

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 SUR-REPLY 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”)
TESLA-1039	Eli Saber Deposition Transcript (June 27, 2025)

I. INTRODUCTION

Patent Owner (“PO”)’s Motion to Amend Reply (“Reply”) fails both to distinguish the prior art grounds raised in Petitioner’s Opposition to the Motion to Amend (“Opposition”) and fails to demonstrate that the substitute claims are adequately supported by the ’474 Patent’s written description.

In a strained attempt to address the prior art, PO implicitly interprets limitations in the substitute claims related to “object size” and “object location” in an overly narrow manner that is inconsistent with the plain language of the claims themselves and incongruent with the level of disclosure of the claimed features in the specification of the ’474 Patent. Rather than take the opportunity to clarify its claims through a revised Motion to Amend, PO instead attempts to import unclaimed limitations through implicit claim interpretations, thereby evading the need to demonstrate written description support for the allegedly distinguishing features (which support could not be shown).

For the reasons explained below, and as the Board correctly recognized in its Preliminary Guidance on the Motion to Amend, the substitute claims are obvious over the prior art. PO’s implicit claim interpretations only further highlight how the claims further suffer from written description deficiencies under 35 U.S.C. §112.

II. THE SUBSTITUTE CLAIMS ARE UNPATENTABLE UNDER § 103

A. Grotmol-Zhu Renders Limitations [85.11]-[85.12] Obvious

1. Patent Owner Does Not Contest the Relevance of Grotmol's Disclosure

The Opposition presented both Grotmol and Zhu when mapping to “object representation data structures,” described in [85.11]-[85.12]. Opposition (Opp.), 10-14. However, in the Reply, PO attacks Zhu’s disclosure in isolation, claiming only in passing that the Opposition “relies on obviousness in view of Zhu” to explain the absence of Grotmol-related arguments. Reply, 5-6. With Grotmol discarded, PO then argues that Zhu alone does not disclose these features (which Petitioner disputes below). *Infra*, §II.A.2. In so doing, PO overlooks that the Opposition advanced a combination of Grotmol and Zhu, and fails to contest relevant disclosure from Grotmol that likewise contributes to the Grotmol-Zhu combination.

For example, critical to PO’s Zhu argument is the concept of “actual” object size and location as opposed to the size and location of an object “representation,” and Zhu’s alleged lack of such disclosure. Reply, 6-7; *infra*, §II.A.2. However, in making this argument, PO fails to consider Grotmol’s disclosure, which renders moot any need to rely on Zhu to disclose “actual” object size and location, should the claims be interpreted to have such a requirement (they should not).

As identified in the Opposition, Grotmol discloses that features associated with detected objects include their “size” and “location.” Opp. 10-11; TESLA-1008, 9:41-42, 10:23-34, 28:19-40, 39:13-28, 21:41-43. Grotmol further explains—using the *same terms* recited in [85.11]-[85.12] of “object size” and “location”—that “[t]he

tasks of the robot may be configured based on a context” and “the context may comprise ... state of the environment (e.g., **object size, location**).” TESLA-1008, 10:23-34 (emphasis added); Opp. 10-11. Grotmol does not indicate that the size and location of the objects it detects are anything other than the object’s “actual” size and location. *Id.* Indeed, this makes sense, as Grotmol detects these objects for real-world “path navigation” of a robot (e.g., navigating a robot around real world obstacles) and for manipulation of actual objects in the real world. *Id.* Even if the claims were to be interpreted as narrowly as PO contends, this interpretation would be indistinguishable from Grotmol’s disclosures as cited in the Opposition.

