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571-272-7822

Paper 20
Date: December 13, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

AUTONOMOUS DEVICES, LLC,
Patent Owner.

IPR2023-01054
Patent 10,452,974 B1

Before BARBARA A. PARVIS, ROBERT J. WEINSCHENK, and RUSSELL E. CASS, *Administrative Patent Judges.*

CASS, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Tesla, Inc. ("Petitioner") filed a Petition (Paper 1 ("Pet.")) requesting *inter partes* review of claims 1–20 of U.S. Patent No. 10,452,974 B1 (Ex. 1001, "the '974 patent"). Autonomous Devices, LLC ("Patent Owner") filed a Preliminary Response. Paper 11 ("Prelim. Resp."). In its Preliminary Response, Patent Owner states that it has disclaimed claims 1–3, 6, 8–10, 12–13, and 16–20 of the '974 patent. *Id.* at 1 (citing Ex. 2004; 37 C.F.R. § 42.107(e)). In light of the disclaimer, only claims 4–5, 7, 11, and 14–15 (the "challenged claims") of the '974 patent remain at issue in this proceeding. With authorization, Petitioner filed a Preliminary Reply (Paper 12 ("Prelim. Reply")), and Patent Owner filed a Preliminary Sur-reply. Paper 13 ("Prelim. Sur-reply").

We have authority to determine whether to institute review under 35 U.S.C. § 314 and 37 C.F.R. § 42.4. An *inter partes* review may not be instituted unless it is determined that "the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a).

Upon consideration of the contentions and the evidence of record at this preliminary stage, we conclude Petitioner establishes a reasonable likelihood of prevailing in demonstrating the unpatentability of at least one of the challenged claims of the '974 patent. Accordingly, we grant Petitioner's request and institute an *inter partes* review of all challenged claims of the '974 patent and with respect to all grounds set forth in the Petition.

II. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies itself as the real party-in-interest. Pet. 1. Patent Owner names itself as the real party-in-interest. Paper 4, 1.

B. Related Matters

The parties inform us that the ’974 patent was asserted in *Autonomous Devices LLC v. Tesla, Inc.*, No. 22-cv-1466 (MN) (D. Del.) (the “parallel district court proceeding”). Pet. 1; Paper 4, 1. The parties also identify a concurrently filed petition, IPR2023-01055, challenging U.S. Patent No. 11,238,344 (the “’344 patent”), a continuation of the ’974 patent. Pet. 1; Paper 4, 1.

C. The ’974 Patent

The ’974 patent is titled “Artificially Intelligent Systems, Devices, and Methods for Learning and/or Using a Device’s Circumstances for Autonomous Device Operation.” Ex. 1001, code (54). The ’974 patent is directed to “devices, apparatuses, systems, and related methods for providing advanced learning, anticipating, decision making, automation, and/or other functionalities.” *Id.* at 1:10–13. The ’974 patent describes artificially intelligent devices, systems, and methods

> that enable learning a device’s circumstances including objects with various properties along with correlated instruction sets for operating the device, storing this knowledge in a Knowledgebase (i.e. neural network, graph, sequences, etc.), and operating a device autonomously.

Id. at 57:49–57.

Figure 2 of the ’974 patent is depicted below.

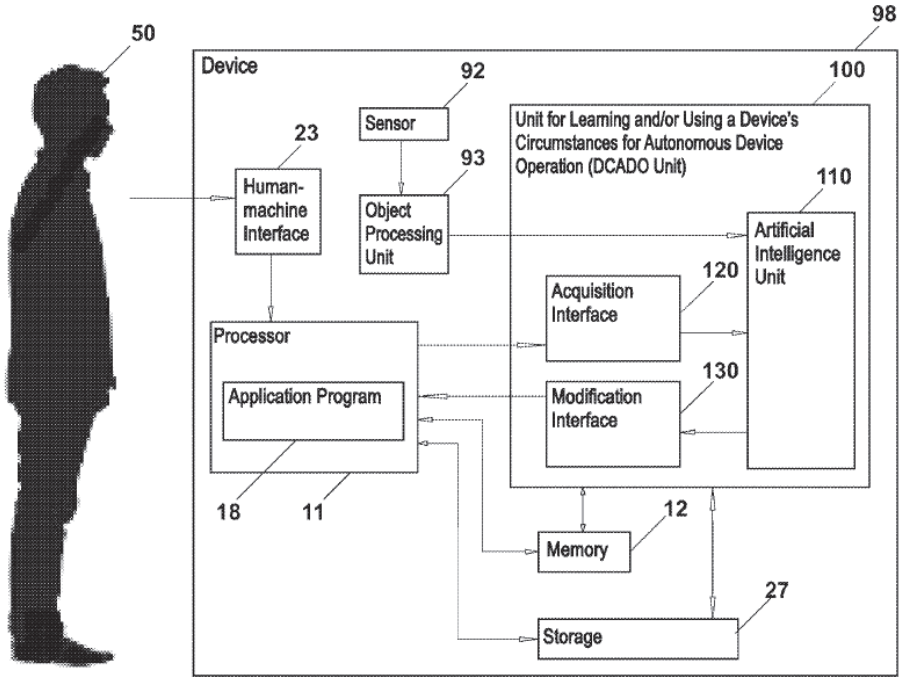

FIG. 2

Figure 2 illustrates an embodiment of device 98 comprising "Unit for Learning and/or Using a Device's Circumstances for Autonomous Device Operation" (DCADO Unit) 100, processor 11, human-machine interface 23, sensor 92, object processing unit 93, memory 12, and storage 27. *Id.* at 66:55–66:60.

Processor 11 is configured to execute instruction sets for operating the device. Ex. 1001, 67:4–7. User 50 issues an operation direction to application program 18 responsive to which application program's 18 instructions or instruction sets are executed by processor 11 to perform a desired operation on device 98. *Id.* at 68:26–30. Sensor 92 "comprises the functionality for obtaining or detecting information about [the sensor's] environment" and "can be used to detect objects and/or their properties" near device 98. *Id.* at 69:4–9. Object processing unit 93 "comprises the functionality for processing output from [s]ensor 92" and can be used "to

detect objects and/or their properties." *Id.* at 71:38–43. DCADO Unit 100 comprises artificial intelligence unit 110, acquisition interface 120, and modification interface 130. *Id.* at 66:62–64. Artificial intelligence unit 110 is "configured to receive a first collection of object representations" that include "one or more representations of objects detected by the sensor." *Id.* at 67:13–17.

Artificial intelligence unit 110 comprises functionality for learning device's 98 operation. *Id.* at 96:27–28. An embodiment of this functionality is shown in Figure 32 of the '974 patent, depicted below.

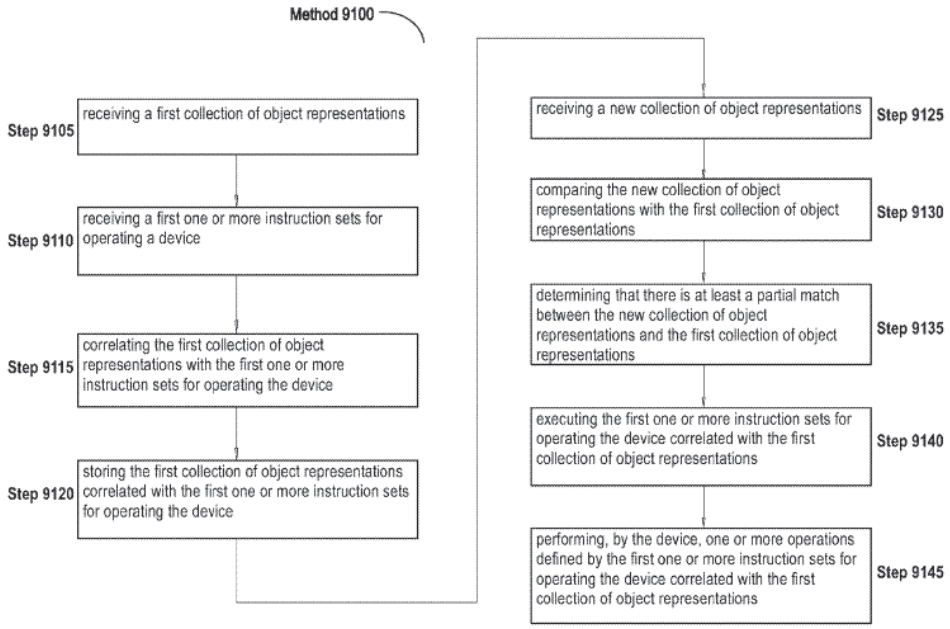

FIG. 32

Figure 32 is an illustration showing an embodiment of method 9100 "for learning and/or using a device's circumstances for autonomous device operation." *Id.* at 150:7–9. At step 9105 of Figure 32, "a first collection of object representations is received." *Id.* at 150:21–22. "An object representation may include an electronic representation of an object (i.e. Object 615, etc.) detected in a device's surrounding." *Id.* at 150:26–28. At

step 9110, "a first one or more instruction sets for operating a device are received." *Id.* at 151:60–61. At step 9115, "the first collection of object representations is correlated with the first one or more instruction sets for operating the device." *Id.* at 153:15–17. At steps 9125 and 9130, a new collection of object representations is received and "compared with the first collection of object representations." *Id.* at 154:39–44. At step 9135, "a determination is made that there is at least a partial match between" the two collections. *Id*. at 155:27–29. At step 9140, the "first one or more instruction sets for operating the device correlated with the first collection of object representations are executed." *Id.* at 156:66–157:1.

D. Illustrative Claims

Claims 4–5, 7, 11, and 14–15 of the '974 patent are at issue in this proceeding. These claims depend, directly or indirectly, from disclaimed claim 1, and thus incorporate the subject matter of claim 1. Ex. 1001, 170:16–172:26.

Claims 4 and 14 are illustrative of the claimed subject matter at issue and are reproduced below, along with disclaimed independent claim 1, from which they depend.

> 1.[1.1[1]] A method implemented using a computing system that includes one or more processor circuits, the method comprising:
>
> [1.2] accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device, wherein the

[1] We use Petitioner's designations for the elements of claim 1. *See* Pet. 11–22.

first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device,

[1.3] and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user;

[1.4] generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;

[1.5] anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation; and

[1.6] at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process.

