

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner

v.

AUTONOMOUS DEVICES, LLC,
Patent Owner

Case: IPR2023-01172
U.S. Patent No. 11,055,583

PATENT OWNER'S RESPONSE

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Exhibit	Description
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2002	Declaration of Blair M. Jacobs (previously submitted)
2003	Supplemental Declaration of Blair M. Jacobs (previously submitted)
2004	District Court Docket (previously submitted)
2005	District Court Scheduling Order (previously submitted)
2006	District Court Invalidity Contentions (previously submitted)
2007	Declaration of Dr. Eli Saber
2008	Deposition transcript of Dr. Jason Janet dated March 22, 2024 in IPR2023-01172
2009	RESERVED
2010	Institution Decision in IPR2023-01054
2011	U.S. Patent No. 10,452,974
2012	American Heritage Dictionary (1992) Excerpts
2013	Webster's Third New International Dictionary (2002) Excerpts
2014	RESERVED
2015	Dr. Eli Saber CV

I. INTRODUCTION

Autonomous Devices, LLC (“Patent Owner” or “Autonomous Devices”) respectfully submits this Response to the Board’s decision to institute *inter partes* review (Paper No. 21, the “Decision”) and to the Petition for *inter partes* review (Paper No. 2, the “Petition” or “Pet.”) filed by Tesla, Inc. (“Petitioner” or “Tesla”). This Response is timely filed in accordance with the Board’s Scheduling Order (Paper No. 22) and the Parties’ Joint Stipulation to Modify Trial Due Dates 1, 2 and 3 (Paper No. 27). The Board instituted review of U.S. Patent No. 11,055,583 (“the ’583 patent”) on Petitioner’s ground that challenges claims 1-9, 11-24, 26, 29 and 31-34 (the “Challenged Claims”) of the ’583 patent based on anticipation by U.S. Patent No. 9,604,359 (“Grotmol”) (Exhibit 1005). Decision, 17.

Petitioner has not carried its burden of proving unpatentability of claims 7, 9, 14-18, 23, 29, and 31 by a preponderance of the evidence (35 U.S.C. § 316(e)). As explained below and in the accompanying Declaration of Patent Owner’s expert, Dr. Eli Saber, Petitioner has not established that the above-cited prior art reference discloses all of the limitations of the foregoing claims.¹ In addition, Petitioner’s

¹ Patent Owner submits the Declaration of Dr. Eli Saber (Ex. 2007), an expert in the field of the ’583 patent. Ex. 2007, ¶¶1-18; Ex. 2015.

expert, Dr. Janet, provided deposition testimony that undermined Petitioner's arguments regarding several claims.

II. THE '583 PATENT

The '583 patent, titled "Machine Learning for Computing Enabled Systems and/or Devices," discloses systems for machine learning for computing enabled systems and/or devices. Ex. 1001, Abstract, 1:43-65; *see also* Ex. 2007, ¶¶47-51. The '583 patent discloses systems for capturing "one or more digital pictures, receiv[ing] one or more instruction sets, and learn[ing] correlations between the captured pictures and the received instruction sets." Ex. 1001, Abstract.

1. Existing Technology

Prior to the innovations described in the '583 patent, "[a] machine learning solution [was] needed for computing enabled systems and/or devices to be less dependent on or fully independent from user input." *Id.*, 1:37-39. The '583 patent solved this problem by utilizing a sophisticated system for "learning and/or using visual surrounding for autonomous device operation" comprising "learning one or more digital pictures of a device's surrounding along with correlated instruction sets for operating the device, storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, etc.) and autonomously operating a device." *Id.*, 59:11-12, 14-18; *see also* Ex. 2007, ¶¶47-48.

2. Advantages Provided by the '583 Patent

The '583 patent is directed to artificially intelligent devices, systems, and methods that store a knowledgebase that includes digital pictures of at least a portion of a device's surroundings correlated with device operating instruction sets, receive or generate new captured digital pictures, match the new pictures with stored pictures in the knowledgebase, and cause the device that captured the new pictures to autonomously execute an instruction set correlated to the matched pictures. Ex. 1001, 1:43-2:7, 152:33-153:63; *see also* Ex. 2007, ¶¶49-51. Referring to Figure 37 (shown below) and the specification's description of Figure 37, for example, Computing-enabled machine 98a (a loader) includes Picture Capturing Apparatus 90, which captures digital pictures 525 of Computing-enabled machine 98a's surroundings. Ex. 1001, 152:33-153:63. Computing-enabled machine 98a learns User 50-directed collecting, moving, maneuvering, lifting, and/or unloading in Computing-enabled machine's 98a visual surrounding that includes a pile of material, truck, and/or other objects. *Id.* In the future, when Computing-enabled machine 98a encounters visual surroundings that include the same or similar objects, or detects the same or similar objects, Computing-enabled machine 98a autonomously implements collecting, moving, maneuvering, lifting, and/or unloading using previously learned instruction sets 526 correlated with previously learned digital pictures 525. *Id.*, 153:59-63.

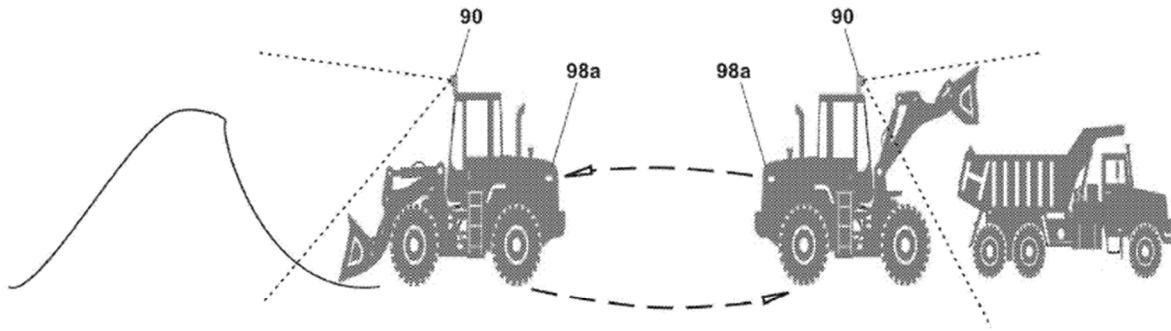


FIG. 37

Ex. 1001, Fig. 37.

