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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AVIDBOTS CORP. and AVIDBOTS USA CORP.,
Petitioners,

v.

BRAIN CORPORATION.,
Patent Owner

Case No. IPR2025-01603
US Patent No. 10,823,576

PATENT OWNER'S PRELIMINARY RESPONSE

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OTHER AUTHORITIES

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LIST OF EXHIBITS

Exhibit	Description
2001	Proposed Protective Order
2002	Redlined Protective Order
2003	Complaint for Patent Infringement, <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569, Dkt. 1 (N.D. Ill. Dec. 6, 2024)
2004	Declaration of Daniel P. Hughes
2005	Northern District of Illinois Local Patent Rules
2006	Joint Initial Status Report & Notification of Docket Entry, <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569, Dkts. 40 & 42 (N.D. Ill.)
2007	Report of the Parties' Planning Meeting, <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569, Dkt. 34 (N.D. Ill.)
2008	Defendant Avidbots's Second Supplemental Non-Infringement and Invalidity Contentions, <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)
2009	Certificate of Service of Complaint in <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569, Dkt. 8 (N.D. Ill.)
2010	HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY - Exhibit 97 to December 11, 2025 Cabrerra Deposition in <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)
2011	HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY - Exhibit 99 to December 11, 2025 Cabrerra Deposition in <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)
2012	HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY - Excerpts of December 11, 2025 Cabrerra Deposition in <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)

2013	HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY - Exhibit 102 to December 11, 2025 Cabrerra Deposition in <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)
2014	HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY - Exhibit 104 to December 11, 2025 Cabrerra Deposition in <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)
2015	HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY - Excerpt of Exhibit 103 to December 11, 2025 Cabrerra Deposition in <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)
2016	Printout of November 16, 2019 Wayback Machine archive of https://www.braincorp.com/patents (captured on January 7, 2026)
2017	Printout of April 16, 2022 Wayback Machine archive of https://www.braincorp.com/patents (captured on January 7, 2026)
2018	HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY – Document produced by Avidbots bearing production nos. AVID0576615–AVID0576616
2019	Printout of https://www.braincorp.com/legal/brain-corp-patents/ (captured January 14, 2026)
2020	Printout of https://www.braincorp.com/ (captured January 16, 2026)
2021	Redacted Excerpt of Defendant Avidbots’s Final Invalidity Contentions, <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)
2022	HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY – Declaration of Allan Le An
2023	Order Denying Motion to Stay, <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No. 1:24-cv-12569 (N.D. Ill.)
2024	Redacted Excerpt of Defendant Avidbots’s Final Invalidity Contentions, <i>Brain Corp. v. Avidbots Corp. et al.</i> , Case No.

	1:24-cv-12569 (N.D. Ill.) (includes additional pages compared to EX2021)
2025-2049	RESERVED
2050	Declaration of Marilyn Wolf, Ph.D.
2051	Marilyn Wolf CV

Patent Owner Brain Corporation (“Brain”) submits this Preliminary Response to the Petition filed by Avidbots Corp. and Avidbots USA Corp. (collectively, “Petitioners”) regarding U.S. Patent No. 10,823,576 (“’576 Patent”).

I. INTRODUCTION

To the extent not discretionarily denied, the Petition should be denied on the merits.

First, the Petition should be denied because Petitioners argue in this IPR that no construction of any terms is necessary, but failed to inform the Board that they are simultaneously arguing in district court that several claims are indefinite. Petitioners do not explain why different constructions are warranted between the district court and PTAB, and thus, the Petition should also be denied for failing to satisfy 37 C.F.R. §42.104(b)(3).

Second, Petitioners’ anticipation and obviousness theories rest on legal errors and mischaracterizations of the claims and the asserted art. For example, all of the Petition’s anticipation arguments are legally flawed. The Petition argues that Olson anticipates the claims but fails to recognize that its arguments mixed and matched disclosures describing different variants of an algorithm. Similarly, the Petition also argues that Stachniss anticipates the claims, but Stachniss is a book chapter that provides an overview of many different robotic mapping techniques used by different robots with different sensors. Indeed, the Petition admits “Stachniss is a

reference guide describing the overview of many topics in the robotics field” (Pet., 80) and, specifically, that “[i]t describes several SLAM methods.” Pet., 46. The Petition again mixes and matches the different disclosures within Stachniss for a purported “anticipation” argument, which is prohibited. Those failures with respect to anticipation also carry over into the Petition’s obviousness-based grounds because Petitioners never recognize that they combined different disclosures within Olson and Stachniss, and thus never offer a motivation to combine, reasonable expectation of success, or even a coherent explanation of how those different disclosures are combined.

