

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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TESLA, INC.,  
Petitioner

v.

AUTONOMOUS DEVICES, INC.,  
Patent Owner

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Case: IPR2023-01173  
U.S. Patent No. 11,055,583

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**PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE**

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**LIST OF EXHIBITS**

|        |                                                                                                                                                                                                                                                                                                                 |
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| EX1001 | U.S. Patent No. 11,055,583 (the “’583 patent”)                                                                                                                                                                                                                                                                  |
| EX1002 | Prosecution File History of U.S. Patent No. 11,055,583                                                                                                                                                                                                                                                          |
| EX1003 | Declaration of Jason Janet, Ph.D.                                                                                                                                                                                                                                                                               |
| EX1004 | Curriculum Vitae of Jason Janet, Ph.D.                                                                                                                                                                                                                                                                          |
| EX1005 | U.S. Patent No. 9,604,359 (“Grotmol”)                                                                                                                                                                                                                                                                           |
| EX1006 | [RESERVED]                                                                                                                                                                                                                                                                                                      |
| EX1007 | U.S. Patent No. 8,639,644 (“Hickman”)                                                                                                                                                                                                                                                                           |
| EX1008 | Service, Robert F., <i>Minds of Their Own</i> , Sci. Magazine. Oct. 10, 2014,346(6206):182-183, available at, <a href="https://www.usna.edu/AcResearch/_files/documents/Science_Minds_of_Their_own_182.full1.pdf">https://www.usna.edu/AcResearch/_files/documents/Science_Minds_of_Their_own_182.full1.pdf</a> |
| EX1009 | U.S. Patent No. 9,283,674 (“Hoffman”)                                                                                                                                                                                                                                                                           |
| EX1010 | Supplemental Declaration of Jason Janet, Ph.D.                                                                                                                                                                                                                                                                  |
| EX1011 | Transcript of Deposition of Eli Saber, Ph.D., IPR2023-01172 and -01173 (June 21, 2024)                                                                                                                                                                                                                          |
| EX1012 | Patent Owner’s Response, IPR2023-01055 (U.S. Patent No. 11,238,244), Paper 26 (March 7, 2024)                                                                                                                                                                                                                   |
| EX1013 | [RESERVED]                                                                                                                                                                                                                                                                                                      |
| EX1014 | [RESERVED]                                                                                                                                                                                                                                                                                                      |
| EX1015 | U.S. Patent No. 10,607,134 (“Cosic ’134”)                                                                                                                                                                                                                                                                       |
| EX1016 | Transcript of Deposition of Eli Saber, Ph.D., IPR2023-01054 (U.S. Patent No. 10,452,974) (May 16, 2024)                                                                                                                                                                                                         |
| EX1017 | [RESERVED]                                                                                                                                                                                                                                                                                                      |
| EX1018 | Selected Excerpts from the New Oxford American Dictionary (3d Ed.) (2010)                                                                                                                                                                                                                                       |

|        |                                                                                |
|--------|--------------------------------------------------------------------------------|
| EX1019 | Selected Excerpts from Webster's New World College Dictionary (4th Ed.) (2012) |
| EX1020 | U.S. Pub. No. 2015/0258683 ("Izhikevich-683")                                  |
| EX1021 | U.S. Pub. No. 2014/0277718 ("Izhikevich-718")                                  |
| EX1022 | U.S. Pub. No. 2014/0089232 ("Buibas")                                          |

## **I. INTRODUCTION**

The Patent Owner's Response ("POR") fails to rebut Petitioner's ("Tesla") showing in the Petition that the Challenged Claims of the '583 Patent are unpatentable. Patent Owner's ("Autonomous Devices" or "PO") arguments mischaracterize the Petition's obviousness theories, disregard and distort pertinent teachings in the prior art, and rest on flawed claim interpretations.

## **II. THE POR FAILS TO REBUT THE PETITION'S SHOWING THAT CLAIMS 10, 11, 25, 27, AND 30 ARE OBVIOUS**

### **A. Ground 1: Obviousness Based on Grotmol in View of the Knowledge of a POSITA**

#### **1. Claim 10**

PO's argument that Grotmol "fails to disclose any second learning process or second user" is wrong. POR, 11. As described below, Grotmol discloses or renders obvious both (i) multiple learning processes and (ii) multiple users. The claimed "second learning process that includes operating the first device at least partially by a second user" would have been obvious based on Grotmol. EX1010, ¶¶65-67; Pet., 23-25.

#### **(a) Grotmol's Multiple Learning Processes**

PO's assertion that "Grotmol only discloses ... one learning process" is unsupported and false. POR, 11; EX1010, ¶¶68-71. Even a brief review of Grotmol confirms that its robots are trained to perform *multiple* tasks through *multiple*

learning processes, e.g., according to a “*hierarchical*” learning scheme that facilitates training of both simple and complex tasks. EX1010, ¶68; Pet., 23-25. Despite the prominence of these teachings in Grotmol, however, PO never once addresses them in the POR nor provides any reasons why Grotmol allegedly discloses no more than a single learning process. Tellingly, PO’s argument for claim 10 contains no citations to Grotmol *at all*. See POR, 10-16; EX1010, ¶68.

