

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner

v.

AUTONOMOUS DEVICES, INC.,
Patent Owner

Case IPR2024-00745
Patent 11,663,474

**PETITIONER'S OPPOSITION TO
PATENT OWNER'S MOTION TO AMEND**

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EXHIBIT LIST

TESLA-1001	U.S. Patent No. 11,663,474 (“the ’474 Patent”)
TESLA-1002	U.S. Patent No. 11,663,474 File History
TESLA-1003	Expert Declaration of Jason Janet, Ph.D.
TESLA-1004	First Amended Complaint, <i>Autonomous Devices LLC v. Tesla, Inc.</i> , Case No. 22:1466-MN (D. Del.), Doc. 92 (Sept. 15, 2023)
TESLA-1005	U.S. Patent Pub. No. 2014/0089232 to Buibas et al. (“Buibas”)
TESLA-1006	U.S. Patent Pub. No. 2013/0325768 to Sinyavskiy et al. (“Sinyavskiy”)
TESLA-1007	U.S. Patent Pub. No. 2017/0024877 to Versace et al. (“Versace”)
TESLA-1008	U.S. Patent No. 9,604,359 to Grotmol et al. (“Grotmol”)
TESLA-1009	U.S. Patent No. 5,219,264 to McClure et al. (“McClure”)
TESLA-1010	U.S. Patent Pub. No. 2018/0137403 to Kaur et al. (“Kaur”)
TESLA-1011	U.S. Patent Pub. No. 2016/0167226 to Schnittman (“Schnittman”)
TESLA-1012	Scheduling Order, <i>Autonomous Devices LLC v. Tesla, Inc.</i> , Case No. 22:1466-MN (D. Del.), Doc. 25 (March 22, 2023)
TESLA-1013	Stipulation and [Proposed] Order to Stay Pending <i>Inter Partes</i> Review, <i>Autonomous Devices LLC v. Tesla, Inc.</i> , Case No. 22:1466-MN (D. Del.), Doc. 143 (Jan. 9, 2024)
TESLA-1014	Stay Order, <i>Autonomous Devices LLC v. Tesla, Inc.</i> , Case No. 22:1466-MN (D. Del.), (Jan. 10, 2024)
TESLA-1015	Original Complaint, <i>Autonomous Devices LLC v. Tesla, Inc.</i> , Case No. 22:1466-MN (D. Del.), Doc. 1 (Nov. 7, 2022)

TESLA-1016	Email Correspondence from Patent Owner’s Counsel Mr. John Holley re Asserted Claims of ’474 Patent (Nov. 3, 2023)
TESLA-1017	Autonomous Device’s Infringement Contention Chart for U.S. Patent No. 11,663,474 (Exhibit K), <i>Autonomous Devices LLC v. Tesla, Inc.</i> , Case No. 22:1466-MN (D. Del.), Doc. 92-1 (Sept. 15, 2023) (Public)
TESLA-1018	U.S. Patent Pub. No. 2003/0216834A1 to Allard (“Allard”)
TESLA-1019	U.S. Patent Pub. No. 2006/0181236A1 to Brogardh (“Brogardh”)
TESLA-1020	U.S. Patent Pub. No. 2013/0226345A1 to Zhao et al. (“Zhao”)
TESLA-1021	Federal Court Management Statistics—Profiles, U.S. District Courts—Combined Civil and Criminal (December 31, 2023 Reporting Period), <i>retrieved from</i> https://www.uscourts.gov/sites/default/files/fcms_na_distprofile1231.2023_0.pdf
TESLA-1022	Second Expert Declaration of Jason Janet, Ph.D
TESLA-1023	U.S. Patent No. 9,221,396 to Zhu et al. (“Zhu”)
TESLA-1024	<i>Neural Network Design</i> , Second Edition (“Hagan”)
TESLA-1025	Declaration of June Munford
TESLA-1026	<i>Tesla, Inc. v. Autonomous Devices, Inc.</i> , IPR2023-01054, Paper 46 (PTAB December 12, 2024) – Final Written Decision on U.S. Patent No. 10,452,974
TESLA-1027	<i>Tesla, Inc. v. Autonomous Devices, Inc.</i> , IPR2023-01055, Paper 47 (PTAB December 12, 2024) – Final Written Decision on U.S. Patent No. 11,238,344
TESLA-1028	Eli Saber Deposition Transcript (April 4, 2025)

TESLA-1029	U.S. Patent Application Serial No. 13/623,820 (“Fisher”)
TESLA-1030	U.S. Patent No. 10,131,052 (“Gabardos”)
TESLA-1031	U.S. Patent No. 8,793,205 (“Fisher205”)
TESLA-1032	Eli Saber Deposition Transcript in ’583 Patent IPR, IPR2023-00172, Exhibit 1011 (June 21, 2024)
TESLA-1033	<i>Tesla, Inc. v. Autonomous Devices, Inc.</i> , IPR2023-01054, Paper 26 – Patent Owner’s Response
TESLA-1034	<i>Tesla, Inc. v. Autonomous Devices, Inc.</i> , IPR2023-01055, Paper 26 – Patent Owner’s Response
TESLA-1035	U.S. Patent Pub. No. 2017/0200078 A1 (“Bichler”)
TESLA-1036	U.S. Patent Pub. No. 2015/0363687 A1 (“Gocek”)
TESLA-1037	U.S. Patent Pub. No. 2013/0304684 A1 (“Yufik”)
TESLA-1038	U.S. Patent Pub. No. 2017/0010106 A1 (“Shashua”)