Third, the Petition fails to show that the asserted references disclose numerous limitations. For example, the ’576 Patent addresses the problem of enabling autonomous mobile robots—notably commercial floor-cleaning robots—to associate meaningful operational actions with precise locations on a learned route on a map created in real-time. None of the cited references, including Olson, Stachniss, and Fong, discloses, teaches, or suggests this capability.

As another example, the claims require that each “node” along a robot’s route comprise a “range ... based on confidence measure at a respective node.” But the Petition fails to present a cogent argument how Olson discloses such that “range.” Instead, the Petition points to many different concepts spread across multiple

chapters and dozens of pages within Olson without explaining how any of those different concepts discloses the claimed “range.”

Fourth, three of the five asserted grounds rely on Stachniss (EX1005) and/or Prassler (EX1007), yet the Petition does not argue that they qualify as prior art. Instead, the Petition improperly incorporates those arguments by reference to an expert declaration. But that declaration is based on hearsay, and worse, is internally inconsistent. For example, that declaration inconsistently asserts that Stachniss and Prassler were somehow publicly available on January 1, 2016, yet in the same sentence, state that they were *created* in July 2016. At the very least, this contradiction raises the sort of factual issues best decided by the District Court, not the Board.

For these reasons, and others detailed herein, the Board should deny institution.

II. BACKGROUND

A. Brain Corporation

Founded in 2009, Brain is an autonomous technology company that pioneered the commercial robotics domain by developing innovative solutions in robotics and artificial intelligence. In 2014, after significant investment in research and development, Brain launched its Brain Operating System (BrainOS®), which provided a breakthrough in robot programming. This breakthrough was inspired by

Brain's commitment to understanding how biological brains perceive their environment via inputs and learn from demonstration. BrainOS® is the leading artificial intelligence platform for powering robots in commercial public spaces worldwide.

Soon after developing BrainOS®, Brain recognized that the commercial floor cleaning industry was experiencing a labor shortage. Brain then partnered with major floor equipment manufacturers to integrate BrainOS® into manual cleaning equipment. By 2018, Brain began collaborating with major global retailers to provide autonomous floor scrubbers in several of their stores. Brain's technology solved problems unique to autonomous floor cleaning, including how to navigate dynamic environments while cleaning as much of the desired area as possible. The success of the initial launch quickly led to Brain deploying autonomous floor scrubbers in stores nationwide.

Following this success, Brain continued to expand in the areas of autonomous technology and artificial intelligence. In 2019, Brain was named a top Autonomy Solution Provider. Brain's technology has now been implemented in over 40,000 mobile robots that have operated for more than 21 million operational hours. EX2020; EX2022, ¶5.

B. The '576 Patent

The '576 Patent is titled “Systems and Methods for Robotic Mapping” and issued November 3, 2020. EX1001, Cover. The '576 Patent is a continuation of an earlier application originally filed November 1, 2016, which issued as U.S. Patent No. 10,274,325. *Id.*; *see also* EX2050, ¶31.

The '576 Patent describes and claims systems and methods that enable a robot—such as a commercial floor-cleaning robot—to learn a route and actions performed along that route, so that the robot can later navigate and perform those actions autonomously. EX1001, 6:8-32. For example, the specification explains the robot can be driven or remotely operated by a human operator along a desired path, during which the operator also performs the cleaning or other task-related actions that the robot learns and later repeats autonomously. *Id.* at 6:8-32, 7:27-45, 22:49-57; *see also* EX2050, ¶32.

As the operator guides the robot through the environment, the robot collects sensor data at discrete points along its route represented by nodes. EX1001, 15:63-66. Each node can be associated with an estimated pose of the robot. *Id.*, 16:20-31. Because raw sensor data contains noise and drift over time, the robot assigns each node a range, which can be computed by a posterior probability distribution or other methods. *Id.*, 16:32-56. The ranges can represent areas around each node wherein the actual location of the robot can be within those areas. *Id.*; *see also* EX2050, ¶33.

These ranges can expand as the robot travels or contract when higher-confidence information is available. EX1001, 16:58-67. Figure 6A illustrates an example of how a robot 302 travels along a route, wherein nodes 602A-602D have associated ranges 604A-604D that grow larger as the robot travels farther.