4. [4.1] The method of claim 1, wherein the learning process includes: generating or receiving the first circumstance representation, and generating or receiving the second circumstance representation; and,

[4.2] obtaining or receiving the first one or more instruction sets for operating the first device, and obtaining or receiving the second one or more instruction sets for operating the first device,

[4.3] and wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation

> correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth correlation is learned in another learning process that includes: generating or receiving the fourth circumstance representation; and obtaining or receiving the fourth one or more instruction sets for operating the second device.
>
> 14. The method of claim 1, wherein the first circumstance representation includes: one or more object representations, or one or more collections of object representations, and wherein the second circumstance representation includes: one or more object representations, or one or more collections of object representations, and wherein the third circumstance representation includes: one or more object representations, or one or more collections of object representations.

Ex. 1001, 169:36–170:4, 170:15–36, 172:10–18.

E. Evidence

Petitioner relies on the references summarized in the table below.

Name	Reference	Exhibit
Grotmol	US 9,604,359 B1, filed Jan. 27, 2015, issued Mar. 28, 2017	1004
Hickman	US 8,639,644 B1, filed May 4, 2012, issued Jan. 28, 2014	1005

Petitioner also relies on the Declaration of Jason Janet, Ph.D. (Ex. 1002) to support its contentions that the challenged claims are unpatentable.

F. Asserted Grounds

Petitioner asserts that the challenged claims of the ’974 patent are unpatentable based on the following grounds summarized in the table below (Pet. 3–4):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
4–5, 7, 14–15	102(a)(2)	Grotmol
11	103	Grotmol in view of the knowledge of a person of ordinary skill
4, 11	103	Grotmol, Hickman

III. DISCRETION UNDER 35 U.S.C. § 314(A) BASED ON RELATED DISTRICT COURT PROCEEDING

Patent Owner argues we should exercise our discretion under 35 U.S.C. § 314(a) to deny institution of *inter partes* review in view of the parallel district court proceeding. Prelim. Resp. 46–52; Prelim. Sur-reply 4–5. Petitioner disagrees. Prelim. Reply 3–5. We address the parties' arguments regarding discretionary denial below.

Under Section 314(a), the Director has discretion to deny institution. *See* 35 U.S.C. § 314(a) (stating "[t]he Director *may not* authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition") (emphasis added); *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018) ("[Section] 314(a) invests the Director with discretion on the question whether to institute review." (emphasis omitted)); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) ("[T]he agency's decision to deny a petition is a matter committed to the Patent Office's discretion."); *Harmonic Inc. v. Avid Tech, Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) ("[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.").

In determining whether to exercise this discretion based on a related litigation, the Board assesses all relevant circumstances, including the merits, to balance considerations such as system efficiency, fairness, and patent quality. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"); *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 19–20 (PTAB Sept. 12, 2018) (precedential). We consider six factors as part of this balanced assessment when determining whether to use our discretion to deny institution:

> 1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
>
> 2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
>
> 3. investment in the parallel proceeding by the court and the parties;
>
> 4. overlap between issues raised in the petition and in the parallel proceeding;
>
> 5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
>
> 6. other circumstances that impact the Board's exercise of discretion, including the merits.

Fintiv, Paper 11 at 5–6. In evaluating these factors, we "take[] a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.* at 6.

On June 21, 2022, the Director issued an Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation ("Interim *Fintiv* Guidance").[2] The Interim *Fintiv* Guidance

[2] The Interim *Fintiv* Guidance is available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_

provides "several clarifications" to "the PTAB's current application of *Fintiv* to discretionary denial where there is parallel litigation" in response to comments received from stakeholders in response to a Request for Comments. Interim *Fintiv* Guidance 2.

We now apply the six factors to the facts and circumstances present here.

A. Fintiv Factor 1: Stay in the Parallel Proceeding

Under the first *Fintiv* factor, we consider "whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted." *Fintiv*, Paper 11 at 6. Patent Owner contends that this factor weighs in favor of denial because "there is no stay in the district court proceeding, and there is a low likelihood of a stay." Prelim. Resp. 48; *see also* Prelim. Sur-Reply 4 ("a stay is unlikely"). Patent Owner also asserts that the parallel district court proceeding is at an advanced stage of litigation. Prelim. Resp. at 48. Petitioner argues that neither party has requested a stay in the district court proceeding, and this factor should be considered neutral. Prelim. Reply 3.

Patent Owner does not dispute Petitioner's argument that no stay has been requested in the parallel district court litigation. Prelim. Sur-reply 4. Although Patent Owner argues that resources are being expended on discovery, based on the current schedule in the parallel district court proceeding significant investment remains including claim construction briefing, which does not begin until April 26, 2024, and the claim construction hearing, which is not scheduled until July 26, 2024. *See generally* Ex. 2006. We, therefore, do not agree that the evidence supports

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Patent Owner's argument that the parallel district court proceeding is in an advanced stage such that a stay, if requested, would not be granted.

We will not attempt to predict how the district court in the parallel district court proceeding would proceed if a stay is requested because the court may determine whether or not to stay any individual case, including the related one, based on a variety of circumstances and facts beyond our control and to which the Board is not privy. *Sand Revolution II, LLC v. Cont'l Intermodal Grp. - Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative) ("*Sand Revolution*"). Accordingly, we find that factor 1 is neutral.

B. Fintiv *Factor 2: Trial Date in the Parallel Proceeding*

Under the second *Fintiv* factor, we consider the "proximity of the court's trial date to the Board's projected statutory deadline for a final written decision." *Fintiv*, Paper 11 at 6. Petitioner states that trial in the parallel district court proceeding "is currently set for June 23, 2025." Prelim. Reply 4 (citing Ex. 2006). Patent Owner does not dispute that trial is set for June 23, 2025. Prelim. Sur-reply 4–5. Because the deadline for our final written decision is approximately six months before the current trial date in the parallel district court proceeding, we find that factor 2 weighs against exercising discretion to deny institution.

C. Fintiv *Factor 3: Investment by the Court and the Parties in the Parallel Proceeding*

Under the third *Fintiv* factor, we consider the "investment in the parallel proceeding by the court and the parties." *Fintiv*, Paper 11 at 6. Patent Owner asserts that substantial resources will have already been invested, including exchanging preliminary contentions, substantially

completing document production, and likely engaging in deposition discovery. Prelim. Resp. 48–49; Prelim. Sur-Reply 5. Patent Owner also argues that Petitioner "waited seven months after the parallel district court litigation was filed to file its petition" and that Petitioner's delay was "unreasonable." Prelim. Resp. 49. Petitioner also contends that the institution decision will occur prior to the close of fact discovery, claim construction briefing, and the start of expert discovery. Prelim. Reply 4–5.

Claim construction briefing does not begin until April 26, 2024 and the hearing on claim construction is scheduled for July 26, 2024. Ex. 2006, 3, 7. The parties do not dispute that trial in the parallel district court proceeding is currently set for June 23, 2025. *Id.* at 11. Because of the significant investment that remains in the parallel district court proceeding (*see generally* Ex. 2006), we find that factor 3 weighs against exercising discretion to deny institution.

D. Fintiv *Factor 4: Overlap Between Issues Raised in the Petition and Parallel Proceeding*

Under the fourth *Fintiv* factor, we consider the "overlap between issues raised in the petition and in the parallel proceeding." *Fintiv*, Paper 11 at 6. Petitioner stipulates that,

> if the Board institutes IPR on the Petition grounds, Petitioner will not pursue an invalidity defense in the district court (C.A. No. 22-cv-1466-MN) that the patent claims subject to the instituted IPR are invalid based on the same Petition grounds.

Prelim. Reply 5.

Patent Owner argues that the fourth *Fintiv* factor favors institution despite Petitioner's stipulation. Prelim. Sur-Reply 5. In particular, Patent Owner asserts that Petitioner "provided a weak stipulation under *Sand*

Revolution that falls short of a *Sotera* stipulation." *Id.* (citing *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 18–19 (PTAB Dec. 1, 2020) (precedential)).

Petitioner's stipulation that it will not rely on the grounds asserted in the Petition in the parallel district court proceeding mitigates to at least some degree concerns of duplicative efforts and potentially conflicting decisions. Prelim. Reply 5; *see Sand Revolution*, Paper 24 at 12. Thus, we determine that factor four weighs marginally against exercising discretion to deny institution.

E. Fintiv *Factor 5: Whether Petitioner is the Defendant in the Parallel Proceeding*

Under the fifth *Fintiv* factor, we consider "whether the petitioner and the defendant in the parallel proceeding are the same party." *Fintiv*, Paper 11 at 6. When the Board's deadline for a Final Written Decision precedes the district court trial date and the parties are the same in both proceedings, *Fintiv* factor 5 typically weighs against exercising discretion to deny institution. *See Hanwha Solutions Corp. v. REC Solar Pte. Ltd.*, IPR2021-00989, Paper 12 at 14, 17 (PTAB Dec. 13, 2021) (determining that factor 5 did not weigh in favor of exercising discretion to deny institution where district court trial date was set for three months after statutory deadline for a final written decision); *Carrier Fire & Security Americas Corp. v. Sentrilock, LLC*, IPR2021-00665, Paper 12 at 13–14 (PTAB Sept. 16, 2021) (The parties being the same "could weigh either in favor of, or against, exercising discretion to deny institution, depending on which tribunal is likely to address the challenged patent first," and the Board reaching the merits before the district court means "estoppel will apply against Petitioner should we determine that Petitioner failed to demonstrate unpatentability of

the challenged claims.”)). Because the deadline for our final written decision is approximately six months before the current trial date in the parallel district court proceeding, we find that factor 5 weighs against exercising discretion to deny institution.

F. Fintiv *Factor 6: Other Considerations*

Under the sixth *Fintiv* factor, we consider “other circumstances that impact the Board’s exercise of discretion, including the merits.” *Fintiv*, Paper 11 at 6. As discussed below, we determine that Petitioner has shown a reasonable likelihood of unpatentability of several of the challenged claims. Beyond that, given the facts relating to the other *Fintiv* factors in this case, we need not make further determinations regarding Petitioner’s showing in order to decide whether to exercise our discretion to deny institution in this proceeding. Therefore, we treat this factor as neutral in our analysis.

G. Conclusion

As noted above, we take “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Fintiv*, Paper 11 at 6. Weighing all of the factors, we are not persuaded that the interests of efficiency and integrity of the system would be best served by invoking 35 U.S.C. § 314(a) to deny institution of a potentially meritorious petition. Based on the record before us, we determine the facts of this case do not warrant discretionary denial.

IV. ANALYSIS

A. Legal Standards

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628,

631 (Fed. Cir. 1987). To establish anticipation, "all of the elements and limitations of the claim must be shown in a single prior reference, arranged as in the claim." *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness, i.e., secondary considerations.[3] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art,

> would have [had] 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.

[3] Patent Owner does not present objective evidence of nonobviousness at this stage of the proceeding.