I. INTRODUCTION

Patent Owner (“**PO**”)’s Motion to Amend (“**MTA**”) includes: (1) substitute claims 85-91 to contingently amend claims 45-47, 51, 56-57, and 60, respectively, if certain claims challenged in the Petition are found unpatentable and (2) substitute claims 92-93 to contingently replace claims 56-57 if claims 56-57 are not found unpatentable. Petitioner opposes the MTA on the basis that the Substitute Claims are unpatentable under 35 U.S.C. §§ 103 and 112.

II. THE SUBSTITUTE CLAIMS ARE UNPATENTABLE UNDER § 103

The original claims are unpatentable for the reasons described in the Petition and further addressed in Petitioner’s Reply to the POR. TESLA-1022, ¶¶1-7, 39-84. The substitute claims and the additional features recited therein are likewise unpatentable based on the following obviousness grounds:¹

Ground	Substitute Claims	§ 103 Basis
MTA-1A	85-91	Grotmol-Zhu
MTA-1B	85-91	Grotmol-Zhu-Buibas

A. Overview of Additional Prior Art²

¹ Substitute claims 92-93 are identical to original claims 56 and 57 and are unpatentable based on Grounds 1A and 2C as described in the Petition and Reply.

² The Petition provides overviews of Grotmol and Buibas. Pet., 8-11, 51-54.

1. Overview of Zhu

Zhu describes techniques for, among other things, capturing images of an environment surrounding an autonomous vehicle and detecting objects including other vehicles depicted in the images. TESLA-1023, 1:48-2:4, 10:58-67, 11:16-55. Zhu discloses that autonomous vehicles include persistent data with sensor parameters that can be used to determine “when a sensor has detected an object, and the type of object detected by the sensor” (“how an object is classified”). *Id.* The sensor parameters are applied to the detected object with a “label” with a “bounding box” of a defined size. TESLA-1023, 14:43-17:28, FIGS. 9-10; TESLA-1022, ¶41.

B. Overview of the Prior Art Combinations

1. Ground MTA-1A: Grotmol-Zhu

As discussed above, Zhu describes techniques for labeling objects detected by an autonomous vehicle with semantic information, including labeling objects to indicate their classification/type, size, and location with a bounding box. *Supra* §II.A.1. Grotmol likewise describes techniques for training and operating autonomous vehicles (e.g., mobile robots) by acquiring images and other sensory information about the vehicles’ environment, detecting objects and extracting features from the sensory information, and processing the features of the sensory information to determine control outputs/instructions sets (e.g., motor commands) for autonomously operating the vehicle. TESLA-1008, Abstract, 23:3-22, 24:1-16, 28:19-40, 33:12-35, 39:13-28, FIGS. 10A-11B; Pet., 51-54. A POSITA reviewing

the teachings of Grotmol and Zhu would have found it obvious to apply Zhu's suggestion for extracting additional features of detected objects—such as a classification/type of the object, and the object size and location (e.g., using a bounding box). TESLA-1022, ¶¶42-44. In the combination, Grotmol's autonomous vehicle would then predictably use the additional features of the extracted objects suggested by Zhu to learn/characterize images and circumstances encountered by the vehicle during training, and to compare current circumstances obtained during autonomous operation to previously learned circumstances to determine instruction sets for operating the device consistent with Grotmol's existing methodologies for training and autonomously operating a device based on a wide range of features of detected objects and sensory inputs. TESLA-1008, 21:64-22:18, 25:30-42, 26:5-20, 27:24-40, FIGS. 10A-11B, 15; TESLA-1023, 14:43-17:28, FIGS. 9-10; TESLA-1022, ¶¶42-44.

A POSITA would have been motivated to combine Grotmol and Zhu for multiple reasons. TESLA-1022, ¶45. To start, a POSITA would have sought to classify and label the type of objects detected in the vicinity of Grotmol's autonomous vehicle based on Zhu's teachings to provide additional semantic information to Grotmol's controller that would allow it to more accurately and efficiently characterize circumstances encountered by the vehicle and to compare current circumstances to prior circumstances learned in the past (e.g., as represented

in a trained neural network). TESLA-1022, ¶45; TESLA-1023, 11:16-55. For example, semantic labels indicating the type of detected objects would allow the robot to readily characterize a current scene at a higher level of abstraction than the raw pixels of an image, and the semantic labels could be processed more efficiently by a neural network than the raw pixels of an image to determine the similarity of the current scene to prior learned circumstances (e.g., determine whether a tree, a ball, and an object are present in both the current scene and a prior circumstance). *Id.* A POSITA likewise would have sought to apply Zhu's suggestion for labeling the coordinates and size of detected objects (e.g., using a bounding box) to Grotmol's system to more accurately and efficiently characterize circumstances encountered by the vehicle and to compare current circumstances to prior circumstances learned in the past. TESLA-1022, ¶45. Knowledge of the size and location of detected objects would predictably allow Grotmol's vehicle to compare current and past circumstances based on such information consistent with Grotmol's use of other object features that do not require comparison of raw pixels or other raw sensor information in the adaptive controller. TESLA-1008, 39:13-28, 28:19-40, FIGS. 10A-11B; TESLA-1023, 14:43-15:20, 15:36-16:4; TESLA-1022, ¶45.