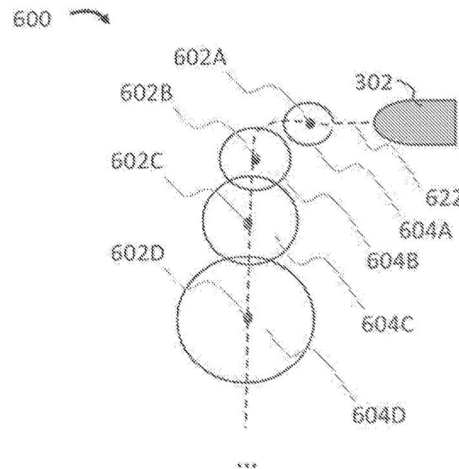


FIG. 6A

EX1001, Fig. 6A, 15:63-16:67; *see also* EX2050, ¶33.

The patent also explains that the robot associates the actions performed by the robot while traveling on the route, such as during an operator's demonstration, with the locations and positions of the robot on the route. EX1001, 22:30-61, 7:27-45, 13:11-32. These actions can include, in the context of floor cleaning robots, turning on/off water, spraying water, vacuuming, gesticulating arms, and the like. *Id.*; *see also* EX2050, ¶34.

C. Prosecution History

The '576 Patent issued from application No. 16/356,160 (“’160 Application”), which was a continuation of application No. 15/340,807, originally filed on November 1, 2016. EX1001, Cover.

Unable to find a substantive fault with the examination of the '576 Patent, Petitioner argues that the Office “erred from the outset” by assigning the '160 Application to Art Unit 3664 (“Data Processing: Generic Control Systems or Specific Applications”) instead of Art Unit 3661 (“Data Processing: Vehicles, Navigation, and Relative Location”). Pet., 3. But Petitioner cites no authority—and Patent Owner is aware of none—suggesting that the Office’s initial assignment of an art unit can comprise an error, much less an error warranting an *inter partes* review. Indeed, “primary examiners have full authority to accept any application submitted to them that they believe is properly classifiable in a class in their art unit.” MPEP § 903.08 (9th ed. June 2020). And here, Petitioners do not even demonstrate that Art Unit 3664 is somehow “inappropriate,” merely that another art unit has a narrower name that Petitioners subjectively believe would have been more appropriate.

Based solely on the art unit alone, Petitioners accuse the examiner of being “unfamiliar with well-known techniques in the art” and that the examiner thus “erred by failing to recognize that the [claim] amendment only captured well-known

techniques in this art.” Pet., 3. But the same examiner already previously examined the ancestor application to the ’576 Patent. *See* U.S. Patent 10,274,325, Cover (identifying Dale Moyer as primary examiner). And the examiner’s search strings confirm his familiarity with the art, evidenced by the examiner’s use of terms of art like “SLAM,” “confidence,” “variance,” “uncertainty,” “Kalman,” “ekf,” (an acronym for Extended Kalman Filter, a SLAM technique), “Mahalanobis,” and “chi-squar\$3.” *See* EX1002, 207-208, 213. Indeed, the examiner’s search string reveals a far more structured and detailed search than Petitioners’ elementary searches for “robot,” “map,” “navigation,” and “home base.” Petitioner’s Search Disclosure, Paper 6, 1.

D. The Level Of Ordinary Skill In The Art

For purposes of this preliminary response only, Patent Owner applies Petitioner’s description of the level of ordinary skill in the art. Pet., 11; *see also* EX2050, ¶¶35-38. As discussed herein, the asserted art fails to teach the claim limitations alone or in combination regardless of the level of ordinary skill in the art. Patent Owner does not necessarily agree with Petitioner’s description of the level of skill and reserves the right to contest that description and propose a different level of skill if this proceeding is instituted.

**III. PETITIONER FAILS TO EXPLAIN WHY IT IS ADVANCING
DIFFERENT CLAIM CONSTRUCTION POSITIONS IN DISTRICT
COURT**

The Director and the Board have recently made clear that a Petitioner fails to satisfy 37 C.F.R. §42.104(b)(3) when it advances different claim construction positions in a co-pending district court litigation and in IPR without sufficiently explaining why the alternative positions are warranted. *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20 at 4-5 (Nov. 3, 2025) (precedential); *Tesla, Inc. v. Intellectual Ventures II LLC*, IPR2025-00340, Paper 18 at 2-4 (Nov. 5, 2025) (informative) (vacating and denying institution where petitioner argued in district court that a claim limitation is indefinite but argued no claim terms required construction in IPR petition).