As explained in the Petition, “Grotmol discloses that multiple learning processes can be done to train multiple behaviors for the robot, including ‘simple tasks’ and ‘complex tasks.’” Pet., 24-25 (citing EX1005, 24:17-67, 26:1-20; EX1003, ¶341). In particular, Grotmol applies a “hierarchical” learning framework in which the robot learns complex tasks/behaviors through the individual training of multiple simpler (sub-)tasks/behaviors that each form part of the complex task. EX1005, 10:35-44; *generally id.*, 24:17-27:17, FIGS. 9-11B. This approach allows different tasks/behaviors to be implemented by different ones of a collection of adaptive controllers (also referred to as “modules”) on the robot, each of which can be trained in a different learning process. EX1010, ¶68. FIG. 10D (reproduced below), for example, shows a pair of “[h]igh-level” adaptive controllers 1 and 2 for more complex tasks that selectively activate different low-level tasks/behaviors implemented by low-level controllers 1-N:

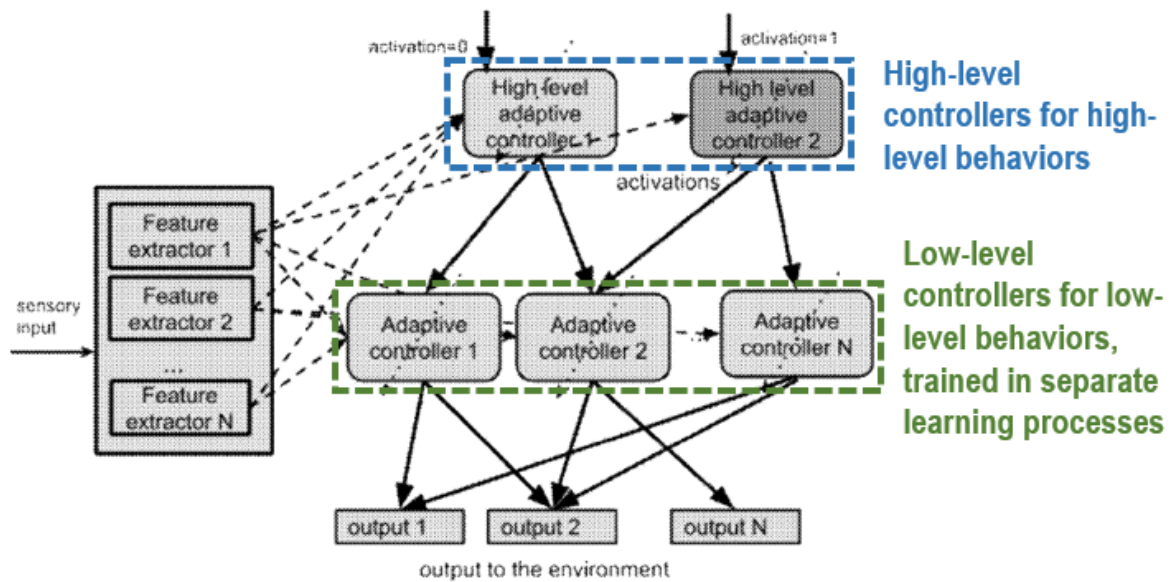


FIG. 10D

EX1005, FIG. 10D (annotated); *see also id.*, 24:29-27:17, FIG. 11B.

The separate training of different tasks/behaviors on different controllers confirms that Grotmol discloses multiple “learning process[es].” EX1010, ¶69. For instance, Grotmol explains that “[w]hile training a particular behavior, *the user may concentrate on a particular behavior and may not show any examples of other behaviors* thus making a prediction task for the classifier substantially easier.” EX1005, 24:57-61. Then, “*after [a] user is done training a particular behavior, he may create another module and activate it*” such that “[t]he system may be configured to *learn [a] second behavior* from the user.” *Id.*, 26:1-6. In one example that involves training the robot to fetch a target object (i.e., a relatively complex task/behavior), a first controller is trained in a first learning process to “control the robot ... to approach the target while avoiding [] obstacles (‘Behavior 1’)” while a

second controller is trained in a second learning process to “control the robot ... to turn and grasp the target (‘Behavior 2’).” *Id.*, 25:30-26:34. A separate higher-level controller orchestrates the overall fetch behavior by selectively activating the controllers for the lower-level tasks of the fetch behavior under appropriate conditions. *Id.*

As further evidence of Grotmol’s multiple learning processes, Grotmol explains that “[a]fter the user is done training a single complex behavior, **he may train another** switcher to switch between different modules and therefore obtain [a] **second complex behavior.**” *Id.*, 26:65-67. Grotmol also explains that a user may individually “reset a module to naive state, revert a module to a particular point in history, delete a module, save/load locally, upload, download, and/or other operations.” *Id.*, 25:54-59. Grotmol’s controllers and their respective tasks/behaviors can thus be trained separately, at different times, and by different methodologies suitable to the respective task. *Id.*; EX1010, ¶70. Even by the standard that PO’s own witness (Dr. Saber) expressed in his deposition for distinguishing between learning processes, Grotmol plainly discloses a second learning process separate from a first learning process as claimed. Indeed, the only factor Dr. Saber considered relevant to distinguishing among separate “learning processes” apart from differences in pictures and instruction sets was whether the learning occurred at different times. EX1011, ¶70; *see also* EX1005, 38:39-42

(Grotmol describing a separate RKNN “learning process” for each controller), 15:24-26, FIG. 8; EX1010, ¶70.

For each of these reasons, Grotmol’s memory stores a knowledgebase that includes at least a first controller/module containing a first one or more digital pictures correlated with a first one or more instructions sets learned in *a first learning process* and a second controller/module containing a second one or more digital pictures correlated with a second one or more instructions sets learned in *a second learning process*.<sup>1</sup> EX1005, 38:39-42, FIG. 8; EX1010, ¶71.