A POSITA also would have been motivated to combine Grotmol and Zhu to gain the benefit of Zhu's cross-validation techniques that allow the accuracy of different sensors on the vehicle to be evaluated. TESLA-1008, 38:43-39:12, FIGS.

20A-B; TESLA-1023, 10:29-57, 11:56-62, 14:43-15:65, 22:64-23:10; TESLA-1022, ¶¶46-47. Additionally, the combination is (1) merely the application of known techniques as suggested by Zhu to a known system (e.g., Grotmol's robotic vehicles) to yield predictable results (e.g., Grotmol's robots labeling objects according to Zhu), and (2) the use of known techniques as taught in Zhu to improve a similar system (e.g., an autonomous robotic device). *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 415-421 (2007); TESLA-1022, ¶48.

A POSITA would have reasonably expected success implementing the combination considering that Grotmol and Zhu both relate to processing sensory information on autonomous vehicles, and Grotmol likewise describes techniques for extracting features of circumstances and objects detected in the vehicle's environment. TESLA-1008, 18:29-37, 33:49-55; TESLA-1023, 14:43-17:28, FIGS. 9-10. Further, Zhu's autonomous vehicles include sensors explicitly disclosed by Grotmol for providing input to a neural network (e.g., cameras, SONAR, LiDAR). TESLA-1008, 8:57-9:40, 10:16-22, 38:33-51; TESLA-1023, 1:18-27, 8:25-46. Additionally, Grotmol also provides a suitable mechanism (e.g., an adaptive controller) for implementing Zhu's robotic behaviors (e.g., labeling objects). TESLA-1008, 21:64-22:18, 25:30-42, 26:5-20, 27:24-40, FIGS. 10A-11B, 15; TESLA-1022, ¶49. Another prior art patent (Gabardos, TESLA-1030) to the same assignee (Brain Corp.) as Grotmol likewise confirms that the use of a bounding box

to indicate size and location of objects in a system substantially similar to that described in Grotmol was known before earliest effective filing date of the '474 Patent. TESLA-1030, 30:18-33, 38:56-65, FIGS. 10A-11B.

2. Ground MTA-1B: Grotmol-Zhu-Buibas

For the reasons described in detail in the Petition in Ground 2C, it would have been obvious to further combine Grotmol-Zhu with Buibas such that the adaptive controllers on Grotmol's device would be implemented using brain images like those described in Buibas, where the brain images could be independently trained, shared, and merged by different users on different devices to flexibly provide different sets of capabilities and learned behaviors to Grotmol's device. Pet., 77-80; TESLA-1003, ¶¶150-157; TESLA-1022, ¶50. A POSITA would have been motivated to combine Grotmol-Zhu with Buibas, and would have reasonably expected success, for the reasons discussed in the Petition. *Id.*

C. Obviousness of the Substitute Claims

1. Elements [85.pre]-[85.7]

(a) All Grounds

The language of [85.pre]-[85.7] is identical to [45.pre]-[45.7]. Grotmol discloses and/or renders these features obvious for at least the reasons addressed in Ground 2A of the Petition. Pet., 51-68; TESLA-1003, ¶¶113-131. Substitute claim 85 further recites that the claimed “knowledgebase includes a neural network” and “the one or more inputs are one or more input neurons of the neural network.” MTA,

2. Grounds MTA-1A – MTA-1B each provide these additional limitations as discussed in further detail below, and the aspects of [85.pre]-[85.7] that refer to a “knowledgebase” and “one or more inputs” are rendered obvious by these grounds for the same reasons. TESLA-1003, ¶¶113-131; TESLA-1022, ¶51.

2. Element [85.8]

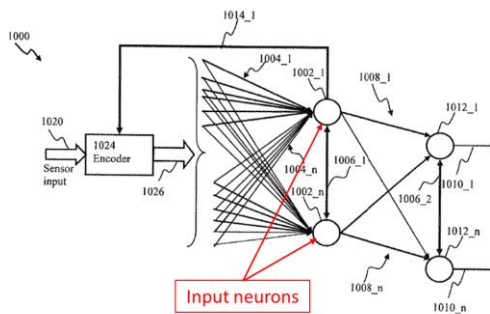
(a) Grotmol-Zhu

Grotmol discloses that the mobile robot’s (“*first device*”) adaptive controller (“*knowledgebase*”) can include a neural network. TESLA-1008, 11:28-30 (“the predictor is a neural network”), 9:41-10-15, 16:8-12, 19:10-54 (“spiking neuron network”), 21:41-46 (“multi-layer perceptron and/or a convolutional network”), 21:64-68, 26:5-20 (“‘Adaptive controller’ of type ‘2’ (e.g., perceptron classifier)”), 34:3-17, 36:19-31. As Dr. Janet explains, a POSITA would have known that neural networks conventionally included input neurons (as evidenced by Buibas), and it would have been obvious for a neural network in Grotmol’s adaptive controller to include input neurons that would allow it to receive information characterizing a sensory input from which a control output could be generated. TESLA-1005, ¶¶[0068], [0073]-[0076], [0136]-[0138], [0144]-[0154], FIGS. 1, 10, 11; TESLA-1022, ¶52. For example, Fisher, incorporated by reference in Grotmol (TESLA-1008, 9:53-60) discloses a spiking neural network 1040 having input neurons 1042. TESLA-1029, [0227]-[0228], FIG. 10A; TESLA-1022, ¶52. Any of a variety of neural network architectures would be obvious and suitable to apply in the