The '583 patent describes and claims systems implementing its innovative techniques for autonomous operation. Ex. 2007, ¶¶47-51. For example, one such method is claimed in claim 1. Claim 1 is directed to a method implemented by a computing system that uses learning digital pictures to implement autonomous operation. Several other dependent claims provide additional details regarding systems for autonomous operation.

III. PERSON OF ORDINARY SKILL IN THE ART

Patent Owner adopts Petitioner's definition of a person of ordinary skill in the art (POSA). Petition, 3-4; *see also* Ex. 2007, ¶¶45-46. A POSA relevant to the '583 patent would have at least: (1) a bachelor's degree in electrical engineering, computer engineering, computer science, systems engineering, or equivalent course

work with two to three years of work experience in computer vision, image/video processing, and/or machine learning; or (2) a master's degree in electrical engineering, computer engineering, computer science, systems engineering, or equivalent course work with a focus in computer vision, image/video processing, and/or machine learning. Petition, 3-4; *see also* Ex. 2007, ¶¶45-46.

IV. ALLEGED PRIOR ART

The Petition relies on one reference for its unpatentability grounds, and that reference is summarized below.

A. GROTMOL (EX. 1005)

Grotmol discloses a simplistic method for training and operating a robotic device to follow a simple trajectory based on a simple sequence (i.e., ordered buffer) of images. Ex. 1005, Abstract. If any circumstance occurs for which the simple trajectory is not trained (i.e., different objects, etc.) the robot in Grotmol would not know what to do or would collide with an obstacle. Ex. 2007, ¶¶62-65. The robotic device “may utilize a camera” to store a “sequence of images of a visual scene seen when following a trajectory during training in an ordered buffer.” Ex. 1004, Abstract. During training, “[m]otor commands issued by a trainer corresponding to time instances when the images are acquired may be stored.” *Id.*, 39:17-19. During autonomous operation, the robotic device may be configured to compare an acquired image “with one or more images from the training buffer in order to determine the

most likely match.” *Id.*, Abstract. After an acquired image is matched to an image stored in the training buffer, the best match may be used “to predict motor command for controlling operation of a robot.” *Id.*, 27:57-58.

V. CLAIM CONSTRUCTION

The claims in an *inter partes* grant review are construed using the same standard that applies in district court proceedings, as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 100(b) (2019). Claim terms are afforded “their ordinary and customary meaning,” which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312-17). The Board, however, only construes the claims when necessary to resolve the underlying controversy. *Toyota Motor Corp. v. Cellport Systems, Inc.*, IPR2015-00633, Paper No. 11 at 16 (Aug. 14, 2015) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Patent Owner proposes a construction for one term (“connections”) that appears in claim 23, and that term is discussed below in Section V.A. Petitioner

proposed a construction for one set of terms (Petition, 4), and those terms are discussed below in Section V.B.

A. “connections” (Claim 23)

Claim 23 recites “connections” between a digital picture and an instruction set. Claim 23 recites in part:

wherein the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device include the first one or more digital pictures connected, using at least one or more *connections*, with the first one or more instruction sets for operating the first device.

Ex. 1001, Claim 23 (emphasis added).

In the context of claim 23 of the ’583 patent, including in light of the claims, specification, and drawings, a “connection” should be construed as a “relationship that includes a link.” Ex. 2007, ¶¶53-59. This construction is supported by the claims, specification, drawings, and intrinsic record as a whole. *Id.* Figure 16 of the ’583 patent makes clear that a connection is a relationship that includes a link:

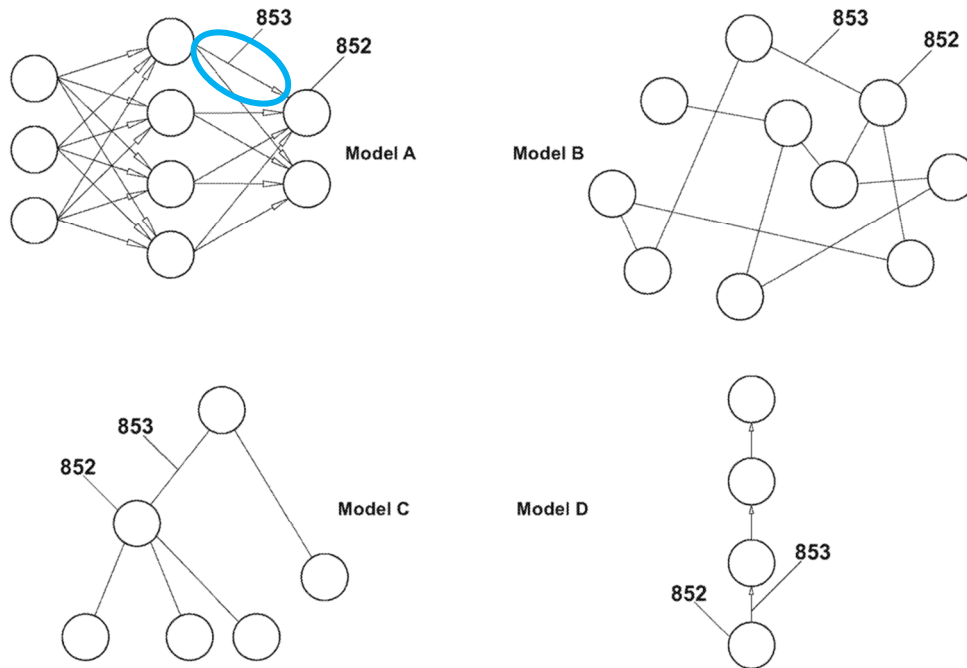


FIG. 16

Ex. 1001, Figure 16 (annotated to show Connection 853 in blue); Ex. 2007, ¶¶53-55.

In describing Figure 16, in this particular use of connections, the '583 patent states that “machine learning, knowledge structuring or representation, decision making, pattern recognition, and/or other artificial intelligence functionalities may include a network of Nodes 852 (also referred to as neurons, etc.) and Connections 853 similar to that of a brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto.” Ex. 1001, 96:2-8. For example, a node may include at least a portion of a digital picture while another node may include at least

a portion of an instruction set, and the two nodes may be in a relationship that includes a connection or link. As shown for example in Model A in Figure 16, in this particular use of connections, Connections 853 are included in connecting or linking Nodes 852. *Id.*, 95:65-96:59. Connections are included as some of the elements connecting those nodes and showing relationships between those nodes. Ex. 2007, ¶¶55-56. Further, “Connection 853 may include or be associated with a value such as a symbolic label or numeric attribute (i.e. weight, cost, capacity, length, etc.).” Exhibit 1001, 96:19-22.