Despite being given the opportunity at his deposition to explain how PO’s claim interpretation would distinguish Grotmol, Dr. Saber failed to provide an answer—only stating that his declaration “responded to the argument in general” while failing to identify the specific portion of his declaration that does so. TESLA-1039, 12:9-17:16, 23:1-26:15, 33:9-38:11. Further, Dr. Saber could not provide a reason why a POSITA reviewing Grotmol’s disclosure would not understand that the object size and location described by Grotmol is the object’s actual size and location. *Id.* This further confirms that PO’s and Dr. Saber’s arguments are incomplete in focusing on Zhu in isolation while inexplicably ignoring Grotmol’s relevant disclosure as the starting point for the combination. *Id.*; *Palo Alto Networks, Inc. v. Centripetal Networks, LLC*, 122 F.4th 1378 (citing *Game & Tech. Co. v.*

Wargaming Grp. Ltd., 942 F.3d 1343, 1352 (Fed. Cir. 2019)) (“The question in an obviousness inquiry is whether it would have been obvious to a person of ordinary skill in the art to combine the relevant disclosures of the two references, not whether each individual reference discloses all of the necessary elements.”); *see also* *Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019) (same); *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013).

2. Patent Owner’s Interpretation That “Object Representation Data Structures” Require “Actual” Object Characteristics is Unsupported, but Zhu Renders it Obvious Regardless

Turning to Zhu, PO argues that Zhu’s bounding boxes are “representations of objects,” and thus not object representation data structures. Reply, 6-7. Specifically, PO alleges that because Zhu’s bounding boxes do not directly represent object size and location (the “actual size” and “actual location” as described by PO) they are not object representation data structures as these boxes “deal with location and size of object representations within the image, not the location and size of the detected objects themselves.” *Id.* (emphasis omitted). This argument suffers from multiple problems, however, including that it (1) overlooks pertinent disclosures in Zhu cited in the Opposition of bounding box parameters that characterize the actual size and location of detected objects using *physical* units of the object in the real world, (2) ignores that the size and coordinate location of a bounding box for an object depicted

in an image reflects the size and coordinate location of an actual object in the real world, and (3) is unsupported by the specification of the '474 Patent.

In more detail, PO's argument that Zhu's coordinates only "define the location of an image" is incorrect. Reply, 6-7. Zhu's coordinates not only define the location of the object in the image, but also define physical characteristics of the detected object, for example, "the physical height of the object" (e.g., measured in meters). Opp., 11-12; TESLA-1023, 15:1-20. Indeed, Zhu explicitly discloses that object labels (e.g., bounding boxes) can be "measured in physical units" and that these labels can be "based on the physical characteristics of the object encompassed by the object label." TESLA-1023, 20:34-40; *see also id.*, 18:36-47, 20:67-21:17. PO's Reply never addresses these disclosures, and tellingly, Dr. Saber could not explain how his opinions could be squared with Zhu's disclosures in this regard. TESLA-1039, 51:21-72:7. This is because PO's arguments and Dr. Saber's analysis are simply wrong and contradicted by Zhu's express disclosure.

Even if Zhu's disclosure was limited to parameters defining the location and size of an object in an image in pixels as PO contends (which it is not), it is apparent that such parameters are still indicative of "object size" and "object location" as claimed, and even indicative the object's actual size and location as PO argues is necessary. For example, Zhu's FIG. 9 shows a bounding box 902 of a certain size in the left portion of the scene depicted in the image. TESLA-1023, FIG. 9. The

position of the bounding box directly corresponds to the vehicle's actual position in the real world, and the size of the bounding box is likewise directly correlated with the physical size of the object. *Id.* The only technical reason that Dr. Saber could articulate as to why bounding boxes in Zhu's image are somehow insufficient to discern the vehicle's actual size and location is that Zhu's image is two-dimensional and supposedly lacks depth information. TESLA-1039, 51:21-52:20. But, here again, Zhu's disclosure is not as limited as PO and Dr. Saber assumed. Zhu specifically discloses that its system is configured to determine distances of detected objects to the vehicle, using for example, "sonar," "stereo cameras," a "localization camera," and/or "a laser." TESLA-1023, 9:57-10:11, 8:39-46. This makes sense because, like Grotmol, Zhu's system is concerned with the navigation of a vehicle around real world obstacles. Opp., 2; TESLA-1023, 1:48-2:4, 8:25-28, 10:58-67, 11:16-55. Indeed, Zhu explicitly describes that the sensor parameters that form bounding boxes "should be considered an object" and Zhu even disclose 3D images. TESLA-1023, 10:58-64, 13:46-58, 14:43-15:20, FIG. 7; Opp., 11.