combination. TESLA-1024, 36-43; TESLA-1035, ¶¶[0025]-[0040], [0119]-[0122], FIG. 7; TESLA-1036, ¶¶[0044]-[0047], FIG. 5.; TESLA-1022, ¶¶52-54.

(b) Grotmol-Zhu-Buibas

In addition to Grotmol's disclosures of neural networks, Buibas further describes a spiking neural network that would have been obvious to provide in Grotmol's adaptive controller in some implementations of the combination, which network includes input neurons for receiving information characterizing sensory input(s). TESLA-1005, ¶¶[0068], [0073]-[0076], [0136]-[0138], [0144]-[0154], FIGS. 1, 10, 11; TESLA-1022, ¶55.



TESLA-1005, FIG. 10.

3. Element [85.9]

(a) All Grounds

Grotmol discloses that its mobile robot includes machine-readable code that, when executed by one or more processors, causes the one or more processors to perform operations. TESLA-1008, 2:15-18, 3:27-36, 7:66-8:4, 38:33-42, FIG. 8; Pet., 62-63 (Element [45.4]); TESLA-1022, ¶56.

4. Element [85.10]

(a) Grotmol-Zhu

Grotmol's mobile robot includes a sensor component that "provide[s] information associated with objects within the field-of-view" and that includes a "a stream of pixel values associated with one or more digital images." TESLA-1008, 8:57-9:3, 44:46-55 (describing a "camera stream"). Grotmol further discloses that the robot, during autonomous operation, generates a stream of observations of the environment (e.g., images 2000 and 2010) that represent circumstances encountered by the robot over time. TESLA-1008, 38:52-39:28, 38:38-41 ("sequence of images"), 42:46-43-11 (describing autonomous operation including capturing sensory inputs to be correlated with motor commands at each "given time step"), 44:56 ("At individual time steps[] ..."), 44:34-46:10, FIGS. 8, 20A-B; Pet., 63-64 at [45.5] ("generating a circumstance representation"); TESLA-1022, ¶57. In the combination, Zhu likewise discloses generating a stream of circumstance representations representative of the circumstances of an autonomous vehicle. TESLA-1023, 10:20-28 ("[T]he sensors 146 may continuously update their output to reflect the environment being sensed at or over a range of time, and continuously or as demanded."), 8:25-46, 13:46-58, FIGS. 1, 7-10; TESLA-1022, ¶57.

(b) Grotmol-Zhu-Buibas

In addition to the disclosures from Grotmol and Zhu provided above, Buibas discloses generating a stream of sensory input including "a sequence of images" and

“streams of input stimuli.” TESLA-1005, ¶¶[0136], [0227], [0236]. Like Grotmol and Zhu, Buibas describes a controller that “responds to input” detected from the environment (e.g., “increasing/decreasing synaptic weights ... related to the behavior being executed at the time of input”). TESLA-1005, ¶¶[0172], [0228]; TESLA-1022, ¶58.

5. Element [85.11]

(a) All Grounds

As discussed above with respect to [85.10], Grotmol’s mobile robot generates a stream of circumstance representations that enables the robot to autonomously perform various tasks/behaviors. *Supra*, [85.10]; Pet., 63-64 at [45.5]; *see also* TESLA-1023, 10:20-28, 8:25-46, 13:46-58, FIGS. 1, 7-10. For example, the robot may capture an image 2000 of its environment that includes representations of multiple objects (e.g., a tree, a box, and a ball) at a first time. TESLA-1008, 38:43-39:12 (“object representations”). According to Grotmol, the robot can detect objects from sensory signals such as image 2000 and can further extract features associated with the detected objects that enable comparison to stored features. TESLA-1008, 39:13-28 (“images (e.g., raw and/or pre-processed) ... may be stored in a memory buffer” and the “pre-processing operations may comprise ... feature extraction”), 28:19-40 (“the term feature may be used to describe ... values characterizing the input, e.g., the presence or absence of ... [an] **object**, at particular **locations** in the image” including “properties of the mentioned features such as **size**, ... **position**”),

21:41-43, 9:41-2 (“object recognition and/or classification”), 10:23-34 (“The tasks of the robot may be configured based on a context. ... [T]he context may comprise ... state of the environment (e.g., **object size, location**)[] ...”); TESLA-1022, ¶59.