Pet. 4 (citing Ex. 1002 ¶¶ 40–42). At this stage in the proceeding, Patent Owner adopts Petitioner's proposal. *See* Prelim. Resp. 5.

Considering the subject matter of the '974 patent, the background technical field, and the asserted prior art, we agree with Petitioner's proposed qualifications for the person of ordinary skill in the art, except we decline to adopt "at least," as that language is vague and open-ended. Otherwise, Petitioner's proposed definition is consistent with the level of skill reflected in the specification of the '974 patent and the asserted prior art references. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Accordingly, for purposes of this Decision, and based on the current record, except as noted above, we adopt Petitioner's assessment of the level of skill for one of ordinary skill in the art.

C. Claim Construction

We construe the challenged claims by applying the standard used in federal courts, in other words, "the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b)," which is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2020). Under this standard, the words of a claim generally are given their "ordinary and customary meaning," which is the meaning the term would have to a person of ordinary skill at the time of the invention, in the context of the entire patent including the specification. *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).

Petitioner provides a construction for "means for generating or receiving," "means for anticipating," and "means for executing" in disclaimed claim 19. Pet. 4–5. Patent Owner argues that "construction of these terms is unnecessary" due to the disclaimer of claim 19. Prelim. Resp. 14. We agree. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (alteration in original)).

Petitioner states that it "applies the ordinary and customary meaning of the claim terms" and "explains the meaning of claim terms" in its element-by-element analysis where appropriate. Pet. 4. Patent Owner provides a proposed construction for "object representation." Prelim. Resp. 9–13. We discuss the parties' dispute regarding that term below.

1. "object representation"

Petitioner argues that the '974 patent "does not define 'object representations' beyond its use in the phrase 'collection of object representations,' which it defines as 'one or more representations of objects detected by the sensor at a time.'" Pet. 42 (citing Ex. 1001, 3:31–33). Petitioner argues that the '974 patent explains that the sensor may include a camera or motion picture camera and "provides examples of objects represented in pictures." *Id.* at 36–37 (citing Ex. 1001, 69:45–56, 72:52–57). Petitioner also argues that the '974 patent describes "various approaches to object recognition." *Id.* (citing Ex. 1001, 75:1–5).

Patent Owner asserts that the term "object representation" should be construed as "a 'data structure that includes an object property generated by object processing.'" Prelim. Resp. 10. Patent Owner argues that its proposed construction is apparent "[i]n the context of the '974 patent," including Figure 4B of the '974 patent, and further that its construction is correct "[b]ecause [the '974 patent describes] the object properties are generated by Object Processing Unit 93 and stored in the object representations." *Id.* at 10–13 (citing Ex. 1001, 71:38–53, 71:64–66, 80:16–34, Figs. 2, 4B). Patent Owner argues that its construction "is confirmed by and consistent with the language of the claims." *Id.* at 13.

In its Preliminary Reply, Petitioner counters that Patent Owner's proposed construction "imports limitations from cherrypicked embodiments in the specification and unjustifiably restricts the ordinary meaning of a 'representation' of an object to a particular 'data structure.'" Prelim. Reply 1. Petitioner argues that because "the '974 patent does not expressly define 'object representation'" and the Specification and file history do not include "any relevant disclaimer or disavowal," Patent Owner's proposed construction should be rejected. *Id.* at 1–2 (citing, e.g., *Polaris Innovations Ltd. v. Brent*, 48 F.4th 1365, 1376 (Fed. Cir. 2022)). Petitioner also argues that Patent Owner's proposed construction "improperly reads out embodiments of the '974 patent that refer to object representations in broader contexts." *Id.* at 2 (citing Ex. 1001, 3:31–51, 28:9–12). Petitioner further argues that the language of claim 18 of the continuation '344 patent supports Petitioner's position. *Id.* (citing Ex. 1001, 173:66–174:4).

Patent Owner argues that the '974 patent Specification is "highly relevant" and "provide[s] important context and meaning" for the term

"object representation." Prelim Sur-reply 2; *see also id.* at 3 (arguing the claim term should not be analyzed "in a vacuum"). Patent Owner argues that its proposed construction also does not improperly read out embodiments "that refer to object representations in broader contexts." *Id.* (citing Ex. 1001, 3:50–51, 28:10–12). Additionally, Patent Owner contends that the '974 patent disclosures relied on by Petitioner simply acknowledge "that sensors are used, in part, to detect objects in the sensors' normal operation of capturing the device's general environment." *Id.* Patent Owner also asserts that the recitation in claim 18 "that an object representation includes 'one or more digital pictures that depict one or more objects'" is consistent with Patent Owner's construction and "provides an example of what the data structure can include." *Id.* at 3.

We start first with the language of claim 18 of the continuation '344 patent (challenged in IPR2023-01055), which recites

> wherein the first one or more object representations include: one or more three dimensional representations of one or more objects, one or more digital pictures that depict one or more objects, one or more digital pictures that depict one or more representations of one or more objects, one or more information about one or more properties of one or more objects, ***or*** one or more computer representations of one or more objects.

Ex. 1008, 173:66–174:6 (emphasis added). At this preliminary stage in the proceeding, we find that the limitation in claim 18 relied on by both parties recites a list of possible "object representations" including the conjunction "or," which we preliminarily find links alternatives such that "the first one or more object representations" may include "one or more digital pictures that depict one or more objects" *or* "one or more information about one or more

properties of one or more objects." *Id.* We, therefore, preliminarily find that the language of claim 18 supports Petitioner's position.

Next, we turn to the '974 patent Specification. We preliminarily find that the '974 patent Specification suggests a broader interpretation of "object representations" than that proposed by Patent Owner. In particular, the Specification explains that '[i]n *some embodiments*, *the first collection of object representations includes one or more representations of objects detected by the sensor at a time*" (*id.* at 3:31–33 (emphasis added)) and "[i]n *further embodiments*, an object representation of one or more object representations includes *one or more object properties*" (*id.* at 3:49–51 (emphases added)). We preliminarily find that this disclosure is consistent with Petitioner's argument that the '974 patent refers "to object representations in broader contexts" than the embodiment relied on by Patent Owner. *See* Prelim. Reply 2.

Furthermore, Patent Owner relies on non-limiting examples in the Specification to support its proposed construction. For instance, the '974 patent describes Figure 4B as illustrating "an exemplary embodiment." Ex. 1001, 55:45–47. The '974 patent also explains that object processing unit 93 "*may* create or generate" collection of object representations 525 and that object representation 625*a* "*may* include" object property 630*aa*. *Id.* at 80:16–23 (emphases added). Neither party relies on the prosecution history of the '974 patent.

Our reviewing court has repeatedly "cautioned against limiting the claimed invention to preferred embodiments or specific examples in the specification." *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1346–47 (Fed. Cir. 2015) (internal quotations omitted); *SuperGuide Corp. v. DirecTV*

Enterprises, Inc., 358 F.3d 870, 875 (Fed. Cir. 2004) (noting that "it is important not to import into a claim limitations that are not a part of the claim"). "[I]t is the *claims*, not the written description, which define the scope of the patent right." *Williamson*, 792 F.3d at 1346–47; *see also Phillips*, 415 F.3d at 1312 (noting that "[i]t is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude'"). Thus, "a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment." *SuperGuide*, 358 F.3d at 875.

At this preliminary stage, therefore, we decline to adopt Patent Owner's proposal that the term "object representation" should be construed as "a 'data structure that includes an object property generated by object processing.'" Prelim. Resp. 10. At this early stage, we, instead, agree with Petitioner that the '974 patent refers to object representations in broader contexts, including that "the first collection of object representations includes one or more representations of objects detected by the sensor at a time." Prelim. Reply 2 (citing Ex. 1001, 3:31–51); *see also* Pet. 42 (arguing that the '974 patent describes "object representations" in the phrase "one or more representations of objects detected by the sensor at a time") (citing Ex. 1001, 3:31–33)). We also agree with Petitioner that the '974 patent Specification describes a camera as an exemplary sensor. Pet. 42 (citing Ex. 1001, 69:45–56). No further determinations are needed to resolve disputes between the parties at this preliminary stage in the proceeding.

D. Anticipation of Claims 4–5, 7, and 14–15 by Grotmol

Petitioner asserts that claims 4–5, 7, and 14–15 are anticipated by Grotmol. Pet. 3–4. Patent Owner disagrees. Prelim. Resp. 14–34.

We begin with an overview of Grotmol. We then turn to the parties' contentions.

1. Overview of Grotmol (Ex. 1004)

Grotmol is titled "Apparatus and Methods for Training Path Navigation by Robots." Ex. 1004, code (54). Grotmol describes an apparatus and methods for training and operating a robotic device to follow a trajectory. *Id.* at code (57).

More specifically, Grotmol describes exemplary mobile robotic apparatus 160, shown in Figure 1 below. *Id.* at 8:57–61.

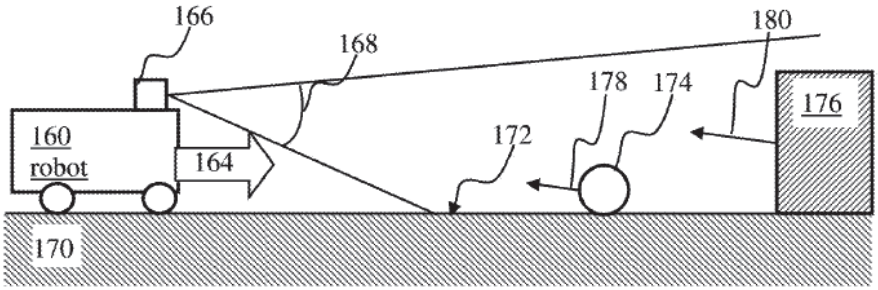

FIG. 1

Figure 1 depicts mobile robotic apparatus 160 that contains sensor component 166. *Id.* Sensor component 166 provides "information associated with objects within the field-of-view 168." *Id.* at 8:64–66. Grotmol's sensor 166 comprises "a camera configured to provide an output comprising a plurality of digital image frames." *Id.* at 10:16–20. A user "may train the system to switch between tasks based on the sensory context." *Id.* at 10:45–47.

Grotmol further describes a "mechanism for enabling a robot to learn navigating a target trajectory while reducing deviation from a target path." *Id.* at 38:33–35. The robot comprises robotic vehicle 160, camera 166, and

"a controller configured to store a sequence of images obtained during training phase." *Id.* at 38:36–39. Figure 20A from Grotmol is shown below.