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<sup>1</sup> PO characterizes the “knowledgebase” in claim 10 as storing “mixed knowledge,” in apparent reference to the inclusion of knowledge learned through multiple learning processes and/or users. POR, 14. Grotmol’s knowledgebase stored in memory of the robot (e.g., memory 814) likewise provides mixed knowledge at least because it includes training sets of digital pictures and instructions sets (e.g., motor commands) for multiple tasks/behaviors learned in different learning processes by one or more users. EX1005, 3:36-39, 38:39-42, FIG. 8.

**(b) Grotmol's Multiple Users for Training the Robot in Different Learning Processes**

PO's next argument that "Grotmol only discloses *one user*" and fails to disclose or render obvious "a second learning process that includes operating the first device at least partially by a *second user*" is similarly non-availing. POR, 11; EX1010, ¶¶72-75. Grotmol places no restrictions on the number of users who can train the multiple behaviors for the robot. A POSITA would have understood and found obvious that different users can be involved in training different behaviors of the robot, such as different users for different simple or complex tasks. Pet., 24-25; EX1003, ¶341; EX1010, ¶72.

For example, as discussed above, Grotmol describes a first learning process that involves a user teaching the robot "to approach [a] target while avoiding [] obstacles ('Behavior 1')" and a second learning process that involves a user teaching the robot "to turn and grasp the target ('Behavior 2')." EX1005, 25:30-26:34. Both learning processes are user-led and rely on a user to instruct the robot how to perform the task at hand. *Id.* There is no reason that different users could not lead different learning processes in Grotmol, nor does PO provide any such reasons. EX1010, ¶73; EX1005, 24:19-30; *generally id.* 24:19-27:40. Indeed, switching users would be as simple as handing off the gamepad or other remote device used for controlling the robot from one user to another. EX1005, 33:18-20. It would have been utterly

obvious for multiple users to be involved in training Grotmol's robot both as a matter of common sense, practical collaborative behavior, and as was conventionally done in the art. EX1010, ¶73; *see also* EX1022, [0070]-[0071], [0181] ("groups of users"), [0190], [0194], [0198]; EX1007, 1:39-62. As explained in the Petition, a POSITA would have sought to involve multiple users in training Grotmol's robot at least to benefit from the varying skills and knowledge of the different users in training the robot to perform different tasks/behaviors.<sup>2</sup> Pet., 25; EX1010, ¶¶73-75.

PO's arguments against the obviousness of claim 10 are undermined by its own witness, Dr. Saber, who testified in a related proceeding (IPR2023-01055) that Grotmol's training commands can actually be provided by *multiple users*. EX1016, 166:12-18 ("Question: And so these adaptive controllers can receive commands from different users and then have the outputs; is that right? [Answer] That's correct. I mean, you *receive commands from different users* to change a certain behavior or

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<sup>2</sup> Petitioner also notes that the language in claim 10 directed to a "second user" different from the first does not further define any structure or function of the claimed "system" and is not entitled to patentable weight. Even if it were given weight, it would have been obvious based on the teachings of Grotmol in view of the knowledge of a POSITA.

control a certain behavior or adjust it.”). Dr. Saber’s testimony also aligns Grotmol’s express disclosure that the “BrainOS software platform may be configured to enable *users* to selectively remove a learned behavior.” EX1005, 34:18-21.

PO’s critiques of the Petition’s obviousness analysis are also unfounded. Referencing *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed. Cir. 2016), PO argues that the common knowledge of a POSITA cannot be used to supply the “second user” limitation of claim 10. POR, 14-15. But the present record amply demonstrates obviousness consistent both with the principles expressed in *Arendi* and precedent including *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009). Similar to the claims at issue in *Perfect Web*, the “second user” limitation of claim 10 is exceedingly simple. There is no meaningful hurdle, technical or otherwise, to involving a second user in Grotmol’s training processes. To the contrary, as noted above, this would be accomplished in Grotmol simply by a first user handing over the gamepad or other remote control device used during the first learning process to a second user for use in the second learning process. EX1010, ¶73. The alleged complexities that PO references in the POR are simply not real.

Finally, Dr. Janet’s deposition testimony was entirely consistent with his prior declaration testimony that claim 10 would have been obvious in view of Grotmol. Dr. Janet acknowledged in his deposition that “Grotmol maybe doesn’t explicitly

mention word for word a second user,” but explained that this limitation (and indeed claim 10 as a whole) nonetheless would have been obvious to a POSITA. EX2008, 54:24-55:3-8. Even if the Board finds that Grotmol itself does disclose the second user limitation, this would only reinforce—not defeat—a finding of obviousness. *Real Time Data, LLC v. Iancu*, 912 F.3d 1368, 1373 (Fed. Cir. 2019) (“[I]t is well settled that ‘a disclosure that anticipates under § 102 also renders the claim invalid under § 103, for ‘anticipation is the epitome of obviousness.’”) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

## 2. Claim 11

For claim 11, PO repeats its false mantra that “Grotmol only discloses **one** user operating **one** device in **one** learning process.” POR, 17. But again, as with claim 10, PO’s entire argument for claim 11 is unsupported, lacking even a single citation to Grotmol or any reasoned explanation of its teachings. *See* POR, 16-20; EX1010, ¶¶76-85. The notion that Grotmol provides just one user in one learning process is wrong for each of the reasons described above with respect to claim 10.<sup>3</sup>

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<sup>3</sup> PO’s claim that Grotmol discloses only one **user** is also irrelevant for purposes of claim 11, which specifically provides that the “third device” can be operated in the

*Supra*, Claim 10; EX1010, ¶78. This would have been especially in true in the context of claim 11, which refers to a pair of learning processes that involve operating different devices by the same or different users. EX1010, ¶78.