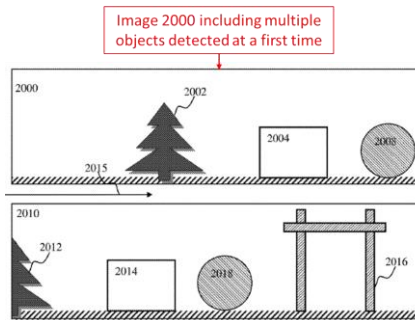
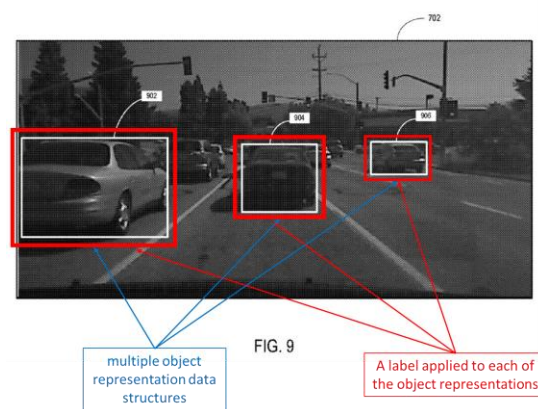


FIG. 20A

TESLA-1008, FIG. 20A.

Zhu further describes techniques for classifying objects detected in a vicinity of an autonomous vehicle at a given time and generating, for each object, a label for object type, coordinates for object location, and a computer model for object size. TESLA-1022, ¶60. For example, Zhu discloses labeling the object type for each object by generating “such classifications as ‘passenger car,’ ‘bicycle,’ ‘motorcycle,’ and other such classifications” that indicate “the **type** of vehicle detected by a given sensor.” TESLA-1024, 11:16-36, 14:43-52 (“may apply an object label to the detected object”), 10:58-64 (data 112 defining parameters for “the **type** of object detected by the sensor”). Zhu’s system is also configured to “define[] ... a bounding box encompassing the object,” where “object label parameters may include a height parameter that defines the height of the bounding box (e.g., in pixels), a width parameter that defines the width of the bounding box (e.g., in pixels), a first pixel

coordinate that defines the latitudinal placement of the bounding box (e.g., an X-coordinate), and a second pixel coordinate that defines the longitudinal placement of the bounding box (e.g., a Y-coordinate).” TESLA-1024, 14:43-67; *see also id.*, 15:1-20, FIGS. 9-10. Zhu thus defines coordinates for the location of each object and a computer model (e.g., a bounding box and associated width/height parameters) for each object’s size. TESLA-1022, ¶60.



TESLA-1024, FIG. 9.

Zhu teaches that the parameters associated with each object can be stored in respective object representation data structures such as the “label” or “bounding box” for each object. TESLA-1024, 14:54-15:20 (“An object label may have one or more object label parameters that define the shape of the object label.”). Zhu further explains that such data can be stored in any suitable “data structure” such as “a relational database,” “a table having a plurality of different fields and records,” or “XML documents.” *Id.*, 6:8-25; *cf.*, TESLA-1001, 65:63-66:14 (’474 Patent disclosing wide range of data structures); TESLA-1022, ¶¶61-62.

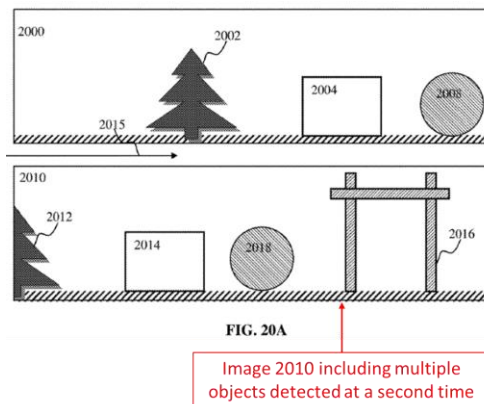
It would have been obvious to a POSITA to apply Zhu's suggestion for labeling the type of detected objects and defining bounding boxes for detected objects that provides a computer model for object size coordinates for object location to Grotmol for the reasons described above in the combination overview. TESLA-1008, 38:43-39:12; TESLA-1024, 11:16-36; *supra*, §II.B.1; Pet., 45-51, 73-77; TESLA-1022, ¶63.

6. Element [85.12]

(a) All Grounds

As discussed above with respect to [85.10]-[85.11], the teachings of Grotmol and Zhu render obvious processors of a mobile robot (***first device***) that generate a stream of circumstance representations, each circumstance representation representing a circumstance detected at least in part by one or more sensors of the robot at different times. *Supra*, [85.10]-[85.11]; *see also* Pet., 63-64 at [45.5]. For example, the robot may capture an image 2000 of its environment that includes representations of multiple objects (e.g., a tree, a box, and a ball) at a first time and shortly thereafter capture an image 2010 that includes representations of the multiple objects (e.g., the tree, the box, and the ball) at a second time. TESLA-1008, 38:43-39:12 (“object representations”), FIG. 20A; TESLA-1023, 10:20-28 (“[T]he sensors 146 may continuously update their output to reflect the environment being sensed at or over a range of time, and continuously or as demanded.”), 8:25-46, 13:46-58, FIGS. 1, 7-10; TESLA-1022, ¶64. In the combination, and for the reasons addressed

in [85.11], the circumstance representation generated at the later (second) time would provide another circumstance representation that (i) includes another multiple object representation data structures that each includes: a label for object type, coordinates for object location, and a computer model for object size, and (ii) represents the multiple objects detected at a second time. TESLA-1022, ¶64.