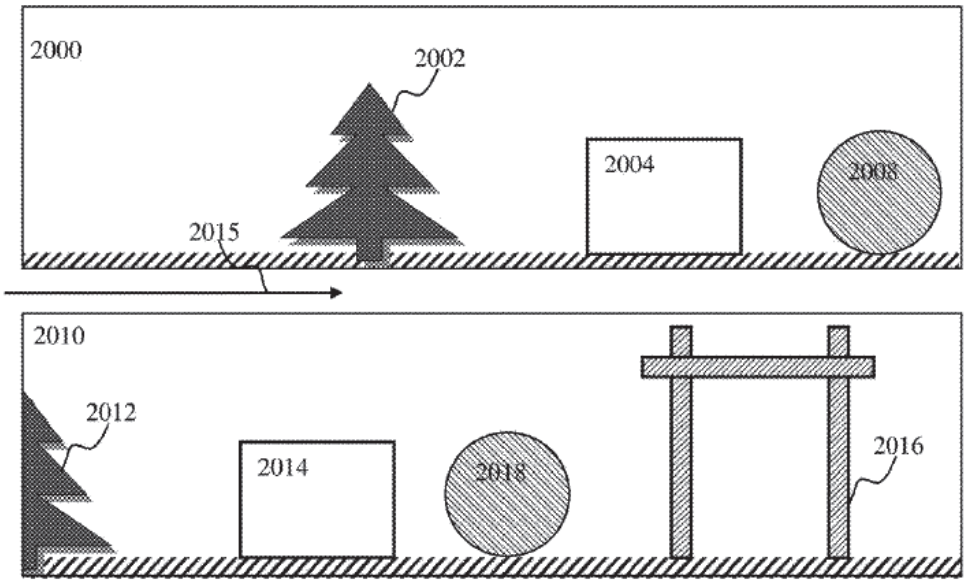

FIG. 20A

Figure 20A illustrates images 2000, 2010 obtained with a camera 166 mounted on a robotic vehicle 160. *Id.* at 38:43–54. Grotmol explains that image 2000 comprises "representations [of] one or more objects, e.g., a tree 2002, a rectangle, a ball 2008, and/or other objects." *Id.* at 38:56–58. Grotmol further explains that image 2010 is obtained after execution of a turn and representations of objects are shifted "relative [to] representations of the same objects in the frame obtained prior to the turn execution." *Id.* at 38:60–65.

During autonomous operation, the control process of the robot is configured to compare a current or recent image with the one or more images from the training buffer. *Id.* at 39:23–28. "Motor commands issued by a trainer corresponding to time instances when the images are acquired" also are stored." *Id.* at 39:17–19. Grotmol explains that "in order to reduce/maintain the error metric during operation of the robot," motor

commands are obtained "by taking the stored motor commands from the training buffer" that correspond to "the best matching stored image." *Id.* at 43:4–9.

2. Disclaimed Independent Claim 1

We begin our analysis with disclaimed independent claim 1 because claims 4–5, 7, and 14–15, which are at issue in this proceeding, depend from claim 1.

a) [1.1] (preamble) "A method implemented using a computing system that includes one or more processor circuits, the method comprising:"

Petitioner argues that Grotmol discloses the preamble by describing a robotic apparatus with one or more processors. Pet. 11 (citing Ex. 1004, 3:27–30, 8:5–15; Ex. 1002 ¶¶ 65–66).

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses the preamble of claim 1 for purposes of institution.

b) [1.2] accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a second circumstance detected

> *at least in part by the one or more sensors of the first device,*

Petitioner argues that "Grotmol discloses a 'memory component may be configured to store training sets,' where '[a] given training set may comprise an instance of the video frame, an instance of the binary signal, and an instance of a motor control indication configured to cause the robot to execute an action.'" Pet. 12 (citing Ex. 1004, code (57), 3:27–39) (alteration in original). "Thus," Petitioner asserts, "Grotmol discloses a memory that stores a knowledgebase including multiple correlations (training sets), where each correlation includes a 'circumstance representation' (image of scene from a robot vehicle's operation) correlated with an 'instruction set[] for operating a first device' (motor control indication configured to cause the robot to execute an action)." *Id.* at 12–13 (alteration in original).

Petitioner also argues that "[t]he images in Grotmol are 'associated with' or 'correspond to'—*i.e.*, are correlated with—motor control indications issued around the same time." Pet. 13 (citing Ex. 1002 ¶ 68). According to Petitioner, "Grotmol describes training behaviors in a robotic device by 'learning of *associations* between sensory context . . . and a respective action . . . during training.'" *Id.* at 13–14 (citing Ex. 1004, code (57), 33:59–62) (alteration in original). "This association," Petitioner contends, "may be based on the timing of the images and the motor commands." *Id.* at 14 (citing Ex. 1004, 39:17–19, 43:5–9).

Additionally, Petitioner argues, "Grotmol discloses that circumstance representations (images) represent circumstances detected by a sensor of the first device." Pet. 14. "Specifically," Petitioner asserts, "Grotmol discloses the video frame instances are detected by a 'sensor component' of the robotic vehicle." *Id.* (citing Ex. 1004, code (57), 3:31–33). According to

Petitioner, Figure 8 of Grotmol shows that "the 'memory' of Grotmol is connected to the 'sensory' functionality through the 'processing' functionality." *Id.* (citing Ex. 1004, 9:1–3). Thus, Petitioner contends, "[b]oth Grotmol and the '974 patent disclose that digital images may come from, for example, a CCD image sensor in the form of color encoded pixels." *Id.* at 14–15 (citing Ex. 1001, 69:67–70:5, 112:24–32; Ex. 1004, 9:8–22). And, according to Petitioner, "Grotmol further discloses that these pixels are used for object (or circumstance) recognition." *Id.* at 15 (citing Ex. 1004, 8:66–9:3). Finally, Petitioner argues, Grotmol discloses "accessing the training sets stored in the memory component to perform autonomous operation." *Id.* (citing Ex. 1004, code (57), 39:23–28).

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses claim element [1.2] for purposes of institution.

c) [1.3] and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user;

Petitioner argues that "Grotmol discloses that a human ('user') can operate the robot during a training process and '[t]rained behaviors of the robotic device may be configured based on *learning* of associations between sensory context (e.g., presence of an obstacle in front of the robotic vehicle) and a respective action (e.g., right turn) during training.'" Pet. 16 (citing Ex. 1004, 33:59–62). "In both the 'listen mode' and 'override mode,'" Petitioner asserts, "Grotmol teaches that the robot will listen to commands sent by a trainer (user) 'and try to remember it for the next time the same

situation occurs.'" *Id.* (citing Ex. 1004, 23:3–29, 24:55–25:5, 34:50–55). According to Petitioner, "Grotmol describes this training as a learning process." *Id.* (citing Ex. 1004, 24:17–20, claim 12). "Accordingly," Petitioner contends, "Grotmol discloses a first correlation and a second correlation are learned during a learning process in which a user operates the first device." *Id.* at 17 (citing Ex. 1002 ¶ 74).

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses claim element [1.3] for purposes of institution.

> *d) [1.4] generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;*

Petitioner argues that "Grotmol discloses that its processor or a feature of an application running thereon receives additional digital pictures from the camera over time." Pet. 17 (citing Ex. 1004, 38:36–39, 39:23–28). "In Grotmol," Petitioner asserts, "'the most recent, current' image corresponds to the claimed 'third circumstance representation' and it is compared to the stored images in the training buffer (the claimed first and second circumstance representations)." *Id.* (citing Ex. 1002 ¶¶ 75–76). "Furthermore," according to Petitioner, "Grotmol discloses that the 'most recent, current' image (*i.e.*, third circumstance representation) can be detected by a camera of the robot that was used during the training mode (*i.e.*, first device), or it can be detected by the camera of a different robot (*i.e.*, second device)." *Id.* at 17–18 (citing Ex. 1002 ¶ 76). "Accordingly,"

Petitioner contends, "Grotmol discloses generating or receiving a third circumstance representation detected by a sensor of the first device or a second device." *Id.* at 18 (citing Ex. 1002 ¶¶ 75–77).

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses claim element [1.4] for purposes of institution.

> *e) [1.5] anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation; and*

Petitioner argues that "Grotmol discloses that '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.'" Pet. 18 (citing Ex. 1004, 43:5–9). Petitioner asserts that "Grotmol discloses that the matching step may comprise calculating a similarity measure between a current image and a stored image, then determining whether that similarity measure breaches a threshold (*i.e.*, 'at least partial match between the third circumstance representation and the first circumstance representation')." *Id.* (quoting Ex. 1004, 2:30–39). "As used in Grotmol," Petitioner contends, "'the term feature 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 . . . .'" *Id.* at 19 (citing Ex. 1004, 28:19–24) (alteration in original). Additionally, according to Petitioner, a "training set," as used in Grotmol "may comprise 'an

instance of the video frame, an instance of the binary signal, and an instance of a motor control indication configured to cause the robot to execute an action.'" *Id.* (citing Ex. 1004, 3:35–39).

Moreover, according to Petitioner, "[b]oth Grotmol and the '974 patent disclose that determining a 'partial match' may comprise pixel-wise difference analysis between two digital pictures." Pet. 19–20 (citing Ex. 1001, 66:24–28, 73:21–54; Ex. 1004, 3:13–15, 41:8–17). "Accordingly," Petitioner contends, "Grotmol discloses anticipating an instruction set for operating the first device learned in the learning process based on a partial match between the third circumstance representation and the first circumstance representation." *Id.* at 20 (citing Ex. 1002 ¶¶ 78–79).

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses claim element [1.5] for purposes of institution.

> *f) [1.6] at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process.*

Petitioner argues that, as described above for limitation [1.5], "Grotmol discloses anticipating the learned instruction sets for operating the device by comparing a new image with a stored image at least by matching portions of the images and determining whether those matching portions exceed a threshold number." Pet. 20 (citing Ex. 1002 ¶¶ 78–79). According to Petitioner, "Grotmol further discloses 'executing the first one or more

instruction sets for operating the first device learned in the learning process' in response to the 'anticipating.'" *Id.* According to Petitioner, "Grotmol describes that after it is determined that the similarity measure between the new image and image from the training set breaches a threshold, one or more potential control signals corresponding to the image from the training set that were obtained during a training operation of the robot (the instruction sets correlated with the first digital picture) are determined and executed." *Id.* at 20–21 (quoting Ex. 1004, 2:34–41, 3:12–13).

Additionally, Petitioner argues, "Grotmol discloses that the robot (first device) autonomously performs the operations defined by the first instruction set for operating the device." Pet. 21 (citing Ex. 1004, code (57), 34:56–62, 43:4–11). According to Petitioner, "Grotmol further discloses that training sets for performing autonomous operation may be loaded into the robot used for training (*i.e.*, first device), or may be loaded into another robot (*i.e.*, second device), and therefore, discloses that a first device or a second device autonomously performs the operations defined by the instructions stored in the training set." *Id.* at 21–22 (citing Ex. 1004, 33:21–32). "Accordingly," Petitioner contends, "Grotmol discloses executing the instruction set for operating the first device learned in the learning process, where the first device or the second device autonomously performs an operation defined by the instruction set." *Id.* at 22 (citing Ex. 1002 ¶¶ 80–82).