In this particular use of connections, Figure 17A of the '583 patent also makes clear that a connection is a relationship that includes a link:

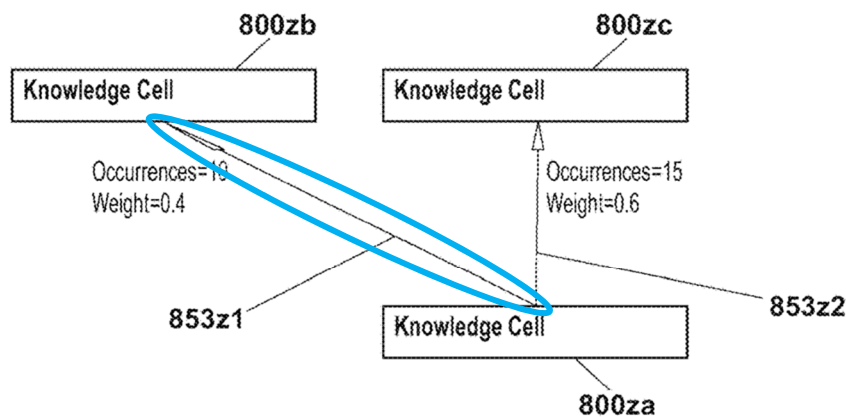


FIG. 17A

Ex. 1001, Figure 17A (annotated to show Connection 853z1 in blue); Ex. 2007, ¶¶56-57.

The specification further explains that, in this particular use, connections between correlations (each knowledge cell depicted in Fig. 17A includes a correlation, *see* Figs. 12-15) “may include or [be] associated with at least one of: an occurrence count, a weight, a parameter, or a data.” Ex. 1001, 15:12-14. In addition, Figure 17A discloses “that Knowledge Cell 800za is connected to Knowledge Cell 800zb and Knowledge Cell 800zc by Connection 853zl and Connection 853z2, respectively. Each of Connection 853zl and Connection 853z2 may include or be associated with occurrence count, weight, and/or other parameter or data.” *Id.*, 98:31-37. This also supports Patent Owner’s construction, as the connections are relationships that include links. Ex. 2007, ¶¶56-58.

The ’583 patent further provides that “[k]nowledge cells [including correlations] may be connected, interrelated, or interlinked into knowledge structures using statistical, artificial intelligence, machine learning, and/or other models or techniques.” Ex. 1001, 144:13-18. In this particular use, Connections are used to indicate and track relationships including links to enable more efficient autonomous device operation. *Id.*, 144:1-51. Further, connections are used to create paths through the knowledgebase for efficient storage and autonomous operation (see ’583 patent Fig. 21 for example). Ex. 2007, ¶¶57-59. This disclosure confirms that, with respect to claim 23, connections are relationships that include links. *Id.*

Patent Owner's expert also confirms that connection should be construed as a "relationship that includes a link." Ex. 2007, ¶¶53-59. In addition, several dictionaries confirm that "connection" can be defined as a "relationship that includes a link." *See* Ex. 2012; Ex. 2013; Ex. 2007, ¶59.

Patent Owner's construction is confirmed by and consistent with the language of the claims and the various disclosures regarding connections throughout the specification and should be adopted. Construction of this term is appropriate because there is a dispute regarding this term, in particular with respect to Petitioner's mapping of prior art, as explained below in Section VI.

B. "means for receiving or generating"; "means for learning" (claim 34)

For the purpose of this stage of the proceeding only, Patent Owner does not dispute Petitioner's construction of these "means . . ." terms of claim 34. Petition, 5.

VI. THE CITED REFERENCE DOES NOT RENDER THE CHALLENGED CLAIMS UNPATENTABLE

The Board instituted review of the '583 patent based on Ground 1. Decision, 17. In instituting review, the Board relied on the Petition and the testimony of Petitioner's declarant, Dr. Janet (Ex. 1002). For the reasons discussed below, the cited reference does not render claims 7, 9, 14-18, 23, 29, and 31 unpatentable. Ex. 2007, ¶¶71-120.

A. Ground 1 Fails

Regarding Ground 1, Petitioner fails to show that Grotmol anticipates claims 7, 9, 14-18, 23, 29, and 31 of the '583 patent. Ex. 2007, ¶¶72-120. Petitioner fails to show that Grotmol discloses multiple limitations in these claims. *Id.*

1. Claim 7: Grotmol Does Not Disclose Detecting Objects and Comparing Detected Objects for Matching

Claim 7 depends from claim 4 and requires:

wherein the determining the first one or more instruction sets for operating the first device based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures includes *determining at least partial match between one or more objects detected in the new one or more digital pictures and one or more objects detected in the first one or more digital pictures.*

Ex. 1001, Claim 7 (emphasis added).

Grotmol fails to disclose “determining at least partial match between one or more objects detected in the new one or more digital pictures and one or more objects detected in the first one or more digital pictures.” Ex. 2007, ¶¶73-77. Grotmol merely discloses comparing images or portions (i.e., features) thereof and does not disclose detecting objects and then comparing the detected objects. *Id.* ***Once the objects are detected in pictures as claimed in claim 7, they are separate from the pictures themselves, and are therefore, different than images or portions thereof*** in Grotmol. Grotmol does not disclose comparing anything detected in images that is

separate from the images, and only discloses comparing images or portions (i.e., features) thereof. *Id.*

Petitioner relies on Grotmol's comparison based on a similarity measure, which does not disclose the matching of objects in claim 7. Petition, 28-29. Using detected objects in the claimed matching ***involves object detection and matching of the detected objects***, and Grotmol does not disclose any matching using detected objects. Ex. 2007, ¶¶75-76.

Petitioner points to Grotmol's disclosure that "the similarity measure may characterize similarity between features of the subset and features of the given training set and features may be used to 'describe one or more integer or floating point values characterizing the input, e.g., the presence or absence of an edge, corner, shape, texture, color, object, at particular locations in the image, values of pixels in an image, patches of color texture, brightness in the image, and/or in the image as a whole.'" Petition, 28-29 (quoting Ex. 1005, 28:19-24). But this disclosure merely provides that a similarity measure may characterize similarity between features, and not that any object detection occurs, much less that detected objects are compared or matched, as required by claim 7. Ex. 2007, ¶¶76-77. Furthermore, ***an image feature is a portion of an image (i.e., each image feature is a collection of pixels of the image), not a detected object***, hence, comparing image features is different than comparing objects detected in an image.