TESLA-1008, FIG. 20A.

7. Elements [85.13]-[85.14]

(a) Grotmol-Zhu

Grotmol discloses that the adaptive controllers determine control outputs (*instruction sets*) for operating a robot using features of the sensory input that are inputted into the controller. TESLA-1008, 29:37-39, 29:54-30:20, FIGS. 10A-11B; Pet., 56-57. As explained in the Petition, Grotmol's system uses a correlation between the one or more inputs of the adaptive controller and instruction sets learned by the adaptive controller to determine instruction sets for operating the robot. Pet., 65-68 at [45.6]; TESLA-1008, 8:57-9:3, 44:46-55; TESLA-1022, ¶65.

Moreover, as discussed above in connection with [85.8], Grotmol discloses that the adaptive controller can be implemented using a neural network having one or more input neurons. *Supra*, [85.8]; TESLA-1022, ¶66. In such embodiments, features of the sensory input are inputted into the input neurons and an output layer of neurons produces control outputs (***instructions sets***) for operating a robot. TESLA-1004, 21:42 (“[C]onfigured to detect targets and/or obstacles based on sensory input” in which “detection may be configured based on an operation of a multi-layer perceptron and/or a convolutional network”), 19:10-42 (control signals for a “spiking controller output” include positive/negative “spikes indicative of a control command”), FIGS. 10A-11B (depicting feature inputs and control commands produced by adaptive controllers); TESLA-1029 (incorporated by reference in Grotmol at 9:53-60), [0227] (“neural spiking network configured to encode the input 1032 into output 1020”), [0226]-[0234], [0252] (“output” includes “motor command”), [0257], FIG. 10A; TESLA-1022, ¶66.

In the combination, it would have been obvious to a POSITA to input (i) the multiple object representation data structures for the objects detected at the first time (*supra*, [85.11]) into the input neurons of the neural network for the benefit of obtaining a first control output conditioned on the first input and (ii) the another object representation data structures for the objects detected at the second time (*supra*, [85.12]) into the input neurons of the neural network for the benefit of

obtaining a second control output conditioned on the second input. TESLA-1008, 25:30-47-42, 17:28-44, 28:41-44, FIGS. 10-11; TESLA-1022, ¶67. Inputting such object representation data structures into the input neurons would have been obvious especially because it involves no more than using the controllers/neural networks in Grotmol according to their ordinary and intended purpose—namely, to process information characterizing sensory inputs including features of detected objects to produce controls for autonomously operating a robot. TESLA-1008, FIGS. 10A-11B; TESLA-1022, ¶67. It is also consistent with the conventional use of input neurons in a neural network to receive inputs. *See, e.g.*, TESLA-1029, [0227]-[0234], FIG. 10A. A POSITA would have reasonably expected success inputting object representation data structures into the input neurons since neural networks were known to be capable of processing a wide range of data including features of detected objects as of the Critical Date. TESLA-1005, ¶¶[0140]-[0142], [0228]; TESLA-1037, ¶¶[0004]-[0006], [0043]-[0048]; TESLA-1022, ¶67. The '474 Patent likewise acknowledges that a POSITA would have possessed the skill necessary to implement such features on a neural network. TESLA-1001, 103:40-60 (“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.”), 104:2-27, 169:30-54, FIG. 17.

Grotmol-Zhu also renders obvious (i) using a correlation between the one or more input neurons and one or more instruction sets for operating a second device to determine the instruction sets for operating the second device and (ii) using another correlation between the one or more input neurons and another one or more instruction sets for operating a third device to determine the instruction sets for operating the third device. TESLA-1022, ¶68. For example, Grotmol discloses that “[t]he trained controller of the robot may comprise a trained configuration configured to enable autonomous operation” and “the trained configuration may be loaded to one or more other robots in order to provide learned behaviors.” TESLA-1008, 33:21-35. Grotmol also discloses that the trained configuration of a controller can be updated through continuous learning, including learning in the “override” and “correct” modes. TESLA-1008, 34:59-62 (“training may comprise periods of autonomous operation and periods of learning”), 33:49-52 (“user commands ... may arrive in one or more clusters ... that may be interleaved by periods of user inactivity”), 23:9-45 (“In the override mode, the robot may execute what it has learned, unless a command is sent by the teacher. ... [T]he robot may head [sic] the teacher’s command, perform the action, and try to remember it for the next time the same situation occurs. ... In the correct mode, the robot may integrate what the teacher commands with what the robot already knows.”), 21:56-60 & Table 3 (“Learns the association”). A POSITA would have understood from these

disclosures, for instance, that the neural network for a controller can first be trained on a third device to learn instruction sets for operating a third device; the trained configuration of the neural network can be shared with and loaded on a second device where the trained configuration is updated through additional learning of instruction sets for operating the second device (e.g., in the override/correct modes); and the updated trained configuration can further be shared with and loaded on a first device from the second device. TESLA-1022, ¶68. As Dr. Janet explains, this predictable situation would have been expected and obvious to a POSITA reviewing Grotmol's disclosure, as it would allow multiple devices to gain the benefit of Grotmol's capabilities for sharing and updating training configurations. *Id.* The predictable result would be a trained neural network on the first device whose input neurons are correlated both with instruction sets for operating the second device (based on training that occurred on the second device) and with instruction sets for operating the third device (based on training that occurred on the third device). *Id.*