Like in *Tesla*, Petitioners are arguing in district court that multiple claim terms of the '576 Patent are indefinite, yet the Petition stated that “no construction of any claim term is necessary for the Board to resolve[.]” Pet., 7. Specifically, in its final invalidity contentions in the district court, Petitioners have argued that the following terms are indefinite:

- “selectively actuate one or more systems as the robot travels along the route” (claim 12)
- “detecting a home locator” (claim 17)

- “the range of each one of the plurality of nodes corresponds to a region around each one of the plurality of nodes such that each one of the plurality of nodes is located within the range” (claim 22)

EX2024, 34-36.

Patent Owner obviously does not agree that any claim terms are indefinite. However, it is solely Petitioners’ burden to satisfy 37 C.F.R. §42.104(b)(3) and explain why any different constructions are warranted between the PTAB and district court. Petitioners’ failure to do so renders the Petition deficient and warrants denial of institution. *Tesla*, IPR2025-00340, Paper 18 at 2-4.

IV. GROUND 1 FAILS TO DEMONSTRATE ANTICIPATION BY OLSON

Petitioners argue in Ground 1 that every claim of the ’576 Patent is anticipated by Olson (EX1004). However, Ground 1 does not demonstrate that any claim is anticipated. The Petition fails to demonstrate that Olson discloses that each node comprises a “range ... based on confidence measure at a respective node.” Further, the Petition fails to demonstrate that Olson discloses “associat[ing] actions undertaken by the robot during traveling ... with the location and position of the robot on the route on the map.” Finally, Petitioners fail to demonstrate that Olson discloses “generat[ing] a map of the environment and a route on the map in real-time, the map being generated concurrently with the collection of the data as the robot travels along the route in the environment.”

A. The Petition Fails to Demonstrate Map Generation in “Real-Time” and Improperly Mixes Different Embodiments Within Olson for Anticipation (Limitation 1[b][2], 13[b], 25[b])

Each independent claim recites “[generate/generating] a map of the environment and a route on the map in real-time.” Limitations 1[b][2], 13[b], 25[b].¹ However, the Petition pays next to no attention to the “real-time” requirement.

1. The Petition Does Not Address “Real-Time”

The Petition argues, in a single sentence, that “Olson discloses a multitude of sensors that are used to generate a map as a robot travels along a route in real-time, where the map includes both a representation of the environment as well as the location and position of the robot as it traveled the route. *See* IV.A.2.a-d.” Pet., 17-18. The Petition cross-references Sections IV.A.2.a-d, but those sections discussed Limitations 1[pre] through 1[b][1], none of which relate to the “real-time” requirement. Indeed, the Petition does not mention “real-time” anywhere in those sections. *See* Pet., 14-17; EX2050, ¶40. And the Petition does not appear to address the “real-time” requirement anywhere else in its discussion of Limitation 1[b][2]. *See* Pet., 17-21; EX2050, ¶40. The Petition’s arguments for Limitations 13[b] and 25[b] fare no better as they merely rely on cross-references to 1[b][2]. Pet., 36, 41.

¹ For purposes of this proceeding and for the convenience of the Board, Patent Owner uses the limitation numbering from the Petition. Patent Owner does not necessarily agree with how the Petition numbers the limitations and reserves the right to use different limitation numbering in other proceedings.

2. The Petition Mixes Different Embodiments

At best, the Petition addresses a separate requirement also contained in Limitation 1[b][2]/13[b]/25[b] of “the map being generated concurrently with the collection of the data as the robot travels along the route in the environment.” Pet., 20. For that, the Petition argues that “Olson explains that its robot and algorithm may be ‘used in online settings—i.e., where the optimization problem [map] is constantly changing as new sensor data continuously arrives.’” *Id.* However, “real-time” is recited separately from “concurrently” in the claim and the Petition does not argue that “concurrently” satisfies “real-time.” See Pet., 20; EX2050, ¶41. Regardless, the Petition’s “concurrently” argument fails because it combines different embodiments described within Olson for an anticipation argument.