To be sure, Grotmol does not limit the knowledge provided in its knowledgebase (e.g., in memory 814) to training sets learned on just a single device as alleged. EX1010, ¶79. The Petition cited Grotmol’s teachings that “[t]he trained controller of the robot may comprise a trained configuration configured to enable autonomous operation (e.g., without user input) by the robotic device,” where “[t]he trained configuration may be stored” and “[a] saved configuration may be loaded into the robot being trained thereby providing one or more trained behaviors to the robot.” EX1005, 33:24-30; Pet., 26. Further, a “trained configuration may be loaded to *one or more other robots* in order to provide learned behaviors.” EX1005, 33:30-32. Thus, the training sets and trained configuration stored on a first robot can include training sets learned on another robot (e.g., learned by operating a third robot and shared with the first robot). EX1005, 3:36-39 (describing training sets including

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“second learning process” by either the same (first) user who operated the device in the “first learning process” or by a different (second) user. EX1001, 162:31-36

digital pictures correlated with motor commands learned during training); EX1010, ¶79.

Further, contrary to PO's arguments, a POSITA would have understood and found obvious from Grotmol's disclosure at col. 33:30-32 that Grotmol's knowledgebase can include so-called *mixed knowledge* including training sets learned in a first learning process on a first device and training sets learned in a second learning process on a third device. EX1010, ¶80. For PO's position to hold (i.e., that Grotmol's knowledgebase only stores training sets learned on a single device), one would need to assume that Grotmol's memory only stores a single trained configuration and that any trained configurations learned on the first robot would be flushed from memory when another trained configuration is shared by another robot (e.g., a third device) and saved or loaded on the first robot. EX1010, ¶80. But this is not how a POSITA would have understood Grotmol and is inconsistent with Grotmol's repeated descriptions of its robots storing *multiple* trained configurations from which a desired configuration can be loaded from memory. *Id.*

For example, Grotmol explains that a version of a trained configuration from an earlier time can be loaded from memory in place of the current configuration using an "undo" and/or "time machine" operation. EX1005, 34:18-48. "The undo operation may be effectuated using a timeline comprising, e.g., a plurality of

bookmarks (e.g., shown in FIG. 5) indicative of one or more date/time, context, action, and/or other attributes of association learning.” *Id.*, 34:39-45. The availability of earlier trained configurations indicates that Grotmol’s knowledgebase is not limited to the current configuration, but further includes other configurations and their associated training sets. EX1010, ¶81. Requiring a trained configuration learned on a first robot to be removed from memory when another configuration is loaded from another robot would be inconsistent with Grotmol’s approach to maintaining multiple training configurations in memory, and indeed, neither PO nor Dr. Saber point to any disclosure in Grotmol that would even suggest that the first configuration is removed. *Id.* Grotmol instead explains that “[s]ubsequent to loading of [a] saved configuration, the controller learning process may match process configuration being present during saving of the configuration”—thus indicating that multiple configurations are available to be matched and that the configurations are saved. EX1005, 33:32-35.

Maintaining multiple configurations and training sets from multiple devices in memory also would have been obvious to a POSITA, who would have appreciated that such an approach was common and straightforward in the art by the relatively late timeframe of the ’583 patent. EX1010, ¶82. Indeed, a POSITA would have been familiar with other prior art publications by the same assignee of Grotmol (Brain Corp.) that similarly disclose multiple trained configurations (e.g., brain

images) stored in memory. EX1020, [0153], [0157] (“The user then selects one or more computational *brain images*. The computational *brain images* may be transmitted for local storage on the AM of a robotic device”; “Full *images* may be loaded on to an autonomy module (AM) and run as a self-sufficient control application. ... *[T]wo or more partial computational brain images may be combined to form full computational brain images.*”); EX1021, [0436] (“Network node and connection information for a current task may be *saved for future use* and flushed. *Previously stored network configuration may be loaded* in place of the network node and connection information for the current task.”).<sup>4</sup> The Petition also described multiple reasons that would have motivated a POSITA to provide multiple trained configurations on a robot from different devices. Pet., 26; EX1003, ¶343.

Furthermore, Grotmol’s teaching that “[a] trained configuration may be loaded to one or more other robots in order to provide learned behaviors” does not mean that the receiving robot would discard other trained configurations saved on the robot, especially since multiple trained configurations can themselves be used to perform complex tasks. EX1005, 33:27-32; EX1010, ¶83. As discussed above

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<sup>4</sup> Izhikevich-718 (EX1021) is incorporated by reference in Grotmol. EX1005, 1:27-42.

(claim 10), Grotmol's robots instead use a collection of controllers, each of which provides a trained configuration for one or more different tasks or behaviors learned in a respective learning process. *Id.* Against this backdrop, a POSITA would have understood Grotmol's disclosure at col. 33:30-32 to mean that a trained configuration containing behavior(s) learned on a third robot and loaded on a first robot can be used together with the trained configurations for other controllers—i.e., controllers that Grotmol expressly discloses are learned locally through learning processes on the first robot. EX1010, ¶¶83-84. The result is a knowledgebase on the first robot that includes knowledge learned in learning process on both the first robot and other robots. *Id.*