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses claim element [1.6] for purposes of institution.

g) Conclusion—Disclaimed Claim 1

After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has established a reasonable likelihood that Grotmol discloses each recitation of claim 1.

3. Dependent Claim 4

a) [4.1] The method of claim 1, wherein the learning process includes: generating or receiving the first circumstance representation, and generating or receiving the second circumstance representation; and,

Petitioner argues that, as discussed above for limitations [1.2] and [1.3], "Grotmol discloses a learning process that results in a memory storing multiple correlations (training sets)," where "each correlation includes a 'circumstance representation' (image of scene from a robot vehicle's operation) correlated with an 'instruction set[] for operating a first device' (motor control indication configured to cause the robot to execute an action)." Pet. 26 (citing Ex. 1002 ¶¶ 67–74) (alteration in original). Petitioner further contends that "[t]he images are generated during a training process and are received by the memory." *Id.* (citing Ex. 1004, code (57)).

Patent Owner does not present arguments specifically directed to limitation [4.1] *See* Prelim. Resp.

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses claim element [4.1] for purposes of institution.

b) [4.2] obtaining or receiving the first one or more instruction sets for operating the first device, and obtaining

or receiving the second one or more instruction sets for operating the first device,

Petitioner argues that, as discussed above for limitations [1.2] and [1.3], "Grotmol discloses a learning process in which multiple correlations (training sets) are stored in memory," where "each correlation includes a 'circumstance representation' (image of scene from a robot vehicle's operation) correlated with an 'instruction set[] for operating a first device' (motor control indication configured to cause the robot to execute an action)." Pet. 26 (citing Ex. 1002 ¶¶ 67–77). Petitioner further contends that "[t]he motor commands are issued by a trainer and are received by the memory during the training process." *Id.* at 26–27 (citing Ex. 1004, 39:13–22).

Patent Owner does not present arguments specifically directed to limitation [4.2] *See* Prelim. Resp.

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses claim element [4.2] for purposes of institution.

c) *[4.3] and wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth correlation is learned in another learning process that includes: generating or receiving the fourth circumstance representation; and obtaining or*

> *receiving the fourth one or more instruction sets for operating the second device.*

Petitioner argues that, as described above with respect to limitations [1.2] and [1.3] of claim 1, "Grotmol discloses that multiple images may be acquired, with images respectively stored in association with corresponding motor commands issued at the time the image was acquired." Pet. 27 (citing Ex. 1004, 3:31–39, 16:4–12, 24:17–23, 24:49–55). "Accordingly," Petitioner contends, "Grotmol discloses first, second, third, fourth, etc. correlations, where each correlation includes a circumstance representation correlated with an instruction for operating the robotic device." *Id.* (citing Ex. 1002 ¶¶ 67–74).

Petitioner also argues that Grotmol "discloses that the training sets and training configurations from a robot (which include the instruction sets for operating first device) can be 'stored' or 'saved.'" Pet. 27 (citing Ex. 1004, 33:12–58). "The saved training configuration," Petitioner asserts, "may then be 'loaded into the robot being trained thereby providing one or more trained behaviors to the robot.'" *Id.* at 27–28 (citing Ex. 1004, 33:27–30). "Further," according to Petitioner, "the 'trained configuration may be loaded to one or more *other robots* in order to provide learned behaviors.'" *Id.* at 28 (citing Ex. 1004, 33:30–32). "Thus," Petitioner contends, "Grotmol discloses that the memory component of a first robot can store the claimed first and second correlations as well as a fourth correlation learned in another learning process involving the operation of a second robot—*i.e.*, a circumstance detected by the sensor of a second robot correlated with instructions for operating that second robot." *Id.* (citing Ex. 1002 ¶¶ 93–94).

Patent Owner responds that "Grotmol fails to disclose that the knowledgebase includes the claimed fourth correlation learned in another

learning process involving the second device." Prelim. Resp. 14. Rather, Patent Owner argues, "Grotmol only discloses one user operating one device in one learning process," and "does not disclose a knowledgebase that mixed knowledge of a first correlation and a second correlation learned on one device in one learning process and a fourth correlation learned on a ***second*** device in a ***second*** learning process." *Id.* at 15. With regard to Grotmol's statement that the "trained configuration may be loaded to one or more other robots in order to provide learned behaviors," Patent Owner contends that "this portion of Grotmol only discloses that a trained configuration may be loaded from a first robot to a second robot," and does not disclose "that the second robot detects a circumstance that is later included in a fourth circumstance representation as part of a fourth correlation in the knowledgebase." *Id.* "Further," according to Patent Owner, "Grotmol does not disclose that 'at least a portion of the fourth correlation is learned in another learning process,' as required by claim 4." *Id.* at 15–16.

We agree with Petitioner that Grotmol discloses that, for a particular robot, "[t]he trained configuration may be stored," and "[a] saved configuration may be loaded into the robot being trained" in order to provide "one or more trained behaviors to the robot." Ex. 1004, 33:27–30. Grotmol also discloses that "[i]n some implementations, the trained configuration may be loaded to one or more other robots to provide learned behaviors." *Id.* at 33:30–32. However, based on the present record, we question whether Petitioner has sufficiently shown that Grotmol discloses more than loading a trained configuration from a first robot to a second robot, and whether Grotmol discloses a fourth correlation learned in another learning process by a second robot that is included as part of the knowledgebase along with the

first and second correlations learned by the first robot. However, as discussed further in Section IV.F.3 below, we find that Petitioner has sufficiently shown for purposes of institution that this limitation would have been obvious over the combination of Grotmol and Hickman. Petitioner, if it so desires, may further address the issue of whether Grotmol anticipates limitation [4.3] during the trial.

4. Dependent Claim 5

Dependent claim 5 recites as follows:

> 5. The method of claim 1, wherein the anticipating the first one or more instruction sets for operating the first device learned in the learning process based on the at least partial match between the third circumstance representation and the first circumstance representation includes:
>
> determining that a number of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold number, or
>
> determining that a percentage of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold percentage.

Ex. 1001, 170:38–50.

Petitioner argues that "Grotmol discloses that the control process for autonomous operation may involve comparing a current image (*i.e.*, third circumstance representation) with an image from the training buffer (*i.e.*, first circumstance representation)," and "further discloses that determining a control signal for operation of the robot may involve computing a similarity measure for a given training set and another training set, and determining whether that similarity measure exceeds a threshold." Pet. 29 (citing Ex. 1004, 3:13–15; 3:35–58, 4:30–39, 39:23–41, 41:8–17, 43:5–9). "Thus,"

Petitioner contends, "Grotmol discloses determining that a number of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold number." *Id.* (citing Ex. 1002 ¶ 95).

Patent Owner responds that "Grotmol's disclosure regarding computing a similarity measure (how similar images are to one another) and comparing that similarity measure against a threshold" is "different from the matching of claim 5, which requires determining that a number of partially matching portions exceeds a threshold number or percentage (of portions)." Prelim. Resp. 16–17. Patent Owner argues that "[u]sing the number of at least partially matching portions in the matching process involves counting the portions and determining whether this counted number of portions exceeds a numerical threshold, and Grotmol does not disclose any such counting of portions and numerical threshold." *Id.* at 18. "Further," according to Patent Owner, "using the percentage of at least partially matching portions in the matching process involves counting the portions to compute the percentage and determining whether this computed percentage of portions exceeds a percentage threshold, and Grotmol does not disclose any such counting of portions and percentage threshold." *Id.* "A similarity measure," Patent Owner contends, "is for measuring similarity of elements, not for counting their number or computing their percentage," and thus "a similarity measure is clearly different than the number or percentage of the similar elements after the similarity measure of those elements is determined." *Id.* at 18–19.

Based on the present record, we question whether Petitioner has sufficiently shown that Grotmol discloses determining that a number or a

percentage of "at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold number," as claim 5 requires. Petitioner argues that Grotmol computes a similarity measure between two training sets and determines whether that similarity measure exceeds a threshold, but Petitioner does not specifically explain how Grotmol discloses determining a ***number*** (or ***percentage***) of at least partially matching portions of two training sets. The parties may further address this issue during the trial.

5. Dependent Claim 7

a) [7.1] The method of claim 1, wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating: the first device, the second device, or a third device,

Petitioner argues that, as discussed above with respect to limitations [1.2] and [1.3], "Grotmol discloses that multiple images may be acquired, with images respectively stored in association with corresponding motor commands issued at the time the image was acquired." Pet. 31. "Accordingly," Petitioner asserts, "Grotmol discloses first, second, third, fourth, etc. correlations, where each correlation includes a circumstance representation correlated with an instruction for operating the robotic device." *Id.* (citing Ex. 1002 ¶¶ 67–74).

Petitioner also argues that Grotmol discloses "that the training sets and training configurations from a first robot (which include the instruction sets for operating first device) can be 'stored' or 'saved.'" Pet. 31 (citing Ex. 1004, 33:12–58). "The saved training configuration," Petitioner asserts, "may then be 'loaded into the robot being trained thereby providing one or more trained behaviors to the robot.'" *Id.* (citing Ex. 1004, 33:27–30).

"Further," according to Petitioner, "the 'trained configuration may be loaded to one or more *other robots* in order to provide learned behaviors.'" *Id.* (citing Ex. 1004, 33:30–32). "Thus," Petitioner contends, "Grotmol discloses a second and third device ('one or more other robots') that can autonomously perform one or more operations defined by one or more instruction sets for operating the first device training configuration from [the] first robot (*e.g.*, training sets with circumstance representations correlated to instruction sets)" that "is loaded into a second or third other robots to 'provide learned behaviors.'" *Id.* at 31–32 (citing Ex. 1002 ¶¶ 98–99).

Patent Owner does not present arguments specifically directed to limitation [7.1] *See* Prelim. Resp.

Petitioner's contentions are supported by the cited portions of Grotmol. After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently that Grotmol discloses claim element [7.1] for purposes of institution.

b) [7.2] and wherein a first connection is generated to connect the first correlation with the second correlation, and wherein a second connection is generated to connect the second correlation with the fourth correlation.