Zhu's disclosure is strikingly similar to pertinent embodiments of the '474 Patent. The '474 Patent frequently describes that object size can be represented with a "point cloud." TESLA-1001, 72:65-66, 78:45-51, 114:15-17, 151:29-30. Zhu discloses this same technique—objects being represented in a "point cloud image"

that represents the environment surrounding the autonomous vehicle. TESLA-1023, 14:43-52, 15:66-16:4, 17:29-53, 19:63-20:13, FIGS. 8, 10; Opp., 11-12.

Beyond these points, there is no basis in the intrinsic record for requiring that the object representation data structures represent “actual” characteristics of the underlying real-world object, and further, the plain language of the claims indicates that these data structures can simply be “representations.” Indeed, the ’474 Patent explicitly discloses that an object representation can include “an electronic representation of an object.” TESLA-1001, 72:4-7. Nowhere does it specify that an object representation must contain only “actual” object characteristics, nor does it explain what PO means by an “actual” characteristic. TESLA-1001, 71:53-73:27.

The specification does not require “actual” object coordinates, as PO alleges. Rather, the ’474 Patent describes that a “location of an object” can be any of “distance and bearing/angle from a known point, coordinates, etc.” *Id.*, 72:58-67. Similarly, the ’474 Patent does not indicate that a “computer model for object size” must be the “actual” size of the object, only describing that the “shape/size of an object” can be a “computer model,” without any further detail. TESLA-1001, 71:53-73:27. Accordingly, it is entirely consistent with the specification of the ’474 Patent to represent size and coordinates of an object with a representation—a bounding box—which is sized and located in proportion to an object’s actual size and location.

The Board has previously declined to adopt another overly narrow construction of the term “object representation” that PO advanced in IPRs for family members of the ’474 Patent. IPR2023-01055, Paper 47, 12-14; *see also* IPR2023-01169, Paper 19, 18-21. While the substitute claims would have been obvious even under PO’s construction, the Board should not permit PO to import similar unclaimed limitations here.

3. Zhu’s Classifications Are Part of its Object Labels, and thus, Part of the Object Representation Data Structures

PO argues that the Opposition’s mapping of “label for object type” to Zhu’s classifications is “inconsistent with [the] mapping of “coordinates for object location” and “model for object size.” Reply, 8-9. This argument misunderstands the Opposition’s mapping and overlooks Zhu’s explicit disclosure.

The Opposition mapped “object representation data structures” to both Zhu’s “labels” and “bounding boxes”—terms used interchangeably in Zhu. TESLA-1023, 14:43-15:20 (“the shape of the object label is a bounding box ...”); Opp., 11-13. PO addresses only the visual depictions of Zhu’s bounding boxes in FIG. 9, overlooking many instances where Zhu describes that the label that “is” the bounding box includes other information—to include the mapped object classifications. Reply, 7-9; Opp., 11; TESLA-1023, 10:58-11:36, 14:43-52. Indeed, Zhu discloses that an object label is applied “based on one or more of the sensor parameters” including a determination of an object’s classification. *Id.* Moreover, like the ’474 Patent, Zhu

broadly describes different ways of organizing data and does not limit the data structure to a particular type. TESLA-1023, 6:8-25; TESLA-1001, 65:63-66:14.

B. Grotmol-Zhu Renders Limitations [85.13]-[85.14] Obvious

1. Patent Owner's Argument That Grotmol's Neural Network Only Accepts Images As Input Is Incorrect

PO argues that “[n]either of the cited references actually discloses [sic] the claimed inputting of the specific claimed object representation data structures ... into input neuron(s)” because the “input neurons of Grotmol’s image-based neural network accept pixels of an image or image features” and thus cannot accept object representation data structures, which are allegedly distinct from images. Reply, 9-12. PO argues that Grotmol and Zhu cannot be combined for this same reason. *Id.*

Regardless of whether an object representation data structure can or cannot be represented by image data, PO’s argument fundamentally misunderstands Grotmol. Nowhere does Grotmol limit the input of its neural network to only images and image features, and likewise, nowhere does the Opposition take this position. Opp., 2-6. In contrast, the Opposition and Petition argued, and Grotmol discloses, that Grotmol’s techniques include “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.” Opp., 2-8 (emphasis added); TESLA-1008, Abstract, 23:3-22, 24:1-16, 28:19-40, 33:12-35, 39:13-28, FIGS. 10A-11B;

