporally correspond to the first one or more digital pictures”), 6 (comparing portions of digital pictures), 7 (comparing objects in digital pictures);

- ’134 patent claim 7 (“a determination is made that the first one or more instruction sets for operating the first avatar of the application temporally correspond to the first one or more object representations”).

“The steps of comparing data with known information, generating information related to first and most recent detection, and determining information based on the first and most recent detection, fall into the category of ‘manipulation of information,’ which ‘by itself does not transform the otherwise-abstract processes of information collection and analysis.’” *Automated Tracking Sols., LLC v. Coca-Cola Co.*, 223 F. Supp. 3d 1278, 1291 (N.D. Ga. 2016), *aff’d*, 723 F. App’x 989 (Fed. Cir. 2018) (quoting *Elec. Power Grp.*, 830 F.3d at 1355).

The use of computers to compare two sets of data was a well-known and routine technique in the art at the time of the filing of the Asserted Patents. Indeed, the steps of “gathering, categorizing, organizing, and comparing data” are conventional. *Blix Inc. v. Apple, Inc.*, C.A. No. 19-1869-LPS, 2020 WL 7027494, at *5 (D. Del. Nov. 30, 2020) (“Claim 17’s method for ‘controlled pre-interaction’ merely recites the conventional steps of gathering, categorizing, organizing, and comparing data.” (citing *Versata*, 793 F.3d at 1335)).

6. Repetition of Steps

At least the following dependent claims recite simply repeating one or more steps:

- ’974 patent claims 4, 7, 9 (fourth correlation);
- ’344 patent claims 9, 10, 11 (third circumstance representation), 12 (third and fourth circumstance representations);
- ’134 patent claims 4, 11, 12, 13, 14 (third correlation).

“Applying repetition of a step that is not itself patent eligible adds very little to the patentable side of the ledger, because it is merely postsolution activity, implemented with entirely

conventional methods." *Mkt. Track, LLC v. Efficient Collaborative Retail Mktg., LLC*, 2015 WL 3637740, at *14 (N.D. Ill. June 11, 2015) (internal quotation marks and citations omitted).

Moreover, the act of training an autonomous system with two or more data points was a well-known and routine technique in the art at the time of the filing of the Asserted Patents.

IX. CONCLUSION

Precise identification of all of the bases upon which the Asserted Claims are invalid and/or unenforceable are likely to be revealed only after further developments in the case, including claim construction and fact and expert discovery. Tesla reserves the right to amend or supplement these Invalidity Contentions to address any additional invalidity arguments that become apparent in view of any relevant facts and information revealed during discovery.

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CERTIFICATE OF SERVICE

I hereby certify that on September 22, 2023, copies of the foregoing were caused to be served upon the following in the manner indicated:

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