Petitioner argues that "[t]he '974 patent describes that '[k]nowledge cells [*containing correlations* (*see supra* claim 2)] may be *connected*, interrelated, or interlinked into knowledge structures using statistical, artificial intelligence, machine learning, and/or other models or techniques.'" Pet. 32 (citing Ex. 1001, 153:66–154:2). Petitioner asserts that "Grotmol discloses these 'connections' between . . . the correlations in the knowledg[e]base," for example by describing "storing sequences of images

with their corresponding instruction sets (*i.e.*, a sequence of knowledge cells)." *Id.* (citing Ex. 1004, code (57), 38:21–42; Ex. 1002 ¶ 101). "An ordered buffer," according to Petitioner, "is a region of memory that is allocated for storing data in a specific order or sequence." *Id.* (citing Ex. 1002 ¶ 101). Therefore, Petitioner contends, "Grotmol describes that the training buffer may be ordered temporally, according to when the images were acquired." *Id.* at 32–33 (citing Ex. 1004, 39:65–40:4; Ex. 1002 ¶ 101). According to Petitioner, "Grotmol also describes alternative ways to order the training buffer, such as 'particle filtering,' in which images 'may be moved to a nearby location in the training buffer where the stored image matches closely with the newly arrived image,' and ordering at random." *Id.* at 33 (citing Ex. 1004, 39:42–40:19; Ex. 1002 ¶ 101). Petitioner argues that "[t]he training data stored in memory in an order or sequence corresponds to the claimed first and second 'connections' between the first and second correlations, and the second and fourth correlations." *Id.* (citing Ex. 1002 ¶¶ 100–101).

Patent Owner responds that "Grotmol fails to disclose the claimed 'first connection' and 'second connection'" because "[e]ach claimed connection links (connects) correlation data structures" and "Grotmol does not disclose correlations connected with such connections." Prelim. Resp. 19. Patent Owner argues that "[t]he connections disclosed in the '974 patent are specific links generated to connect correlation data structures in a knowledgebase," but "Grotmol merely discloses storing information in a sequence and fails to disclose connections or links between correlation data structures." *Id.* at 20. More specifically, according to Patent Owner, in the '974 patent, "[c]onnections are used to indicate and track relationships

between knowledge cells or correlations" and "are used to create paths through the knowledgebase for efficient storage and autonomous operation." *Id.* at 21 (citing Ex. 1001, 106:6–57, 108:31–35). Thus, Patent Owner contends, Grotmol's "knowledge cells are not merely basic storage but are specifically created, constructed, and structured data structures that may be connected or interlinked using connections," and "[n]o such connections are disclosed in Grotmol." *Id.* at 22 (citing Ex. 1001, 98:54–99:10, 131:64–132:26).

"Moreover," Patent Owner argues, "claim 7 additionally requires that the first and second connections are generated," but "Grotmol does not disclose generation of connections." Prelim. Resp. 22. With respect to Petitioner's argument that Grotmol discloses "storing sequences of images with their corresponding instruction sets," Patent Owner asserts that "[a] sequence of elements inherently does not need any connections since the sequence is an ordered group of elements of a single path (i.e. sequence)," and "Grotmol never discloses connections because Grotmol does not need them." *Id.*

We believe this issue would benefit from additional development. For example, it appears that the parties may have a dispute concerning the proper construction of the term "connection" and what is required to generate "a first connection" and "a second connection." Neither party proposes a claim construction for this term, or explains how Grotmol would satisfy the claims under such a construction. The parties may further address this issue during the trial.

6. Dependent Claim 14

a) The method of claim 1, wherein the first circumstance representation includes: one or more object

> *representations, or one or more collections of object representations, and wherein the second circumstance representation includes: one or more object representations, or one or more collections of object representations, and wherein the third circumstance representation includes: one or more object representations, or one or more collections of object representations.*

Petitioner argues that "Grotmol discloses first, second, and third circumstance representations representing first, second, and third circumstances detected at least in part by one or more sensors of the first device." Pet. 41. Petitioner asserts that "Grotmol discloses object representations in the form of images 2000 and 2010 which may "comprise *representations* of one or more objects, e.g., a tree 2002, a rectangle, a ball 2008, and/or other objects." *Id.* at 42 (citing Ex. 1004, 38:54–39:12). According to Petitioner, "Grotmol likewise discloses that the sensor used to capture these images 'may provide information associated with objects within the field-of-view" and "[i]n one or more implementations, such as *object recognition*, and/or obstacle avoidance, the output provided by the sensor component 166 may comprise a stream of pixel values associated with one or more digital images." *Id.* at 43 (citing Ex. 1004, 8:57–9:13). "Accordingly," Patent Owner contends, "Grotmol discloses first, second and third circumstance representations include one or more object representations, or one or more collections of object representations." *Id.* (citing Ex. 1002 ¶¶ 117–121).

Patent Owner responds that "images are not 'object representations' under the proper construction of that term" because images are not "data structures that include an object property generated by object processing." Prelim. Resp. 24. Patent Owner's arguments disputing Petitioner's showing

center on its proposed claim construction of "object representation." *Id.* at 23–34. More specifically, Patent Owner argues the "generated object property" required by the recitation of "object representation" in claim 14 is like exemplary object properties in the '974 patent including "Object Property 630aa 'Cat' in Category 635aa 'Type', Object Property 630ab '6 m' in Category 635ab 'Distance', Object Property 630ac '56°' in Category 635ac 'Bearing.'" *Id.* at 26 (citing Ex. 1001, 80:21–25). "Grotmol's image and its pixels," Patent Owner asserts, are "significantly different" because "a pixel or value" such as that disclosed in Grotmol "is not processed to generate object properties," which are "useful." *Id.* at 26–27; *see also id.* at 28 (arguing that "input into object processing is different than output of object processing" so "Grotmol's images do not disclose 'object representations' as properly construed"); 31 (arguing that Grotmol's images 2000 and 2010 "are merely pictures"); 32 (arguing the '974 patent describes "object properties including characteristics, labels, and numbers" and that "Grotmol's image is logically, structurally, and functionally different than the object representation data structure as properly construed"). With respect to Grotmol's use of the term "representations" in its statement that image 2000 "may comprise representations [of] one or more objects" (Ex. 1004, 38:56–57), Patent Owner argues that those representations "are not object representation data structures including an object property generated by object processing, as disclosed and claimed in the '974 patent." Prelim. Resp. 33. Lastly, Patent Owner contends, "Grotmol's disclosure that a sensor can be used for object recognition and edge detection does not mean that Grotmol discloses object representations." *Id.* at 34.

In its Preliminary Reply, Petitioner argues that "Grotmol anticipates the use of 'object representations' even under Patent Owner's construction." Prelim. Reply 3. Patent Owner argues in its Preliminary Sur-reply that "Grotmol provides almost no disclosure regarding how object detection or feature comparison is performed, including what, if any, data structures are used in these processes." Prelim. Sur-reply 4. "Grotmol's cursory discussion of object and edge detection," according to Patent Owner, "does not support the argument that Grotmol discloses object representations that are ***data structures including an object property generated by*** object processing." *Id.*

As discussed above with respect to claim construction (*see* § IV.C.1), we decline to adopt Patent Owner's proposal that the term "object representation" should be construed as "a 'data structure that includes an object property generated by object processing.'" Prelim. Resp. 10. At this early stage, we, instead, agree with Petitioner that the '974 patent refers to object representations in broader contexts, including that "the first collection of object representations includes one or more representations of objects detected by the sensor at a time." Prelim. Reply 2 (citing Ex. 1001, 3:31–51); *see also* Pet. 42 (arguing that the '974 patent describes "object representations" in the phrase "one or more representations of objects detected by the sensor at a time") (citing Ex. 1001, 3:31–33)). We also agree with Petitioner that the '974 patent Specification describes a camera as an exemplary sensor. Pet. 42 (citing Ex. 1001, 69:45–56). Because we decline to adopt Patent Owner's proposed construction of the term "object representation," we preliminarily find that Patent Owner's arguments do not undermine Petitioner's showing at this early stage.

We remind the parties, at this early juncture, our findings and determinations regarding claim construction and anticipation are preliminary. We welcome the parties addressing construction of the term "object representation" further, as well as the issue of whether Grotmol discloses "object representation" under a narrower construction, in accordance with our rules during trial.

After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently, for purposes of institution, that Grotmol discloses each recitation of claim 14. We preliminarily find that Patent Owner's arguments do not undermine Petitioner's showing. Accordingly, we conclude that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing that claim 14 is anticipated by Grotmol.

7. Dependent Claim 15

a) The method of claim 1, wherein, to correlate the first circumstance representation with the first one or more instruction sets for operating the first device, a determination is made that the first one or more instruction sets for operating the first device temporally correspond to the first circumstance representation, and wherein the first circumstance representation includes: one or more object representations, or one or more collections of object representations.

Petitioner argues that, as described above with respect to limitation [1.2], "the images in Grotmol are . . . correlated with motor control indications issued around the same time." Pet. 44. Petitioner asserts that "Grotmol describes training behaviors in a robotic device by 'learning *associations* between sensory context . . . and a respective action . . . during training.'" *Id.* (citing Ex. 1004, 33:59–62). "This association," according to

Petitioner, "may be based on the timing of the images and the motor commands." *Id.* (citing Ex. 1004, 39:17–19). "Accordingly," Petitioner contends, "Grotmol discloses that a determination is made that the first instruction set temporally corresponds to the first circumstance representation." *Id.* (citing Ex. 1002 ¶¶ 67–73, 122). Additionally, Petitioner argues, as discussed above for claim 14, "Grotmol discloses that the first circumstance representation includes one or more object representations, or one or more collections of object representations." *Id.* at 45 (citing Ex. 1002 ¶¶ 117–121, 123).

For claim 15, Patent Owner relies on its arguments concerning "object representations" as for claim 14.

After consideration of the contentions and the evidence of record at this early stage, we determine that Petitioner has shown sufficiently, for purposes of institution, that Grotmol discloses each recitation of claim 15. As discussed above for claim 14, we preliminarily find that Patent Owner's arguments that Grotmol does not disclose "object representations' does not undermine Petitioner's showing. Accordingly, we conclude that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing that claim 15 is anticipated by Grotmol.

E. Unpatentability of Claim 11 as Obvious over Grotmol

Claim 11 recites as follows:

> The method of claim 1, wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth

> correlation is learned in another learning process that includes operating the second device at least partially by another user.

Ex. 1001, 171:44–53.