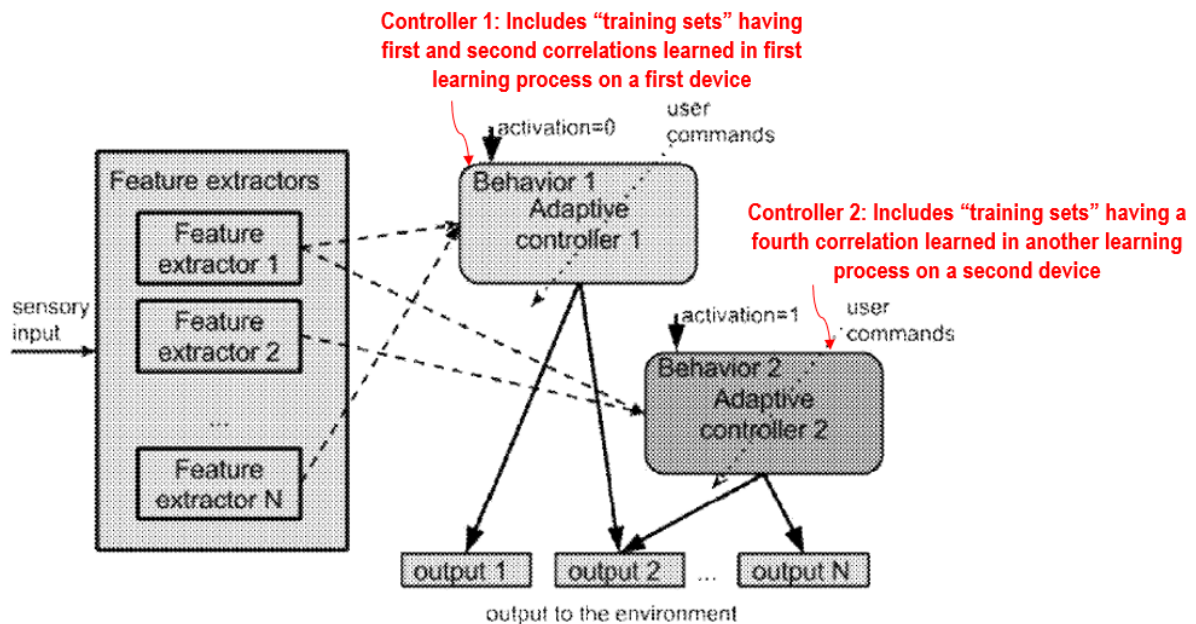


FIG. 10B

EX1004, FIG. 10B (annotated).

To the extent PO argues that Grotmol must provide mixed knowledge within a single controller to render claim 11 obvious, Grotmol does this as well. EX1010, ¶85. This would occur, for example, when the first robot loads a trained configuration from a second robot and a user then modifies the trained configuration through additional training on the first robot. EX1005, 23:12-47 (describing “override” and “correct” modes), 33:30-32; EX1010, ¶85.

PO’s critiques of the Petition’s obviousness analysis are also unfounded. Referencing *Arendi*, PO argues that the common knowledge of a POSITA cannot be used to supply the type of mixed knowledge recited in claim 11. POR, 19. But the record here amply demonstrates obviousness consistent with the principles expressed in *Arendi* and *Perfect Web Techs.* Similar to the claims at issue in *Perfect Web*, the alleged delta between Grotmol and the features recited in claim 11 is narrow and pertain to features that are exceedingly simple (e.g., not deleting a first trained configuration when another configuration is received from another robot). Grotmol thus renders claim 11 obvious. *Id.*

Finally, Dr. Janet’s deposition testimony was entirely consistent with the opinion from his first declaration (EX1003) that claim 11 would have been obvious based on Grotmol. Dr. Janet acknowledged in his deposition that to the extent “there might be a small delta” in Grotmol’s express disclosure, claim 11 nonetheless would have been obvious to a POSITA. EX2008, 59:23-60:6. And even if Grotmol

sufficiently discloses all limitations of claim 11, this would only reinforce—not defeat—a finding of obviousness. *Real Time Data*, 912 F.3d at 1373.

**B. Ground 2: Obviousness Based on Grotmol in View of Hickman**

**1. The Grotmol-Hickman Combination**

**(a) PO Errs in Contending that Hickman Teaches Away from a Knowledgebase that Correlates Digital Pictures with Instruction Sets**