Pet., 51-54. Indeed, Grotmol clearly discloses that the input to its neural network is a set of features which can include many possible types of information, specifically including object “size” and “position” (e.g., the features of [85.11]-[85.12]). TESLA-1008, 28:19-40; Opp., 2-8; Pet., 51-54. As discussed in the Opposition in more detail, the type of input that Grotmol’s neural network would have accepted is the same type of input Zhu’s system would have provided, and the argument that Grotmol is limited to only image data is off-base. *Id.* For at least this reason, PO’s combination arguments fall flat.

PO’s argument also improperly assumes that an object representation data structure cannot be represented by image features, despite the fact that image features can represent all of the required object characteristics of an object representation data structure (e.g., “a label for object type,” “coordinates for object location,” and “a computer model for object size”). Reply, 9-12. The ’474 Patent does not indicate that image features would have been outside the scope of an object representation data structure, but rather, broadly describes that an object representation can simply include “an electronic representation of an object.” TESLA-1001, 72:4-14. The Reply simply assumes that image features would have been outside the scope of an object representation data structure without providing any basis for such a conclusion.

**2. Patent Owner’s Interpretation of Limitations [85.13]-[85.14]
With Respect To The Prior Art Is Inconsistent With PO’s**

**Interpretation With Respect To The '474 Patent's Alleged
Written Description Support**

PO argues elsewhere in the Reply that “input neurons” are simply the three first neurons of a neural network, and that the “multiple input representation data structures” would have been input into these neurons simply “because they are incoming from the perspective of the input neurons of the neural network.” Reply, 2-3; TESLA-1001, FIG. 17. As recognized in the Opposition, the entirety of PO’s alleged support for this feature rests with FIG. 17—an image that simply depicts a basic structure of a neural network with multiple layers of neurons.

Yet, with respect to the prior art, PO argues that this basic action is beyond the teachings of multiple prior art references that all generally describe the same structure of a neural network, even when these references are viewed through the lens of a POSITA. Reply, 10-11. For example, Dr. Janet cited to Fisher to support the argument that inputting object representation data structures into a neural network would have been within the knowledge of a POSITA—a reference that depicts a similar visual representation to the '474 Patent's FIG. 17. Opposition, 7-8; TESLA-1029, FIG. 10A. PO does not, and cannot, distinguish the prior art from their identified written description support, and this argument is nothing more than a thinly veiled attempt to interpret disclosure broadly when claiming support and narrowly when distinguishing prior art.

III. THE SUBSTITUTE CLAIMS LACK SUPPORT UNDER § 112

Petitioner respectfully submits that, to the extent the amended claims are interpreted as PO alleges in the Reply, this is beyond the supporting disclosure of the '474 Patent. PG, 5-9. For example, PO's position that FIG. 17 of the '474 Patent provides adequate support for "inputting the multiple object representation data structures of the stream into the one or more input neurons" simply by depicting input neurons cannot be reconciled with the argument that the prior art does not render the same obvious by depicting almost identical structure. Reply, 2-4; TESLA-1001, FIG. 17; Opp., 7-8; TESLA-1029, FIG. 10A.

Likewise, the Reply cites that a POSITA would have understood that, despite any specific disclosure describing their input, the general description of DCADO units interfacing with multiple robots (e.g., loaders 98a) supports the amended claims. Reply, 4-5; PG, 5-9. However, despite only this general description, PO argues that the input mapped by Petitioner in the Opposition falls short. *Supra*, §II.A-B. PO cannot have their cake and eat it, too. If the amended claims are supported by such generic disclosure, then they are obvious over the prior art. If the amended claims somehow distinguish the art (they do not), the specificity needed to do so is missing from the '474 Patent and the amended claims are unsupported.

IV. CONCLUSION

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

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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 Petitioner's Sur-Reply to Patent Owner's Motion to Amend totals 12 pages, which is equal to the 12 pages limit allowed under 37 CFR § 42.24.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that on July 11, 2025, a complete and entire copy of this Petitioner's Sur-Reply 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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