“To anticipate a claim, a single prior art reference must expressly or inherently disclose each claim limitation.... But disclosure of each element is not quite enough—this court has long held that ‘[a]nticipation requires the presence in a single prior art disclosure of all elements of a claimed invention *arranged as in the claim*’” *Finisar Corp. v. DirecTV Group, inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008). Thus, even if a reference discloses all the claimed limitations within its four corners, it does not anticipate unless “all of the limitations [are] arranged or combined in the same way as recited in the claim.” *NetMoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008) (no anticipation where prior art disclosed two distinct

protocols, neither of which included all claim limitations, and improper to combine parts of the two protocols in an anticipation analysis); *Microsoft Corp. v. Biscotti, Inc.*, 878 F.3d 1052, 1069 (Fed. Cir. 2017) (“[A]nticipation is not proven by ‘multiple, distinct teachings that the artisan might somehow combine to achieve the claimed invention.’”).

There is no dispute that Olson describes *two distinct algorithms*: a “batch” algorithm and an “online” algorithm. See EX1004, 3 (“Both batch and online versions of the algorithm are described.”), 16 (“We describe an optimization algorithm A batch version of this algorithm (for off-line use) is described in Chapter 4, followed by a version suitable for on-line use in Chapter 5.”), 106 (“This thesis describes both a batch and online version of the algorithm”); EX2050, ¶42. Petitioners admit that there are two algorithms discussed in Olson. Pet., 12 (“Olson further discloses both ‘batch and online versions of [its] algorithm.’”

Critically, in a batch algorithm, mapping is done *after* all data has been collected—*not* concurrently with the data collection. Compare EX1004, 56 (explaining in “batch applications,” the “solution is only needed at the very end”) with *id.* at 11-12 (“online settings—i.e., where the optimization problem is constantly changing as new sensor data continuously arrives”); see also EX1005, 1155 (“[A]lgorithms for the full SLAM problem are often batch, that is, they process all data at the same time.”); EX2050, ¶¶42-43.

The Petition relies on disclosures relating to both the batch and online algorithms for Limitation 1[b][2]/13[b]/25[b]. For example, the Petition relies on “maps produced by its algorithm, including a map of the Intel Research Center (IRC), depicted in Figure 3-17.” Pet., 19-20. But that map was generated *after* the data collection, not concurrently with the data collection. See EX1004, 49 (“The Intel dataset consists of 875 poses, spanning 44.9 minutes of robot driving. ... Total processing time was 180 s.”); EX2050, ¶44. Elsewhere, the Petition relies on the batch algorithm for the “range” limitation. See Pet., 21 (citing EX1004, 63-66 (part of Olson Chapter 4, discussing the batch algorithm)); EX2050, ¶45. But the Petition relies on Olson’s “online” algorithm for the “concurrently” portion of Claims 1, 13, and 25. Pet., 20; EX2050, ¶41.

The Petition never sorts between the two algorithms and never addresses what differences or similarities the two algorithms have. The Petition also never suggests that the two algorithms would be combined or present a motivation to combine (which would be improper for anticipation). Thus, because the Petition relies on different versions of Olson’s algorithm, the Petition fails to demonstrate both the “real-time” and “concurrently” limitations. EX2050, ¶46.

B. Petitioner Fails to Demonstrate Olson Discloses That Each of the Nodes Comprises a Range Based on a Confidence Measure at a Respective Node(Limitations 1[b][2], 13[b], 25[b])

Each independent claim recites generating a map based on measurements taken by a robot's sensor at "each one of a plurality of nodes along the route traveled by the robot," "each one of the plurality of nodes comprising a range, the range of each one of the plurality of nodes being based on confidence measure at a respective node." *See* Limitations 1[b][2], 13[b], 25[b].

Figure 6A of the '576 Patent illustrates examples of the claimed ranges for each node in robot's route.