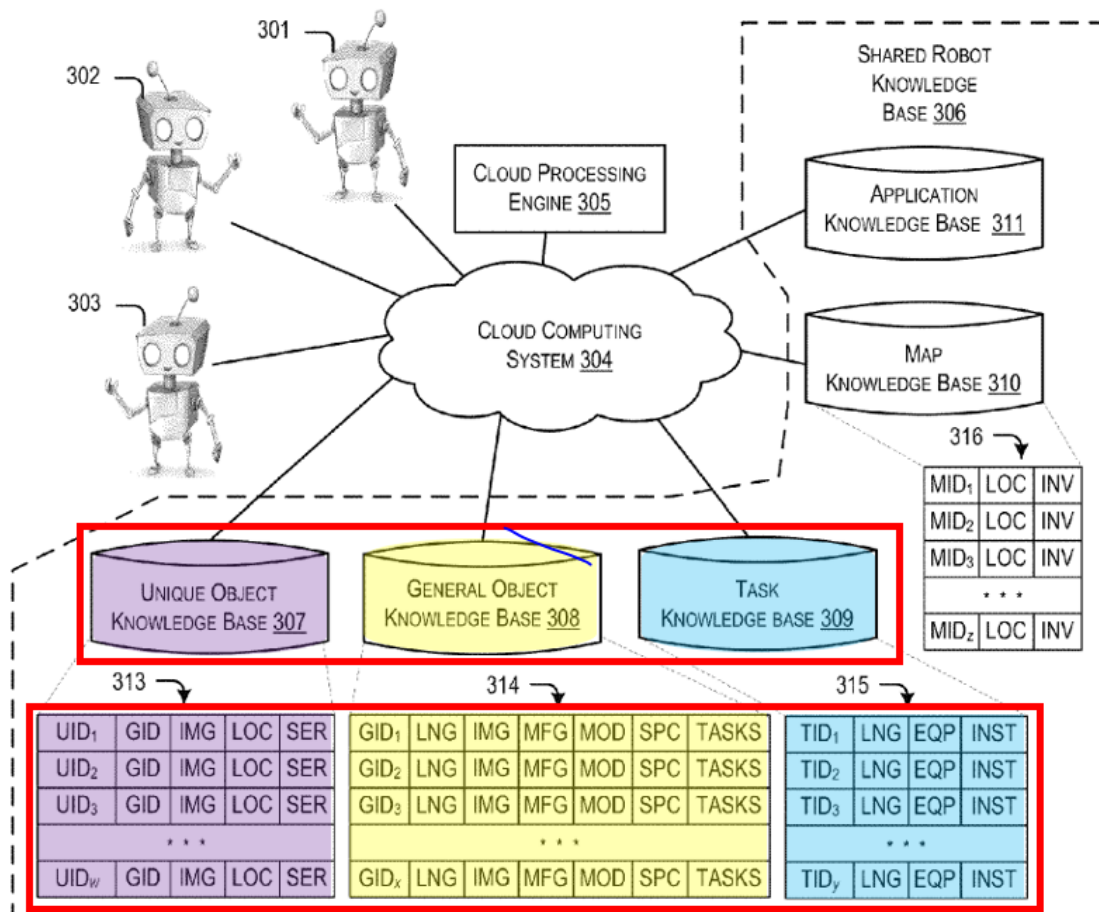
PO argues that Hickman would not have been obvious to combine with Grotmol because Hickman “stor[es] instruction sets and images *separately in separate knowledgebases* (images in Unique Object Knowledge Base 307 and instructions in Task Knowledge Base 309[] ...), which a POS[IT]A would have found to be incompatible with Grotmol’s disclosure of training sets or correlations with images and instruction sets correlated and stored *together*.” POR, 21. Not so. EX1010, ¶¶86-91.

As an initial matter, the specific data structures and organization of Hickman’s knowledgebases is not relevant to the Grotmol-Hickman combination because the combination proposed in the Petition never relied upon or even purported to incorporate the specific data structures or organization of Hickman’s knowledgebases. Pet., 27-37; EX1010, ¶87. The Petition instead focused on applying Hickman’s suggested use of a “shared robot knowledgebase” to facilitate knowledge sharing between robots through a cloud computing system. *Id.* The

Petition was clear that “[i]n the combination of Grotmol and Hickman, *the training configuration learned by operation of a robot described in Grotmol* would be uploaded to the server containing the ‘shared robot knowledge base’ as described in Hickman.” Pet., 33. Thus, the knowledgebase in the combination stores the robot’s “training configuration” as described in Grotmol—i.e., a training configuration that includes training sets comprised of digital pictures correlated with instruction sets. *See* EX1005, 3:35-39; EX1010, ¶87. PO’s search for insignificant differences between the references based on features that are not even part of the combination is without merit as “[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference....” *Allied Erecting v. Genesis Attachments*, 825 F.3d 1373, 1381 (Fed. Cir. 2016).

Even if the details of Hickman’s knowledgebases were considered, Hickman still would not “teach away” from the combination given that Hickman never criticizes correlated images/instruction sets like those described in Grotmol. *Incept LLC v. Palette Life Scis., Inc.*, 77 F.4th 1366, 1375 (Fed. Cir. 2023) (“[A] reference does not teach away if it merely expresses a general preference for an alternative invention but does not criticize, discredit or otherwise discourage investigation into the invention claimed”) (citations omitted); EX1010, ¶88.

Even more problematic, PO’s “teaching away” argument flows entirely from mischaracterizations of Hickman and disregard of pertinent teachings in Hickman that that are flatly inconsistent PO’s assumption that Hickman always stores images and instruction sets in separate, uncorrelated knowledgebases. EX1010, ¶89. As shown below in FIG. 3, Hickman discloses a data structure 314 for a general object knowledge base 308 (both highlighted in yellow). EX1007, 15:28-37. The data structure 314 includes, among other data, object identifier (GID), image data (IMG), and task data (TASKS). EX1007, 15:28-37.



EX1007, FIG. 3 (annotated).

The task data (TASKS) “may correspond to tasks that can be performed with the object corresponding to the general object identifier (GID);” “defines the types of interactions that a robot may execute with the physical object corresponding to the general object identifier (GID);” and may “include instruction code for controlling and operating” a robot.” EX1007, 18:34-19:34. Hickman explains that “[i]n some embodiments where the task data (TASKS) includes robot instruction code for performing tasks, the shared robot knowledge base 304 [sic] **may not require a separate task knowledge base 309**,” although, in other embodiments, the task data “can be looked up in a separate task knowledge base 309.” EX1007, 19:30-38. Thus, Hickman discloses embodiments in which task data that instructions sets is provided in the **same knowledgebase** (e.g., general object knowledge base 308) as the images, and the images and tasks are correlated in the data structure 314. EX1010, ¶89. PO’s argument that Hickman is somehow limited to “storing instruction sets and images separately in separate knowledgebases” contradicts Hickman’s disclosure. EX1010, ¶89.