Petitioner has not shown and Grotmol does not disclose how the similarity measure for images or portions thereof in Grotmol uses detected objects in the claimed matching. Using Grotmol's similarity measure to characterize differences between images is different than using detected objects for comparison and matching, as claimed in claim 7. Ex. 2007, ¶¶76-77. Petitioner has failed to show that Grotmol anticipates claim 7 due to the difference between the compared images or portions (i.e., features) thereof in Grotmol and the claimed matching of detected objects *that are separate (once they are detected) from the images. Id.*

2. Claim 9: Grotmol Does Not Disclose the Claimed Second Learning Process

Claim 9, which depends from claim 4, states, in part:

wherein the knowledgebase further includes a second one or more digital pictures correlated with a second one or more instruction sets for operating the first device, 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 for operating the first device is learned in a first learning process that includes operating the first device at least partially by a first user, and wherein at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets for operating the first device *is learned in a second learning process* that includes operating the first device at least partially by the first user.

Ex. 1001, Claim 9 (emphasis added).

Grotmol fails to disclose the claimed “second learning process.” Ex. 2007, ¶¶78-81. Grotmol only discloses **one** user operating **one** device in **one** learning process, and therefore fails to disclose any second learning process, let alone the claimed “at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets for operating the first device **is learned in a second learning process** that includes operating the first device at least partially by the first user.” *Id.*

Petitioner contends that “Grotmol describes that multiple training processes can be conducted to learn multiple tasks.” Petition, 31. However, the inquiry here is not whether multiple learning processes **can or cannot** be conducted, but about **the single learning process that Grotmol actually discloses**. Also, this argument is Petitioner’s own words not supported in Grotmol, and is conclusory. Petitioner is wrong since claim 9 specifically recites a knowledgebase that includes one correlation learned in one learning process and an additional correlation learned in another learning process. Ex. 2007, ¶¶79-81. Since Grotmol discloses **only a single learning process, multiple tasks are learned in the single learning process. Nothing in Grotmol suggests that multiple tasks are learned in multiple learning processes as claimed in claim 9.** *Id.* Petitioner's contention that Grotmol teaches

claim 9 is an unjustified leap given that Grotmol does not even mention another learning process. *Id.*

Further, as the Board noted in an IPR involving similar claim limitations in another patent owned by Patent Owner, Grotmol discloses nothing “more than loading a trained configuration from a first robot to a second robot.” Ex. 2010, 35 (Institution Decision in IPR2023-01054) (Board’s discussion regarding claim 4 of U.S. Patent No. 10,452,974 (Ex. 2011)). The Board also questioned whether Petitioner had sufficiently shown that “Grotmol discloses . . . another learning process.” *Id.*, 35-36. The Board concludes correctly that Grotmol’s disclosure of loading a trained configuration from a first robot to a second robot does not constitute another learning process. Ex. 2007, ¶¶80-81. In sum, Grotmol fails to disclose the claimed *second learning process*. Ex. 2007, ¶¶79-81.

3. Claim 14: Grotmol Does Not Disclose the Claimed Modified and Applied Instruction Set and that the Second Device Performs an Operation Defined by the Modified Instruction Set

Claim 14 depends from claim 4 and requires:

wherein the first one or more instruction sets for operating the first device or a copy of the first one or more instruction sets for operating the first device *are modified and applied to the second device*, and wherein the second device is caused *to perform one or more operations defined by: the modified the first one or more instruction sets for*

operating the first device, or the modified the copy of the first one or more instruction sets for operating the first device.

Ex. 1001, Claim 14 (emphasis added).

Grotmol first fails to disclose that a first one or more instruction sets is “modified.” Ex. 2007, ¶¶82-85. Grotmol only discloses correcting device behavior by issuing new commands in certain instances and does not disclose that any instruction sets are *modified*. Ex. 2007, ¶¶83-85. Petitioner points to controlling a robot’s trajectory to compensate for position and orientation mismatch and that new commands may be issued based on shifted images, Petition 36 (citing Ex. 1005, 42:46-43:3). But issuing *new* commands based on shifted images does not disclose modifying instruction sets, as required by claim 14. Ex. 2007, ¶¶83-85. *Grotmol does not modify the new commands, and issuing new unmodified commands is fundamentally different than modifying existing instruction sets* in claim 14. Therefore, Petitioner has not established that Grotmol discloses that the instruction sets in Grotmol’s training sets are modified as required by claim 14. *Id.*

Next, Petitioner has also not established that Grotmol discloses that the modified instruction set is applied to the second device, where the second device performs an operation defined by the modified instruction set, as required by claim 14. Ex. 2007, ¶¶84-85. As just discussed, given that Grotmol does not disclose that the instruction sets are modified at all, Grotmol cannot and does not disclose that a

modified instruction set is applied to a second device, let alone that *the second device performs an operation defined by the modified instruction set*, as required by claim 14. *Id.*

Petitioner’s contention that “when a training configuration is loaded into a second physical device . . . and the second robot encounters ‘position mismatch’ or ‘orientation mismatch’ from the first robot, the instruction set is shifted,” Petition, 36, is wrong. This statement is Petitioner’s own words, not supported in Grotmol, and is conclusory. Ex. 2007, ¶85. Grotmol discloses shifting images, including where “FIG. 20B illustrates using image shift and/or crop for determining image match,” Ex. 1005, 6:26-28, not modifying instruction sets. Ex. 2007, ¶85. As discussed above, Grotmol never discloses modifying any instruction set, and thus nothing in Grotmol discloses that *an instruction that Grotmol fails to disclose as modified is somehow applied to a second device as modified, and that an operation defined by that instruction set that Grotmol fails to disclose as modified would be performed on the second device*, as required by claim 14. Ex. 2007, ¶85.

4. Claim 15: Grotmol Does Not Disclose the Claimed Modifying Instruction Sets, Determining the Modified Instruction Sets, and Causing Operations Based on the Modified Instruction Sets

Claim 15 depends from claim 4 and requires:

modifying: the first one or more instruction sets for operating the first device, or a copy of the first one or more instruction sets for operating the first device . . . ***determining the modified the first one or more instruction sets for operating the first device*** based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures . . . ***causing the first device or the second device to perform one or more operations defined by the modified the first one or more instruction sets for operating the first device.***

Ex. 1001, Claim 15 (emphasis added).