PO and its declarant, Dr. Saber, have explained that even a basic neural network like the feedforward network Model A depicted in FIG. 17 of the '474 Patent has input neurons correlated with instruction sets for operating a device merely because the input neurons have "downstream connections with output nodes/neurons that include/produce instruction sets for operating a device." MTA, 15-16 (identifying written description support in Model A); EX2001, pp. 79-80, 113,

127, 139, 141-142, 151, 154-155, 164-165, 192, 203; TESLA-1001, FIG. 17; TESLA-1028, 28:19-30:8, 71:21-73:8, 101:7-111:10. The input neurons of the neural network in the Grotmol-Zhu combination likewise have downstream connections to output neurons that produce instruction sets for operating the second and third devices (based on the training that occurred on each device). TESLA-1008, FIGS. 10A-11B; TESLA-1029, FIG. 10A. A POSITA thus would have recognized that the system in the Grotmol-Zhu combination uses correlations like that those recited in [85.13]-[85.15] to determine instruction sets for operating the second and third devices. TESLA-1022, ¶69. It also would have been obvious that differences in the inputs provided to the Grotmol-Zhu neural network that correspond to differences in circumstances learned on the second and third devices would cause the neural network to determine/output different instruction sets for operating either the second or third devices. *Id.* For instance, differences in the locations or detected sizes of the multiple objects between the two sets of object representation data structures (and/or differences in other inputted information) could lead to the determination of different instruction sets. *Id.*

(b) Grotmol-Zhu-Buibas

The Grotmol-Zhu-Buibas combination renders [85.13]-[85.14] for substantially the same reasons addressed above in connection with the Grotmol-Zhu combination, except that Buibas further demonstrates that it would be obvious (with

or without Grotmol's teachings of sharing trained controller configurations and re-training/updating controllers) for the neural network in Grotmol's adaptive controller to use correlations between the one or more input neurons and both (i) instruction sets for operating the second device (ii) instruction sets for operating the third device. TESLA-1022, ¶71. Petitioner has addressed the relevance of Buibas' teachings to these claim features, including in combination with Grotmol, in detail in the Petition and the Reply to Patent Owner's Response with respect to original claims 56 and 57.³ Pet., 41-44, 77-82; TESLA-1003, ¶¶99-100, 150-161, Reply to POR, 1-25; TESLA-1022, ¶71.

For example, Buibas discloses techniques by which many different users can independent train their respective robotic devices to autonomously perform different tasks/behaviors. Users can then make the trained configurations of their robots available to others (e.g., by uploading trained brain images to the cloud). TESLA-1005, [0171]-[0180] (describing details of the training application provided to each user), [0181]-[0193] (describing details of sharing trained brain images through the cloud), [0194]-[0207], [0211]-[0213], [0222]-[0225], [0070], FIGS. 16-19. Users

³ Although claims 56 and 57 do not specifically require the knowledgebase to include a neural network, Petitioner's mappings of Buibas for these claims are based on Buibas' teachings of brain images that implement neural networks.

can then select one or more brain images to download and load on their own robots to take advantage of the training performed by others, and can even merge multiple brain images learned on other devices to obtain a combined set of capabilities. TESLA-1005, [0090]-[0127], [0188]-[0189], [0225], FIGS. 3-9. The merged brain image, whether by an interleaved merge or a non-interleaved merge, produces an offspring that has one or more input neurons correlated with instruction sets learned at each of the parents (e.g., at a second device and a third device), which correlations are used to determined instruction sets during autonomous operation. TESLA-1022, ¶72.

8. Claims 86-93

(a) All Grounds (Unless Otherwise Indicated)

Claim 86 – The additional features recited in Claim 86 are obvious based on Grotmol’s teachings for the reasons the Petition described in connection with Claim 46. Pet., 68-70; TESLA-1003, ¶¶132-133. Further, the “one or more inputs” would be input neurons for inputting at least a portion of the one or more object representations as described for [85.8] and [85.13]-[85.14]. TESLA-1022, ¶73.

Claim 87 – The additional features recited in Claim 87 are obvious based on Grotmol’s teachings for the reasons the Petition described in connection with Claim 47. Pet., 70-71; TESLA-1003, ¶¶134-135; TESLA-1022, ¶74.

Claim 88 – The additional features recited in Claim 88 are obvious based on Grotmol’s teachings for the reasons the Petition described in connection with Claim

51. Pet., 71; TESLA-1003, ¶136; TESLA-1022, ¶75. Further, in the Grotmol-Zhu-Buibas combination, Buibas describes an additional learning process for operating a second device at least partially by a user. TESLA-1005, [0171]-[0193], [0070]; Pet., 41-44, 77-82; TESLA-1003, ¶¶99-100, 150-161, Reply to POR, 1-27; TESLA-1022, ¶75.