To the extent PO argues that only the unique object knowledge base 307 should be considered in the Grotmol-Hickman combination (which Petitioner does not argue and Petitioner’s combination is not limited to), Hickman teaches that “[v]arious embodiments of the unique object knowledge base 307 may contain more

or less data corresponding to a particular unique object identifier (UID). For example, in some embodiments, the unique object knowledge base 307 may have many more additional categories of data 15 than the categories shown in conceptual data structure 313.” EX1007, 12: 5-18. Thus, Hickman’s disclosure, even if limited to the use of the unique object knowledge base 307, would not have taught against the combination of Grotmol and Hickman since Hickman contemplates the addition of other fields to the unique object knowledge base 307 and does not exclude the addition of task data. EX1010, ¶90.

Finally, but significantly, the Petition specifically referenced Hickman’s “shared robot knowledge base” (e.g., knowledge base 306) when describing the combination—i.e., a higher-order knowledge base that itself encompasses each of the lower-order knowledge bases 307, 308, and 309. EX1007, FIG. 3; Pet. 27-28. Regardless of how data is stored across knowledge bases 307-309, the data is nonetheless all contained within the higher-order knowledge base (e.g., 306), and images for both individual unique objects and general objects are correlated with tasks in this knowledge base at least through the UIDs, GIDs, and TIDs. EX1007, FIG. 3; *generally id.*, 10:37-22:51; EX1010, ¶91.

**(b) PO Fails to Rebut the Petition’s Rationales for Combining Grotmol and Hickman**

The Petition provided multiple reasons that a POSITA would have been motivated to combine Grotmol with Hickman, including to achieve the known benefits of a knowledgebase like those described in Hickman and a 2014 Science Article. Pet., 28-29. For example, the Petition explains that shared robot learning would “allow far-flung robots to share those lessons and skills” and distribute computer processing across a cloud computing system, among various other benefits. *Id.* ***These benefits are entirely unrebutted by PO.*** Indeed, the combination of Grotmol and Hickman is the predictable result of combining prior art elements according to the known methods disclosed in Grotmol and Hickman. PO’s “hindsight”-based arguments are without merit. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 at 424 (2007).

**2. Claim 25**

PO’s arguments challenging the obviousness of claim 25 are deficient for many of the same reasons as those addressed above. *Supra*, Section II.B.1; EX1010, ¶¶92-94. For instance, PO again focuses on Hickman’s allegedly “simple knowledgebase that includes ***uncorrelated*** images and instruction sets.” POR. 26. But this characterization of Grotmol is both inaccurate and immaterial to the proposed combination. *Supra*, Section II.B.1; EX1010, ¶94. PO also argues that

claim 25 “requires a sophisticated approach where knowledge is stored and processed using instruction sets correlated with a digital picture in a specific manner and ultimately transferred from one device to be used on another device.” POR, 26-27. While it is unclear what “sophisticat[ion]” is required, the Grotmol-Hickman combination communicates “trained configurations”—including digital pictures correlated with instruction sets as described in Grotmol—from a first device to a second device via a server as suggested by Hickman and consistent with the requirements of claim 25. EX1010, ¶94; Pet., 30-33. Moreover, Hickman demonstrates that the sharing of learned behaviors and instructions for autonomous devices was well-known in the art. EX1007, 11:30-41. Storing and sharing digital pictures along with instruction sets is disclosed by both Grotmol and Hickman. *See e.g.*, EX1005, FIGS. 2, 4A, 4B, 3:27-39, Abstract, 8:66-9:3, 10:23-26, 38:36-58, 39:13-22; EX1005, FIGS. 3, 4, 13:35-24:64; EX1010, ¶94.

### **3. Claim 27**

PO’s arguments challenging the obviousness of claim 27 suffer from several of the same deficiencies as those addressed above with respect to claims 10, 11, and 25. EX1010, ¶¶95-100.

First, PO’s arguments based on Hickman’s alleged “failure to disclose and teaching away from ... the claimed correlation of the claimed digital picture with

the claimed instruction set” are both incorrect and irrelevant for the reasons discussed above. *Supra*, Section II.B.1(a); EX1010, ¶98.

Second, PO’s arguments that it would not be obvious to implement a “knowledgebase that includes mixed knowledge” from multiple devices lacks merit for at least the reasons discussed above with respect to claim 11. *Supra*, Section II.A.2 (Claim 11); EX1010, ¶99. Additionally, as described in the Petition, Hickman describes a cloud-based, shared robot knowledgebase that would improve the ability of Grotmol’s robots to share knowledge and to operate based on mixed knowledge learned across multiple devices. Pet., 27-30, 34-37; EX1010, ¶99.

Third, PO’s arguments that Grotmol-Hickman combination does not provide the claimed determination of instruction sets for operating a third device based on “at least partial match” between digital pictures and, in response, causing a fourth device to perform operations defined by those instructions sets also fall based on PO’s erroneous assumptions that the combination lacks a mixed knowledgebase. EX1010, ¶100. As discussed above (claim 11) and in the Petition, the Grotmol-Hickman combination adds a shared knowledgebase in the cloud that includes trained configurations including correlated digital pictures and instructions sets learned on multiple devices (e.g., including a first device and a third device). Pet., 9-10, 27-30, 34-37. The trained configurations can be provided to any other robot, including a fourth device. *Id.* When a match is determined between pictures newly

acquired by the fourth device and pictures correlated with the instruction sets learned on the third device as described in Grotmol, the fourth device would perform operations defined by the correlated instruction sets. EX1007, 26:14-26, 26:57-27:6, 26:38-56, 26:66-27:27, Abstract, FIG. 4; EX1005, 3:35-39, 39:23-26, 43:5-11; EX1010, ¶100.