Grotmol first fails to disclose “modifying: the first one or more instruction sets for operating the first device” Ex. 2007, ¶¶86-93. Grotmol only discloses correcting device behavior by issuing new commands in certain instances and does not disclose that any instruction sets are ***modified***. Ex. 2007, ¶¶87-92. Petitioner points to Grotmol’s disclosure of controlling a robot’s trajectory to compensate for position and orientation mismatch and that new commands may be issued based on shifted images, Petition 37 (citing Ex. 1005, 42:46-43:3). But issuing ***new*** commands based on shifted images does not disclose modifying instruction sets, as required by claim 15. Ex. 2007, ¶¶87-88. ***Grotmol does not modify the new commands, and issuing new unmodified commands is fundamentally different than modifying existing instruction sets*** in claim 14. Therefore, Petitioner has not established that Grotmol discloses that the instruction sets in training sets are ***modified***. *Id.*

Petitioner next points to Grotmol's disclosure that commands from the training sets may be combined with the output from a PID controller as disclosing the claimed modifying instruction sets. Petition, 38 (quoting Ex. 1005, 43:9-11). But Grotmol's disclosure of combining motor commands with the output of a PID controller to stabilize the robot does not disclose modifying instruction sets. Ex. 2007, ¶¶88-89. The motor commands, or instruction sets, are *never themselves modified but instead are only combined* with the output of a PID controller in Grotmol. *Id.* Combining two distinct elements is different than modifying either element itself. *Id.* Therefore, Petitioner has failed to establish that the instruction sets in Grotmol's training sets are actually modified or changed.

Grotmol further fails to disclose “determining the modified the first one or more instruction sets for operating the first device based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures,” as required by claim 15. Ex. 2007, ¶¶89-90. As just discussed, given that Grotmol does not disclose that the actual instruction sets are modified, Grotmol cannot and does not disclose that a *modified instruction set is determined* as required by claim 15. *Id.*

Petitioner contends that “Grotmol discloses that the motor commands at a given time step may be obtained by taking the stored motor commands from the training buffer that may correspond to the best matching stored image and the motor

commands may be modified to compensate for, e.g., position mismatch and orientation mismatch.” Petition, 38. This statement is not supported by Grotmol’s disclosure and is conclusory. Ex. 2007, ¶¶90-92. Also, Petitioner is wrong since this statement asserts *modifying motor commands after they are determined*, which is different than the claimed *determining a previously modified instruction set*. Grotmol fails to disclose that any instruction sets are modified, much less that an instruction set is modified and then the modified instruction set determined based on matching of images as claimed in claim 15. Ex. 2007, ¶¶90-92.

Grotmol further fails to disclose “causing the first device or the second device to perform one or more operations defined by the modified the first one or more instruction sets for operating the first device.” Ex. 2007, ¶¶91-92. Petitioner’s only argument that Grotmol discloses this limitation is that the device’s actual operation can be modified. Petition, 39. The inquiry here is not whether a device’s operation *can or cannot* be modified, but about *the device’s operation that is based on unmodified instructions that Grotmol actually discloses*. Ex. 2007, ¶¶91-92. As discussed above, since Grotmol never discloses modifying an instruction set, Grotmol must also fail to disclose that any operation defined by the modified and determined instruction set was performed.

Petitioner’s citations to its expert’s declaration to support its position regarding the “determining the modified the first one or more instruction sets” and

“causing operations defined by the modified instruction sets” claim limitations are unavailing. Petition, 37-39. Petitioner cites to Paragraphs 262-267 of its expert’s declaration, but these paragraphs argue that a POSA would have known that the modified instruction set would be determined and caused to be performed without any explanation or support. Ex. 1002, ¶¶262-267. Petitioner’s bare assertions regarding what a POSA would have understood are not sufficient to carry Petitioner’s burden to show that Grotmol discloses the claimed invention. *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1358 (Fed. Cir. 2019) (“Conclusory expert testimony does not qualify as substantial evidence.”).

Further, since Grotmol merely discloses changing a device’s operation by *executing alternate, whole, unmodified instructions*, a POSA reading Grotmol’s disclosure would not have understood that the modified and determined instruction set was used to cause an operation defined by that modified instruction set. Ex. 2007, ¶¶92-93. Grotmol never discloses modifying any instruction sets, and thus nothing in Grotmol would have led a POSA to understand that *an instruction that Grotmol fails to disclose as modified is somehow determined as modified, and that an operation defined by that instruction set that Grotmol fails to disclose as modified would be performed*, as required by claim 15.

The testimony of Petitioner’s expert, Dr. Janet, confirmed that the modified instruction set must be the correlated instruction set. Ex. 2008, 27:11-24. In addition,

Dr. Janet could not point to a specific place in Grotmol that discloses an instruction set correlated with a digital picture that is modified. *Id.*, 25:13-27:10.

Dr. Janet attempted to supplement his opinions at his deposition by pointing to additional portions of Grotmol and other opinions not discussed in his declaration, but that is inappropriate particularly because the Petition does not rely on them. *See* Ex. 2008, 27:25-31:8.

**5. Claim 16: Grotmol Does Not Disclose the Claimed
Modifying of Digital Pictures and Matching Using the
Modified Digital Pictures**

Claim 16 depends from claim 4 and requires, among other things:

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 . . . wherein the at least partial match between the new one or more digital pictures and the first one or more digital pictures includes: (i) at least partial match between the modified the new one or more digital pictures and the first one or more digital pictures.

Ex. 1001, Claim 16 (emphasis added).

Grotmol fails to disclose “modifying at least one of: the first one or more digital pictures” and matching using the modified digital picture as required by claim 16. Ex. 2007, ¶¶94-97. Petitioner points to Grotmol’s disclosure of preprocessing images and scaling pixels. Petition, 39-40 (citing Ex. 1005, 39:13-22 and 4:18-22). But this disclosure and Grotmol’s disclosures cited in the Petition only disclose that

an instance of an image may be scaled or transformed, and not that the scaled or transformed image is used in a matching. Ex. 2007, ¶¶95-97. Claim 16 ***requires both: (i) modifying a digital picture, and (ii) using this modified digital picture in a matching, and Grotmol fails to disclose the latter. Id.***

Petitioner has not pointed to anything in Grotmol to show a ***modified digital picture used in a matching process***. Ex. 2007, ¶¶96-97. Petitioner claims that “Grotmol discloses determining whether there is a partial match between the new image and modified first image,” Petition, 40. This is Petitioner’s own words not supported in Grotmol, and is conclusory. Grotmol itself never discloses matching using ***any*** modified images as required by claim 16. Ex. 2007, ¶¶96-97.