Petitioner argues that "Grotmol discloses that a human trainer ('user') can operate a robot during a training process for learning correlations," and that "multiple learning processes can be done to train multiple behaviors for the robot, including 'simple tasks' and 'complex tasks.'" Pet. 56 (citing Ex. 1004, 23:3–11, 24:17–67. 26:1–20, 39:13–22). Petitioner asserts that "Grotmol does not limit the number of users that can train the multiple behaviors for the robot," and one of ordinary skill "would have understood that different users can train different behaviors, particularly given that Grotmol describes the training of both simple and complex tasks." *Id.* at 56–57 (citing Ex. 1002 ¶ 139). According to Petitioner, it would have been obvious to a person of ordinary skill "that different trainers could be used to train behaviors involving different levels of complexity in order to take advantage of the varying skills and knowledge of trainers." *Id.* at 57. (citing Ex. 1002 ¶ 139). Thus, Petitioner contends, it would have been obvious in view of Grotmol and the knowledge of a person of ordinary skill "to have a second user perform an additional training resulting in additional correlation stored in the knowledgebase." *Id.*

Additionally, Petitioner argues, one of ordinary skill would have understood that "Grotmol discloses that a robot can be loaded with a first trained configuration learned during a training process involving operation of that robot by a user, and the robot can also be loaded with another trained configuration learned during [a] training process involving operation of a different (second) robot by a user." Pet. 57–58 (citing Ex. 1004, 33:24–35; Ex. 1002 ¶ 140).

Patent Owner responds that "Grotmol discloses only one user operating one device in only one learning process," and therefore does not disclose the claimed "another user." Prelim. Resp. 35. Patent Owner acknowledges that Grotmol discloses that a "trained configuration may be loaded to one or more other robots in order to provide learned behaviors," but argues that "that portion of Grotmol only discloses that a trained configuration may be loaded from a first robot to a second robot," and does not disclose "that the second robot detects a fourth circumstance that is later included in a fourth circumstance representation as part of a fourth correlation in the knowledgebase." *Id.* at 36. Additionally, according to Patent Owner, "Grotmol fails to disclose that 'at least a portion of the fourth correlation is learned in another learning process' involving another user, as required by claim 11." *Id.* at 37. Thus, Petitioner contends, "Grotmol does not disclose a knowledgebase that includes mixed knowledge of a first correlation and second correlation learned on one device in one learning process with one user and a fourth correlation learned on a second device in a second learning process with another user." *Id.*

Based on the present record, and as discussed above with respect to claim 4, we question whether Petitioner has sufficiently shown that Grotmol discloses a fourth correlation learned in another learning process by a second robot that is included as part of the knowledgebase along with the first and second correlations learned by the first robot. *See* § IV.D.3.(c). However, as discussed further in Section IV.F.4 below, we find that Petitioner has sufficiently shown for purposes of institution that this limitation would have been obvious over the combination of Grotmol and Hickman. Petitioner, if

it so desires, may further address the issue of whether Grotmol anticipates claim 11 during the trial.

F. Unpatentability of Claims 4 and 11 as Obvious over Grotmol and Hickman

Petitioner asserts that claims 4 and 11 would have been obvious over Grotmol in view of Hickman. Pet. 4, 58–66. We begin with an overview of Hickman, and then turn to the parties' contentions.

1. Overview of Hickman (Ex. 1005)

Hickman is titled "Shared Robot Knowledge Base for Use with Cloud Computing System." Ex. 1005, code (54). Hickman describes the following:

> The advantages of a shared robot knowledge base 306 multiply as robots are deployed around the world. If information about a particular object is "public" and therefore accessible by all robots, then information that a single robot learns about that object and uploads to the shared robot knowledge base 306 may be accessible by other robots all around the world. In operation, many millions or even many billions of robots may ultimately access the shared robot knowledge base 306. As a result, the shared robot knowledge base 306 enables robots to benefit from the collective information learned by many other robots.

Id. at 11:31–41.

2. Motivation to Combine Grotmol and Hickman

Petitioner argues that one of ordinary skill "would have been motivated to combine the autonomous robotic system of Grotmol with the shared robot knowledge base of Hickman." Pet. 58–61 (citing Ex. 1002 ¶¶ 142–149). Petitioner asserts that "Grotmol teaches that the training sets and training configurations from a first robot can be 'stored' or 'saved,'" and

the saved training configuration "may then be 'loaded into the robot being trained thereby providing one or more trained behaviors to the robot.'" *Id.* at 59 (citing Ex. 1004, 33:12–58). "Further," according to Petitioner, "the 'trained configuration may be loaded to one or more *other robots* in order to provide learned behaviors.'" *Id.* (citing Ex. 1004, 33:30–32).

Petitioner argues that "Hickman teaches a shared robot knowledge base that could advantageously be paired with Grotmol's autonomous robotic system in order to further facilitate the sharing of learned behaviors." Pet. 59. Petitioner quotes the following excerpt from Hickman to support its position:

> The advantages of a shared robot knowledge base 306 multiply as robots are deployed around the world. If information about a particular object is "public" and therefore accessible by all robots, then information that a single robot learns about that object and uploads to the shared robot knowledge base 306 may be accessible by other robots all around the world. In operation, many millions or even many billions of robots may ultimately access the shared robot knowledge base 306. As a result, the shared robot knowledge base 306 enables robots to benefit from the collective information learned by many other robots.

Id. (quoting Ex. 1005, 11:31–41). According to Petitioner, "Hickman additionally teaches that 'dividing application execution and storage between client devices and the cloud computing system allows more processing to be performed by the cloud computing system, thereby taking advantage of the cloud computing system's processing power and capability, for example.'" *Id.* (quoting Ex. 1005, 5:42–46). Additionally, Petitioner contends, "Hickman further teaches that cloud computing may 'free users from certain hardware and software installation and maintenance tasks.'" *Id.* at 59–60 (citing Ex. 1005, 1:38–41).

Petitioner argues that one of ordinary skill "would have been familiar with the teachings of both Grotmol and Hickman and would have readily appreciated the advantages of their combination." Pet. 60 (citing Ex. 1002 ¶¶ 142–149). In support, Petitioner cites a 2014 article in *Science* magazine including an interview with the CEO of the assignee of Grotmol which, Petitioner contends "expressly contemplated the benefits of the kinds of shared robot learning described in Hickman." *Id.* According to Petitioner, this article explains that:

> The Internet, in turn, will allow far-flung robots to share those lessons and skills. A robot that learns how to pick a strawberry without crushing it, for instance, could uplink that skill for the benefit of its kind around the globe.

Id. (quoting Ex. 1006, 183; citing Ex. 1002 ¶ 148).

Petitioner argues that both Grotmol and Hickman "are directed to the same field of the training and autonomous operation of robots," and "Hickman is listed on the face of Grotmol as a cited U.S. patent document." Pet. 60 (citing Ex. 1002 ¶¶ 142–147). Additionally, Petitioner contends, "Grotmol and Hickman also describe a similar problem in which a robot learns how to 'fetch' from a human," where "Grotmol describes the task as 'quite complex'" and "Hickman teaches that the fetch task can be 'optimiz[ed] . . . based on the collective experience of many different robots.'" *Id.* at 60–61 (citing Ex. 1005, 23:49–24:25; Ex. 1004, 24:31–48, 27:28–40, Fig. 9) (alteration in original). Relying on the testimony of Dr. Janet, Petitioner argues that "[t]he resulting combination of Grotmol's autonomous robotic system and Hickman's shared robot knowledgebase would have been expected and predictable." *Id.* at 61 (citing Ex. 1002 ¶ 150). "Grotmol expressly contemplates the sharing of trained configuration among robots," according to Petitioner, "and Hickman's

expansion upon this idea does not interfere with Grotmol's autonomous robotic system." *Id.* (citing Ex. 1002 ¶¶ 142–149).

Patent Owner responds that Petitioner's proposed combination relies on "impermissible hindsight to arrive at the claimed invention." Prelim. Resp. 45. Patent Owner argues that "Grotmol discloses one user operating one device in one learning process," and that "[t]he knowledge gained from this process in Grotmol, when loaded into a second device, is still knowledge of one user operating one device in one learning process." *Id.* "Further," according to Patent Owner, "Hickman's simple cloud storage of object information does not contemplate using correlations and other data structures to learn knowledge for autonomous operation as required by claims 4 and 11." *Id.*

Patent Owner criticizes Petitioner's obviousness analysis as deficient "because it fails to explain what claim limitation is missing from Grotmol and how Hickman discloses the missing claim limitation." Prelim. Resp. 45. Patent Owner further argues that Petitioner's use of impermissible hindsight is highlighted by its assertion that "[i]n the combination of Grotmol and Hickman, the shared knowledge base[] would include multiple training sets (i.e., circumstance representations correlated with instruction set) learned during the operation of multiple devices," because "Petitioner is using the claimed sophisticated use of correlations, multiple users, and multiple devices as a roadmap for its obviousness combination." *Id.* at 45–46 (citing Pet. 63). Finally, according to Patent Owner, "it would not have been obvious to one skilled in the art to use Hickman's primitive cloud storage method with Grotmol's single-device training sets, as both references fail to

contemplate the use of sophisticated data structures including correlations to enable autonomous operation." *Id.* at 46.

Based on the present record, we determined that Petitioner has established a reasonable likelihood that one of ordinary skill would have been motivated to combine Grotmol and Hickman as Petitioner proposes. First, we note that Patent Owner assertion that both Grotmol and Hickman "fail to contemplate the use of sophisticated data structures . . . to enable autonomous operation" does not appear to match up to the language of claims 4 and 11, which do not appear to require "sophisticated data structures." Based on the present record, we also find reasonable the assertions of Petitioner and Dr. Janet that both Grotmol and Hickman are directed to the same field of the training and autonomous operation of robots, that both references describe a similar problem in which a robot learns how to fetch from a human, and that one of ordinary skill would have understood that Hickman's shared robot knowledge base could have advantageously been paired with Grotmol's autonomous robotic system to further facilitate the sharing of learned behaviors. *See* Pet. 58–61; Ex. 1002 ¶¶ 142–149. Based on this record, we do not agree with Patent Owner's assertions that this analysis involves impermissible hindsight.

3. Dependent Claim 4

Petitioner argues that "Grotmol in combination with Hickman renders obvious the additional requirement of claim 4 that the knowledgebase includes a fourth correlation, which includes a circumstance representation detected by sensors of a second device correlated with an instruction set for operating the second device." Pet. 61 (citing Ex. 1002 ¶¶ 150–155). Petitioner asserts that "Grotmol discloses that the training sets and training

configurations from a robot (which include the instruction sets for operating first device) can be 'stored' or 'saved," and the saved training configuration "may then be 'loaded into the robot being trained thereby providing one or more trained behaviors to the robot.'" *Id.* at 62 (citing Ex. 1004, 33:12–58). "Further," according to Petitioner, "the 'trained configuration may be loaded to one or more *other robots* in order to provide learned behaviors.'" *Id.* (citing Ex. 1004, 33:30–32). "Thus," Petitioner contends, "Grotmol discloses that the memory component of a first robot can store the claimed first and second correlations as well as a fourth correlation learned from operating a second robot—i.e., a circumstance detected by the sensor of a second robot correlated with instructions for operating that second robot." *Id.* (citing Ex. 1002 ¶ 152). For example, Petitioner argues, Grotmol discloses "situations in which the user may wish to train the robot to 'find an object, grasp it, and bring it back' (i.e., fetch)," explains that this "task of playing fetch may be quite complex," and "outlines numerous user training steps that would be needed in order to teach this skill to the robot." *Id.* (citing Ex. 1004, 24:31–25:5).