### **C. Ground 3: Obviousness Based on Grotmol in view of Hoffman**

#### **1. The Grotmol-Hoffman Combination**

PO wrongly contends that a POSITA would not have combined Grotmol with Hoffman because “Grotmol discloses a system for *autonomous* robot operation, whereas Hoffman is a system for *user-controlled (i.e., manual)* robot operation.” POR, 36 (emphasis in original); EX1010, ¶¶101-102. The alleged dichotomy between autonomous and user-controlled operation in the two references is simply inaccurate. Hoffman explains that “the user 10 can select different levels of human control over the robot 200, ranging from a teleoperation mode, in which the user 10 directly controls the ... robot 200, to autonomous operation[] ... .” EX1009, 11:31-36. Grotmol similarly provides different operating modes that involve varying degrees of user input for both training and autonomous operation. EX1005, 33:15-24, 21:64-23:29, Table 3.

PO contends that “Petitioner fails to explain how the map in Hoffman would be used with the digital pictures claimed in Grotmol” (POR, 36-37), but the Petition

was clear that the combination uses “Hoffman’s augmented map generation with Grotmol’s autonomous robotic system in order to provide more detailed information about the robot’s surroundings to the user.” Pet., 39-40; EX1010, ¶102. The motivations and analysis set forth in the Petition confirm that the combination would have been obvious. *KSR*, 550 U.S. at 417 (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious ...”).

## **2. Claim 30**

PO begins its argument for claim 30 by addressing base claim 29, but in so doing, PO mischaracterizes base claim 29 in arguing that it requires a causal chain of “detect[ing] objects in [the] images in order to generate representations of the detected objects in order to then generate a new digital picture.” POR, 40; EX1010, ¶¶103-104. Nothing in claim 29 in fact requires that object detection be performed “in order to generate representations of the detected objects” or that the object representations be generated based on or before detecting the objects. *Mformation*

*Techs.*, 764 F.3d at 1398-99; EX1010, ¶¶60-62. Dr. Saber could not even identify support for such a method in the '583 patent.<sup>5</sup> EX1011, 65:9-67:1.

Even if claim 29 were interpreted to require that a new digital picture be generated using a previous detection of an object, Grotmol would still disclose and render obvious these limitations. EX1010, ¶¶60-62. For example, in FIG. 20A, digital picture 2000 is acquired at time t1 and picture 2010 is acquired at a later time t2. EX1005, 38:43-39:12, FIG. 2A. Objects such as tree 2002, rectangle 2004, and ball 2008 can be detected from the earlier picture 2000. EX1005, 10:23-34 (“state of the environment (e.g., object size, location)”), 8:57-9:3 (“object recognition”), 9:41-52 (“object recognition and/or classification”), 7:60-63 (“representation of an object edge”), 28:14-40 (“object, at particular locations in the image”). Grotmol explains that objects like those detected in picture 2000 at time t1 are among features that Grotmol uses to determine a next control action or behavior such as to turn the robot or to perform a target tracking or grasping task. EX1005, 10:23-34, 28:14-40,

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<sup>5</sup> The '583 patent does disclose detection of objects from a new digital picture, but that is different than the new digital picture being “generated using the separate previously detected objects” as allegedly required by claim 29. *E.g.*, EX1001, 86:52-54, 87:3-5, 88:22-27.

23:3-17, 24:31-25:5, 25:30-42, 46:50-13 (“compare individual features”), FIG. 15. The objects detected in picture at time t1 thus cause the robot to perform actions (e.g. turn) that position the robot to generate picture 2010 (e.g., a new digital picture) at time t2 that includes the detected objects from picture 2000, although from a different perspective. EX1005, 38:43-39:12. The new digital picture 2010 includes representations of the earlier detected objects, and generating the new digital picture 2010 includes generating representations (e.g., depictions) of the objects in the digital picture 2010. EX1005, 38:54-55 (“Images 2000, 2010 may comprise object representations ...”), 38:65-66 (“object representations ... may appear”); EX1010, ¶¶60-62. Grotmol thus discloses each of the steps recited in claim 29. *Id.*

PO’s arguments directed to the additional limitations in claim 30 fare no better. EX1010, ¶105. PO asserts that “Grotmol only discloses detecting objects but does not disclose detecting positions or locations of those objects. But the Petition cited Grotmol’s teachings that “object ... location” is detected as part of the context for a task and that objects are located as part of a fetch task/behavior that includes “find[ing] an object, grasp[ing] it, and bring[ing] it back to the base.” EX1005, 10:23-34, 24:31-25:5; Pet., 42-43. Further, in the combination, the Grotmol-Hoffman system predictably generates a Hoffman-like map while operating in the context of Grotmol’s process, as described above with respect to claim 29. EX1010, ¶105. The augmented map depends on the robot’s location, which in turn depends

on previously detected objects as discussed. *Id.* Generating the map then includes generating depictions (e.g., representations) of walls, obstacles, and other of the detected objects around the robot. *Id.*

### III. CONCLUSION

The Challenged Claims are unpatentable for the reasons described in this Reply and the Petition.

Respectfully submitted,

Dated July 15, 2024

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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 word count for the foregoing Petitioners' Reply to Patent Owner's Response totals 5,566 words, which is less than the 5,600 allowed under 37 CFR § 42.24.

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**CERTIFICATION OF SERVICE**

The undersigned hereby certifies that on July 15, 2024, a complete and entire copy of this PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE was provided via email to the Patent Owner by serving the email correspondence addresses of record as follows:

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