Petitioner’s citations to its expert’s declaration to support its position regarding the “modifying” and “matching” claim limitations are unavailing. Petition, 39-40. Petitioner cites to Paragraphs 268-270 of its expert’s declaration, but these paragraphs ***simply repeat Petitioner’s argument that a modified image could be used in a matching procedure*** without support or explanation. Ex. 1002, ¶¶ 268-270. Petitioner’s bare assertions are not sufficient to carry Petitioner’s burden to show that Grotmol discloses the claimed invention. *See TQ Delta, LLC*, 942 F.3d at 1358 (“Conclusory expert testimony does not qualify as substantial evidence.”).

Petitioner’s expert confirmed that he mapped Grotmol’s disclosure “of applying a transformation to an instance of the sensory input” to claim 16. Ex. 2008,

37:8-23. This testimony confirms that his mapping is not correct, as claim 16 requires that the correlated digital picture is modified and not just that a “picture captured by a camera” is modified. *Id.* Dr. Janet confirmed that the modified digital picture must be the correlated digital picture. *Id.*, 33:24-35:8, 37:24-38:6. In addition, he could not point to a specific place in Grotmol that discloses a digital picture correlated with an instruction set that is modified. *Id.*, 35:24-36:23.

Dr. Janet attempted to supplement his opinions regarding claim 16 at his deposition by claiming that opinions he had not explicitly disclosed were somehow still contained in his declaration, but that is inappropriate, particularly because the Petition does not rely on them. *See* Ex. 2008, 39:12-41:22. That detracts from his credibility for claim 16.

6. Claim 17: Grotmol Does Not Disclose the Claimed Modifying Digital Pictures, Learning the Modified Digital Pictures, and Determining Instruction Sets Using the Modified Digital Pictures

Claim 17 depends from claim 4 and requires, among other things:

modifying: the first one or more digital pictures, or a copy of the first one or more digital pictures, and wherein the learning the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device includes:

learning the modified the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device, or learning the modified the copy of the first one or

more digital pictures correlated with the first one or more instruction sets for operating the first device . . .

determining the first one or more instruction sets for operating the first device based on at least partial match between the new one or more digital pictures and ***the modified the first one or more digital pictures***.

Ex. 1001, Claim 17 (emphasis added).

Grotmol fails to disclose “modifying: the first one or more digital pictures,” learning the modified digital picture, and determining an instruction set using the modified digital picture. Ex. 2007, ¶¶98-102. Petitioner points to Grotmol’s disclosure of preprocessing images and scaling pixels. Petition, 39-40 (citing Ex. 1005, 39:13-22 and 4:18-22). But this disclosure and Grotmol’s disclosures cited in the Petition only disclose that an instance of an image may be scaled or transformed, and not that the scaled or transformed image is learned and then used in a matching. Ex. 2007, ¶¶99-102. Claim 17 ***requires (i) modifying a digital picture, (ii) learning the modified digital picture, and (iii) using this modified digital picture in a matching, and Grotmol fails to disclose the latter two elements. Id.***

Petitioner claims that “Grotmol discloses modifying digital pictures, including the first one or more digital pictures that are received during the training process,” Petition, 40. Petitioner’s argument is Petitioner’s own words and only alleges modifying images. Grotmol itself never discloses ***learning any modified image and***

then matching using the modified image as required by claim 17. Ex. 2007, ¶¶100-102. Petitioner has not pointed to anything in Grotmol and nothing in Grotmol discloses that a modified image correlated with an instruction set is learned, and then the modified image is used in the matching procedure.

Petitioner's reliance upon the alleged understanding of a POSA regarding this claim limitation is circular, and Petitioner has not explained how a POSA would have understood that the *modified image is learned and used in the matching process*. Ex. 2007, ¶¶101-102. Petitioner's sole argument that Grotmol discloses using the modified image in the matching process is that "[a] POSITA would understand that where the first one or more digital pictures stored during the learning process had been modified, the partial match would be determined using the current image (i.e., new one or more digital pictures) and the modified stored image (i.e., modified first one or more digital pictures)." Petition, 43. This argument is incorrect. As Petitioner appears to concede, Grotmol itself never discloses matching using the modified image. Nothing in Grotmol discloses nor leads a POSA to understand that a modified image correlated with an instruction set is learned and then used in the matching procedure. Ex. 2007, ¶¶101-102.

Petitioner's citations to its expert's declaration to support its position regarding the "matching using the modified image" claim limitation are unavailing. Petition, 42-43. Petitioner cites to Paragraphs 278-280 of its expert's declaration, but

these paragraphs *simply repeat Petitioner's argument that a POSA would have known that a modified image could be used in a matching procedure*. Ex. 1002, ¶¶278-280. Petitioner's bare assertions regarding what a POSA would understand are not sufficient to carry Petitioner's burden to show that Grotmol discloses the claimed invention. *See TQ Delta, LLC*, 942 F.3d at 1358 ("Conclusory expert testimony does not qualify as substantial evidence.").

Dr. Janet confirmed that the modified digital picture must be the correlated digital picture in claim 17. Ex. 2008, 45:2-22. In addition, he could not point to a specific place in Grotmol that discloses a digital picture correlated with an instruction set that is modified. *Id.*, 48:5-49:17.

Dr. Janet attempted to supplement his opinions regarding claim 17 at his deposition by claiming that opinions he had not explicitly disclosed were somehow still contained in his declaration, but that is inappropriate, particularly because the Petition does not rely on them. *See* Ex. 2008, 48:17-49:17. That detracts from his credibility for claim 17.

7. Claim 18: Grotmol Does Not Disclose the Claimed Modifying Instruction Sets, Learning the Modified Instruction Sets, Determining the Modified Instruction Sets, and Causing Operations based on the Modified Instruction Sets

Claim 18 depends from claim 4 and requires:

modifying: the first one or more instruction sets for operating the first device, or a copy of the first one or more instruction sets for operating the first device . . . learning the first one or more digital pictures correlated with the modified the first one or more instruction sets for operating the first device . . . determining the modified the first one or more instruction sets for operating the first device based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures . . . causing the first device or the second device to perform one or more operations defined by the modified the first one or more instruction sets for operating the first device.

Ex. 1001, Claim 18 (emphasis added).