Claims 89-90 – In the Grotmol-Zhu-Buibas combination, the additional features recited in Claims 89-90 are obvious based on Grotmol’s and Buibas’ teachings for the reasons the Petition and the Reply to the POR describe in connection with Claims 56 and 57, and further above for [85.13]-[85.14]. Pet., 41-44, 77-82; TESLA-1003, ¶¶99-100, 150-161, Reply to POR, 1-27; TESLA-1022, ¶76.

Claim 91 – The limitation in claim 91 that the one or more object representations include one or more “coordinates” of one or more objects is obvious based on Grotmol’s and Zhu’s teachings for the reasons described above in connection with [85.11]-[85.12]. *Supra*, [85.11]-[85.12]; TESLA-1022, ¶77.

Claims 92-93 – Claims 92 and 93 merely re-write dependent claims 56 and 57 in independent form, respectively, but these claims are unpatentable based on Grounds 1A and 2C for the reasons described in the Petition and the Reply to the POR. Pet., 41-44, 77-82; TESLA-1003, ¶¶99-100, 150-161, Reply to POR, 1-27; TESLA-1022, ¶78.

III. THE SUBSTITUTE CLAIMS LACK SUPPORT UNDER § 112

A. “inputting the multiple [and another] object representation data structures of the stream into the one or more input neurons, and using a correlation between the one or more input neurons and the one or more instruction sets for operating the second [and the third] device”

Substitute claim 85 requires inputting a very specifically recited set of multiple object representation data structures into input neuron(s) of a neural network and using correlations between the input neurons and instruction sets for operating a second device and a third device to determine instruction sets from the inputted data structures. MTA, 1-3. PO has not shown, however, that the inventor was in possession of these concepts, and hence has not shown that the substitute claims are supported by the '474 Patent or the '991 Priority Application. TESLA-1022, ¶79. The MTA includes lengthy string citations to various portions of the lengthy specification of the '991 Priority Application, but the citations to alleged support for processing the recited data structures with a neural network are quite limited.

For example, the MTA cites to FIG. 17 and the feedforward neural network shown in Model A as alleged support for these features. MTA, 15-16. But none of the disclosures cited in the MTA describe inputting the multiple object representation data structures into the input neurons of a neural network for processing as claimed—and particularly not multiple object representation data

structures that include the recited label for object type, coordinates for object location, and computer model for object size. TESLA-1022, ¶80. There is simply no evidence that the inventor possessed the use of a neural network for this specific scenario. PO instead improperly treats the '991 Application's boilerplate 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," as license for asserting long after the filing date that the inventor possessed the specifically claimed combination of features recited in claim 85, in the context of a neural network. EX2004, 93:24-32; MPEP § 2163 ("An invention described solely in terms of a method of making and/or its function may lack written descriptive support where there is no described or art-recognized correlation between the disclosed function and the structure(s) responsible for the function.").

The MTA likewise fails to demonstrate support for a number of specific nuances recited in Substitute Claim 85, including that the instruction sets are determined using correlations between input neurons and two **different** devices (i.e., the second and third devices) for object representation data structures pertaining to the **same** "multiple objects" detected at different times. MTA, [85.11]-[85.14]; TESLA-1022, ¶81. Dr. Saber was unable to identify any relevant support for these features in his deposition. TESLA-1028, 121:12-132:4; *see also id.*, 22:3-28:17,

28:19-30:8, 71:21-73:8, 101:7-111:10, 43:3-45:1, 57:5-58:13, 73:9-74:14, 79:3-81:11, 103:13-107:2, 109:2-109:16, 115:7-116:11. For example, PO points to FIG. 38 as depicting a “second device” (“Loader 98a”), even though this disclosure does not address the claimed “third device,” let alone demonstrate that instruction sets can be determined for operating a third device based on the representations of the same objects that were used to determine instructions for operating the second device (“Loader 98a”). MTA, 16-17; TESLA-1001, FIG. 38. Citing to an entirely different figure, PO then alleges that “Boat 98b” is the claimed third device. *Id.*; TESLA-1001, FIG. 39. PO’s theory would appear to require that (1) the Loader 98a and Boat 98b learned instructions for operating their respective devices based on representations of the same objects, and (2) the first device would need to be capable of executing instructions from both Loader 98a (second device) and Boat 98b (third device). *Id.* There is no support in the ’474 Patent, or explanation in Patent Owner’s motion, that bridges the gap between Figures 38 and 39, or explains how the two devices in these two separate figures would operate as claimed. TESLA-1022, ¶81. PO has failed to demonstrate written description support for the Substitute Claims. *Id.*

IV. CONCLUSION

The Substitute Claims are unpatentable under 35 U.S.C. §§ 103 and 112.

Case IPR2024-00745
Attorney Docket No: 49649-0038IP1
Respectfully submitted,

Dated 04/11/2025

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the page count for the foregoing Petitioners' Opposition to Patent Owner's Motion to Amend totals 25 pages, which is equal to the 25 pages limit allowed under 37 CFR § 42.24.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that on April 11, 2025, a complete and entire copy of this Petitioner's Opposition to Patent Owner's Motion To Amend was provided via email to the Patent Owner by serving the email correspondence addresses of record as follows:

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