Petitioner argues that "Hickman discloses such a system wherein learned robot behaviors are uploaded to a shared knowledge base for use in other robots." Pet. 62. More specifically, Petitioner asserts, "Hickman discloses 'a shared robot knowledge bases for use with cloud computing systems'" that "'collects data from a robot about an object the robot has encountered in its environment," and "stores the received data in the shared robot knowledge base[,] . . . sends instructions for interacting with an object to a robot[,] . . . [and] sends instructions to a robot for executing an application based on information stored in the shared robot knowledge

base.'" *Id.* at 63 (citing Ex. 1005, code (57)) (ellipses in original). "As noted in Hickman," Petitioner contends, "the 'information in the shared robot knowledge bases is updated based on robot experiences so that any particular robot may benefit from prior experiences of other robots.'" *Id.* And, according to Petitioner, Hickman discloses that "robot experiences" may include "'coaching' from humans" similar to "the training described in Grotmol." *Id.* (citing Ex. 1005, 23:36–48; Ex. 1002 ¶ 155). "For example," Petitioner asserts, "similar to the 'fetch' behavior described in Grotmol, Hickman describes a human coach training a robot how to properly grasp objects such as a cup, uploading and storing this information on a shared knowledge base (memory), then having another robot obtain these instructions from the memory and executing the instructions." *Id.* (citing Ex. 1005, 26:21–27:21).

"In the combination of Grotmol and Hickman," Petitioner argues, "the shared knowledge base[] would include multiple training sets (i.e., circumstance representations correlated with instruction set) learned during the operation of multiple devices." Pet. 63. "Accordingly," Petitioner contends, "the shared knowledge base[] would include training sets learned during operating of a first device (i.e., first and second circumstance representations correlated with first and second instruction sets for operating a first device) as well as trainings sets learned during operation of another device (i.e., fourth circumstance representation correlated with instruction set for operating a second device)." *Id.* (citing Ex. 1002 ¶¶ 150–155).

Patent Owner responds that "Grotmol does not disclose a knowledgebase that includes mixed knowledge of a first correlation and second correlation learned on one device in one learning process and a

fourth correlation learned on a second device in another learning process." Prelim. Resp. 41. Hickman, according to Patent Owner, "also does not disclose or suggest the claimed correlations including the fourth correlation learned in another learning process involving the second device, as required by claim 4." *Id.* Patent Owner acknowledges that "Hickman discloses a cloud system that can generally learn from multiple devices," but argues that "it does not disclose the claimed first and second correlations learned on one device in one learning process and the fourth correlation learned on a second device in a second learning process." *Id.* at 41–42. To the contrary, according to Patent Owner, Hickman merely "provides a primitive method for storing and sharing object information." *Id.* at 42 (citing Ex. 1005, code (57)). Thus, Patent Owner contends, Hickman does not disclose the claimed correlations and how those correlations are used in a knowledgebase to autonomously operate a device, as required by claim 4." *Id.*

Based on the present record, and for purposes of institution, we determine that Petitioner has demonstrated a reasonable likelihood that claim 4 would have been obvious over the combination of Grotmol and Hickman. *See* Pet. 61–64; Ex. 1002 ¶¶ 150–155. Additionally, based on the present record, Patent Owner's arguments do not overcome Petitioner's showing and do not squarely address Petitioner's proposed combination. Patent Owner argues that Grotmol does not disclose a knowledgebase with mixed knowledge of first and second correlations learned on one device and a fourth correlation learned on a second device, but Petitioner relies on Hickman to teach the use of a shared knowledgebase with learned multiple behaviors from multiple robots. *See* Pet. 62–63; Prelim Resp. 41. Patent Owner argues that Hickman does not disclose the claimed correlations, but

Petitioner relies on Grotmol to disclose circumstance representations correlated with the various instruction sets. *See* Pet. 61–62; Prelim. Resp. 41–43. Therefore, Patent Owner's arguments view the references in isolation, rather than addressing the combination as a whole.

4. Dependent Claim 11

Petitioner argues that, as described above for Grounds 1 and 2, Grotmol discloses:

> (i) training a robot herein images (circumstance representations) detected by a camera during operation of the robot are correlated with motor commands (instructions); (ii) multiple training (learning) processes can be done to train multiple behaviors; and (iii) a robot can be loaded with a first trained configuration learned during a training process involving operation of that robot by a user, and can also be loaded with another trained configuration from a training process involving operation of a different robot by a user.

Pet. 64 (citing Ex. 1004, 33:24–35; Ex. 1002 ¶ 156).

Petitioner argues that "Hickman discloses 'a shared robot knowledge bases for use with cloud computing systems'" that "'collects data from a robot about an object the robot has encountered in its environment," and "stores the received data in the shared robot knowledge base[,] . . . sends instructions for interacting with an object to a robot[,] . . . [and] sends instructions to a robot for executing an application based on information stored in the shared robot knowledge base.'" Pet. 64–65 (citing Ex. 1005, code (57)) (ellipses in original). Petitioner asserts that, as noted in Hickman, the "information in the shared robot knowledge bases is updated based on robot experiences so that any particular robot may benefit from prior experiences of other robots." *Id.* at 65 (citing Ex. 1005, code (57)). Additionally, according to Patent Owner, Hickman discloses that "robot

experiences" may include "'coaching' from *humans*'" like "the training described in Grotmol." *Id.* (citing Ex. 1005, 23:36–48; Ex. 1002 ¶ 156). "For example," Petitioner asserts, "similar to the 'fetch' behavior described in Grotmol, Hickman describes a human coach training a robot how to properly grasp objects such as a cup, uploading and storing this information on a shared knowledge base (memory), then having another robot obtain these instructions from the memory and executing the instructions." *Id.* (citing Ex. 1005, 26:21–27:21).

"As explained above," Petitioner argues, "it would have been obvious to combine Hickman's shared robot knowledge base with Grotmol's autonomous robot system such that the shared knowledgebase includes the training of multiple robots by multiple users." Pet. 65 (citing Ex. 1002 ¶ 157). "The combination," according to Petitioner, "discloses and renders obvious a knowledgebase that includes circumstance representations correlated with instructions for operating a first device (i.e., claimed first and second circumstance representations correlated with first and second instruction set for operating the first device) learned during a training using the first device," and "also includes a circumstance representation correlated with instructions for operating a different device (i.e., claimed fourth circumstance representation correlated with fourth instruction set for operating a second device) learned during a training using the different device." *Id.* at 65–66 (citing Ex. 1002 ¶¶ 156–157).

Patent Owner responds that, "as discussed above regarding Ground 1 and claim 11, Grotmol does not disclose or suggest the claimed 'fourth correlation,' 'another user' and the 'second device' in claim 11." Prelim. Resp. 43. More specifically, Patent Owner argues, "Grotmol does not

disclose or suggest that the knowledgebase includes the claimed fourth correlation learned in another learning process involving the second device and another user." *Id.* at 43–44. "As discussed above regarding claim 4," Patent Owner asserts, "Grotmol discloses one user operating one device in one learning process," and "[t]he knowledge gained from this process in Grotmol, when loaded into a second device, is still knowledge of one user operating one device in one learning process." *Id.* at 44. Thus, according to Petitioner, "Grotmol does not disclose or suggest a knowledgebase that includes mixed knowledge of a first correlation and second correlation learned on one device in one learning process with one user and a fourth correlation learned on a second device in another learning process with another user." *Id.*

Petitioner argues that "Hickman also does not disclose or suggest the claimed correlations including the fourth correlation learned in another learning process involving the second device and another user, as required by claim 11." Prelim. Resp. 44. According to Petitioner, "Hickman discloses a cloud system that can generally learn from multiple devices, but it does not disclose the claimed first and second correlations learned on one device in one learning process with one user and the fourth correlation learned on a second device in a second learning process with another user." *Id.*

Accordingly, Patent Owner argues, "[f]or the same reasons discussed above with respect to claim 4, Hickman does not disclose or suggest the claimed correlations and how those correlations are used in a knowledgebase to autonomously operate a device, as required by claim 11." Prelim. Resp.

44. " Thus," Patent Owner contends, "Grotmol and Hickman do not disclose or suggest the features of claim 11." *Id.*

Based on the present record, and for purposes of institution, we determine that Petitioner has demonstrated a reasonable likelihood that claim 11 would have been obvious over the combination of Grotmol and Hickman. *See* Pet. 64–66; Ex. 1002 ¶¶ 156–157. Additionally, based on the present record, Patent Owner's arguments, which are similar to its arguments for claim 4, do not overcome Petitioner's showing and do not squarely address Petitioner's proposed combination. Patent Owner argues that Grotmol does not disclose a knowledgebase with mixed knowledge of first and second correlations learned on one device and a fourth correlation learned on a second device in another learning process with another user, but Petitioner relies on Hickman to teach the use of a shared knowledgebase with learned multiple behaviors from multiple robots. *See* Pet. 64–66; Prelim Resp. 44. Additionally, Patent Owner argues that Hickman does not disclose the claimed correlations, but Petitioner relies on Grotmol to disclose circumstance representations correlated with the various instruction sets. *See* Pet. 27, 64; Prelim. Resp. 44. Therefore, Patent Owner's arguments view the references in isolation, rather than addressing the combination as a whole.

V. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated that there is a reasonable likelihood that it would prevail in proving the unpatentability of at least one of the challenged claims of the '974 patent. We thus institute an *inter partes* review of all of the challenged

claims of the ’974 patent on all grounds asserted in the Petition. *See* 37 C.F.R. § 42.108(a).

Any findings or conclusions in this Decision are made only for the purposes of institution and are not dispositive of any issue. We have not made a final determination with respect to the patentability of any challenged claim. Our final determination will be based on the record as fully developed during trial, including any evidence or argument timely presented by the parties under our Rules.

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 4–5, 7, 11, and 14–15 of the ’974 patent is hereby instituted on all grounds of unpatentability set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial commencing on the entry date of this decision.

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