Grotmol first fails to disclose “modifying: the first one or more instruction sets for operating the first device.” Ex. 2007, ¶¶103-110. Grotmol only discloses correcting device behavior by issuing new commands in certain instances and does not disclose that any instruction sets are *modified*. Ex. 2007, ¶¶104-110. Petitioner points to Grotmol’s disclosure of controlling a robot’s trajectory to compensate for position and orientation mismatch and that new commands may be issued based on shifted images, Petition 43-44 (citing Ex. 1005, 42:46-43:3). But issuing *new* commands based on shifted images does not disclose modifying instruction sets, as required by claim 18. Ex. 2007, ¶¶104-106. *Grotmol does not modify the new commands, and issuing new unmodified commands is fundamentally different than modifying existing instruction sets* in claim 18. Therefore, Petitioner has not

established that Grotmol discloses that the instruction sets in training sets are *modified. Id.*

Petitioner next points to Grotmol's disclosure that commands from the training sets may be combined with the output from a PID controller as disclosing the claimed modifying instruction sets. Petition, 44 (quoting Ex. 1005, 43:5-11). But Grotmol's disclosure of combining motor commands with the output of a PID controller to stabilize the robot does not disclose modifying instruction sets. Ex. 2007, ¶¶105-106. The motor commands, or instruction sets, are *never themselves modified but instead are only combined* with the output of a PID controller in Grotmol. *Id.* Combining two distinct elements is different than modifying either element itself. *Id.* Petitioner has failed to establish that the instruction sets in Grotmol's training sets are actually modified or changed.

Petitioner next points to Grotmol's disclosure of an override mode and argues that "[w]hen the robot remembers the new command, overriding the previous one, the robot learns the first digital picture correlated with the modified instruction set." Petition, 44-45. Petitioner is wrong because Grotmol never discloses that the actual instruction set is modified during override mode. Instead, Grotmol discloses that the robot will "try to remember" a user-initiated, whole, unmodified command, Ex. 1005, 23:20-22, but Grotmol never shows that this process involves modifying any command. Ex. 2007, ¶¶106-107. *Grotmol is replacing an original, whole,*

unmodified command with another (i.e., overridden), whole, unmodified command. Replacing an element with another element is fundamentally different than modifying the original element. *Id.* Petitioner has failed to show that Grotmol’s override mode discloses the claimed modifying of an instruction set as required in claim 18. *Id.*

Grotmol next fails to disclose the claimed “learning the first one or more digital pictures correlated with the modified the first one or more instruction sets for operating the first device.” Ex. 2007, ¶¶107-110. Since Grotmol fails to disclose modifying an instruction set as discussed above, it also fails to disclose learning the modified instruction set, and especially learning the modified instruction set correlated with a digital picture as required by claim 18. *Id.* ***Grotmol does not disclose learning any modified instruction set*** and Petitioner does not point to anything in Grotmol that discloses this element of claim 18.

Grotmol further fails to disclose “determining the modified the first one or more instruction sets for operating the first device.” Ex. 2007, ¶¶108-110. As just discussed, since Grotmol does not disclose that the learned instruction sets are modified, Grotmol cannot and does not disclose that a ***learned modified instruction set is determined*** as required by claim 18. *Id.*

Petitioner contends that “Grotmol discloses that the motor commands at a given step may be obtained from the training buffer based on the best matching

image, and motor commands may be modified to compensate for, e.g., ‘position mismatch’ and ‘orientation mismatch.’” Petition, 46. Petitioner’s statement that “motor commands may be modified to compensate for, e.g., position mismatch and orientation mismatch” is Petitioner’s own summary not supported in Grotmol, and is conclusory. Petitioner is also wrong because the *modifying of motor commands in Petitioner’s statement occurs after obtaining (i.e. determining) the motor commands from the training buffer*, whereas *the instruction sets in claim 18 are modified before they are learned, and especially before they are determined*. Nothing in Grotmol even contemplates, let alone discloses, such modifying of instruction sets, learning them as modified, and determining them after they have been modified and learned. Ex. 2007, ¶¶109-110.

Grotmol finally fails to disclose “causing the first device or the second device to perform one or more operations defined by the modified the first one or more instruction sets for operating the first device.” Ex. 2007, ¶110. Petitioner’s only argument that Grotmol discloses the claimed causing operations defined by the modified instruction sets is that the device’s actual operation can be modified. Petition, 46. The inquiry here is not whether a device’s operation *can or cannot* be modified, but about *the device’s operation that is based on unmodified instructions that Grotmol actually discloses*. As discussed above, since Grotmol never discloses modifying an instruction set, learning the modified instruction set, and determining

the learned modified instruction set, Grotmol also fails to disclose that any operation defined by the modified, learned, and determined instruction set was performed. Ex. 2007, ¶110. Grotmol cannot and does not disclose that *an instruction set that Grotmol fails to disclose as modified is somehow learned as modified, determined as modified, and that an operation defined by that instruction set that Grotmol fails to disclose as modified would be performed*, as required by claim 18. *Id.*

8. Claim 23: Grotmol Does Not Disclose the Claimed Connections

Claim 23 depends from claim 4 and requires:

wherein the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device include the *first one or more digital pictures connected, using at least one or more connections, with the first one or more instruction sets* for operating the first device.

Ex. 1001, Claim 23 (emphasis added).

Grotmol fails to disclose the claimed “first one or more digital pictures connected, using at least one or more connections, with the first one or more instruction sets” under Patent Owner’s proposed construction of “connection.” Ex. 2007, ¶¶111-113. When properly construed, each claimed connection is a relationship that includes a link. *Supra* Section V.A. Grotmol does not disclose such connections. Ex. 2007, ¶¶112-113. Grotmol’s disclosure of *mere associations*

between images and instruction sets fails to disclose the claimed connections under Patent Owner’s construction of that claim term. *Id.*

As discussed above, in the context of the ’583 patent, including in light of the claims, specification, and drawings, a “connection” should be construed as a “relationship that includes a link.” *Supra* Section V.A; Ex. 2007, ¶¶53-59. Petitioner’s argument that “[a]n association between a digital picture and an action (i.e., instruction set) constitutes a ‘connection’ between the two,” Petition, 53, is wrong. Ex. 2007, ¶¶112-113. The connections disclosed in the ’583 patent are not simply associations but are relationships that include links to connect two elements. *Id.* In Grotmol, an *image is only associated with the motor control command, not connected including a specific connection (even under that term’s plain and ordinary meaning), let alone connected in a relationship that includes a link.* *Id.* As a result, Grotmol fails to disclose the claimed connections and therefore does not anticipate claim 23.

9. Claim 29: Grotmol Does Not Disclose the Claimed Detecting of Objects, Generating Representations of the Detected Objects, and Generating New Digital Pictures From the Representations of the Detected Objects

Claim 29 depends from claim 4 and requires, among other things:

wherein the *generating the new one or more digital pictures includes: detecting one or more objects* in the first device’s surrounding or the second device’s surrounding; *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.

Ex. 1001, Claim 29 (emphasis added).

First, Grotmol fails to disclose “generating the new one or more digital pictures includes: detecting one or more objects in the first device’s surrounding or the second device’s surrounding.” Ex. 2007, ¶¶114-118. Grotmol discloses simply ***capturing images (that happen to have some objects depicted therein) by a camera*** and not the specifically recited detecting of objects outside of or in addition to capturing the image to then use the detected objects in generating the new image. Ex. 2007, ¶¶115-118. While Petitioner points to Grotmol’s generic disclosure of object detection and recognition, Petition, 59, and that images may generally comprise representations of objects, *id.*, object detection and recognition and object representations are not used to generate a new digital picture as required by claim 29. The detected objects in claim 29 are separate entities from the new generated digital picture (as recited in claim 29) and are detected prior to the generating of the new digital picture in order to then be used to generate the new digital picture, whereas objects in Grotmol are depicted in and are a part of the image captured by a camera and are never detected to be used to generate the image. Ex. 2007, ¶¶115-

116. Nothing in Grotmol discloses that the *new digital picture is generated using the separate previously detected objects* recited in the first step of claim 29.

Grotmol also fails to disclose “generating the new one or more digital pictures includes: generating one or more representations of the one or more objects”. Ex. 2007, ¶¶116-118. “Generating one or more representations of the one or more objects” in claim 29 refers to the “one or more objects” detected in the prior step of “detecting one or more objects in the first device’s surrounding or the second device’s surrounding,” which Grotmol does not disclose as discussed above. *Id.* Thus, Grotmol cannot and does not disclose generating one or more representations of the detected one or more objects that Grotmol has not disclosed. *Id.* Petitioner’s assertion that “autonomous operation of a robot may be based in part on recognized objects and their characteristics and that the images may include representations of the objects detected in the device’s surroundings,” Petition, 60, talks about operation of a robot that may be based in part on recognized objects, not that a new digital picture is generated using detected objects and using generated representations of the detected objects as claimed in claim 29. Grotmol captures images by a camera but *never detects objects in those images in order to generate representations of the detected objects in order to then generate a new digital picture* as required by claim 29. Ex. 2007, ¶¶116-118.

Finally, Grotmol fails to disclose “generating the new one or more digital pictures includes: generating the new one or more digital pictures that include the one or more representations of the one or more objects.” Ex. 2007, ¶¶117-118. “Generating the new one or more digital pictures that include the one or more representations of the one or more objects” refers to the “one or more representations of the one or more objects” generated in the prior step of “generating one or more representations of the one or more objects,” which Grotmol does not disclose as discussed above. *Id.* Thus, Grotmol cannot and does not disclose generating the new one or more digital pictures that include the one or more representations of the detected one or more objects that Grotmol has not disclosed. *Id.* Grotmol captures images by a camera but *never detects objects in those images in order to generate representations of the detected objects in order to then generate a new digital picture based on those representations of the detected objects* as required by claim 29. Ex. 2007, ¶¶117-118.

Claim 29 provides a specific method for generating a new digital picture that is different than simply capturing images (that happen to have some objects depicted therein) by a camera. Ex. 2007, ¶¶115-118. First, an object is detected in the first device’s or second device’s surroundings through processing of information from one or more sensors including, in some embodiments, images from a camera. Next, also through processing, *a representation of the detected object is generated that is*

separate from the sensory information (i.e. original image, etc.) in which the object is detected (note that detected objects and their generated representations are specifically recited as separate from the new digital picture being generated from them in claim 29). Finally, also through processing, the new digital picture is generated to include the representations of the detected objects. This is in contrast to Grotmol's disclosure of capturing an image by a camera that happens to have some objects depicted in the captured image. Nothing in Grotmol discloses a process of *detecting objects, generating representations of the detected objects, and then generating a new picture based on the representations of the detected objects. Id.*

10. Claim 31: Grotmol Does Not Disclose the Claimed One Instruction Set Being a Representation of Another Instruction Set

Claim 31 depends from claim 4 and requires, among other things:

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.*

Ex. 1001, Claim 31 (emphasis added).

Grotmol fails to disclose “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.” Ex. 2007, ¶¶119-120. Petitioner points

to the fact that in Grotmol the “system may be configured to remove a learned behavior,” and that “[w]hen the system then uses the reloaded configuration, the system is generating the first instruction set as a representation of a second instruction set.” Petition, 61-62. This statement is Petitioner’s own summary not supported in Grotmol, and it is conclusory. Petitioner is wrong since “remove a learned behavior,” and “reloaded configuration” are vastly different concepts than the first instruction set being generated as a representation of a second instruction set. Ex. 2007, ¶¶119-120. In fact, Petitioner’s “remove a learned behavior,” and “reloaded configuration” do not mention anything about one instruction set that represents another instruction set. For example, an instruction set that represents another instruction set in claim 31 includes a more generalized instruction set that can be used more flexibly on multiple different types of devices. Ex. 2007, ¶120. Grotmol’s disclosure of simply obtaining an instruction set executed by the robot does not even contemplate, let alone disclose *another instruction set that is a representation of the original instruction set*.

VII. CONCLUSION

For the foregoing reasons, Petitioner has failed to prove by a preponderance of the evidence that any of claims 7, 9, 14-18, 23, 29, and 31 are unpatentable. Patent Owner respectfully requests that the Board confirm the patentability of these claims and enter judgment against Petitioner.

Dated: April 15, 2024

Respectfully submitted,

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CERTIFICATION OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned **PATENT OWNER'S RESPONSE** specified in 37 C.F.R. § 42.24 have 8,651 words, in compliance with the 14,000 word limit set forth in 37 C.F.R. §42.24(b)(1). This word count was prepared using Microsoft Word 2016.

Dated: April 15, 2024

By: /Arvind Jairam/
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CERTIFICATION OF SERVICE

The undersigned hereby certifies that a copy of this **PATENT OWNER'S RESPONSE** and supporting exhibits have been served on Petitioner via email on the following counsel of record for Petitioner:

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