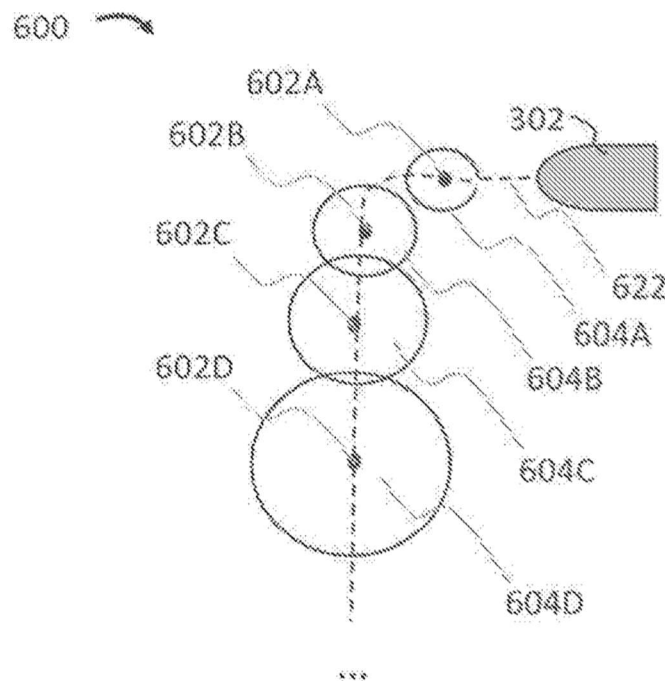


FIG. 6A

EX1001, Fig. 6A; *see also* EX2050, ¶47. The specification explains that “[a]s robot 202 navigates along the route represented by route 622 illustrated in graph 600, it can take measurements at nodes 602A-602D[.]” EX1001, 15:63-65. Further, “[e]ach of edges between nodes 602A-602D can have an associated probabilistic function and/or probabilistic distribution, illustrated for each of nodes 602A-602D as ranges 604A-604D, respectively.” *Id.*, 16:32-35. The patent explains that “ranges 604A-604D can be representative, at least in part, of areas around each node 602A-602D, wherein the actual location of robot 202 relative to graph 600 (e.g., illustrated as robot indicator 302) can be within the areas.” *Id.*, 16:48-52. Because of “compounding noise, sensor drift, and other factors,” these ranges can become larger, “representing more uncertainty of the positioning of nodes 602A-602D.” *Id.*, 16:58-63. Thus, the specification and the claims make clear that the claimed range is the range related to *a node*, not some other type of range or probability, such as the operative range of a sensor or the probability that a map is correct. EX2050, ¶48.

The Petition fails to demonstrate that Olson discloses that each of the plurality of nodes comprises such a range. The Petition points to several disclosures but none relate to “*nodes* comprising a range.”² *See* Pet., 20-21; EX2050, ¶49.

First, the Petition states that Olson’s “map building problem can be described as finding the *posterior probability distribution function of a map x*.” Pet., 20-21

² All *emphases* added unless noted otherwise.

(emphasis in original). But that does not describe that each node comprises a range based on a confidence measure at a respective node. EX2050, ¶50. Indeed, this disclosure does not discuss nodes at all. The Petition never explains the significance of this statement or why it emphasized the phrase “posterior probability distribution function of a map x .” Pet., 20-21; EX2050, ¶50.

Second, the Petition argues that Olson discloses “[t]he nodes of a pose/feature graph are the same as the random variables of a graphical model.” Pet., 21. Again, the Petition contains no further explanation of the significance of that disclosure. That statement does not describe that each node comprises a range based on a confidence measure at a respective node. EX2050, ¶51.

Third, the Petition argues that “Olson further discloses that the probability distribution for a node may be represented as a range that ‘resemble[s] radially-oriented ellipses.’” Pet., 21 (quoting EX1004, 118). But Petitioner mischaracterized Olson’s disclosure. Olson’s disclosure at page 118 was not discussing the probability distribution for a node (which represents the position of the robot). EX1004, 118; EX2050, ¶52. Rather, Olson was describing that “[t]he noise model of the laser scanner involves uncertainty in both range and bearing,” and that “[r]ange is typically more uncertain than bearing, and so the probability distributions resemble radially-oriented ellipses.” EX1004, 117-118. A POSITA would have understood that the “radially-oriented ellipses” referenced here were describing the

uncertainty of the laser scan points collected by a laser scanner sensor, not a range for a **node** (position of the robot). EX2050, ¶52. Indeed, Olson explains that “the probability distribution of an observed point is dependent upon the position of that point relative to the scanner.” EX1004, 118. Thus, this disclosure does not disclose that each node comprises a range based on a confidence measure at a respective node. EX2050, ¶52.

The Petition also cites pages 13, 22, and 32 as a “*see also*” cite, but provides no explanation of the significance of those pages. Pet., 21. Those pages are from disparate sections of Olson that describe different concepts unrelated to the laser-scan-uncertainty discussed at page 118. EX2050, ¶52.

Fourth, the Petition argues that “Olson further discloses that confidence and error may be modeled as an information matrix, Σ^{-1} , and with a chi-squared error matrix, where chi-squared represents a range of uncertainty.” Pet., 21 (citing EX1004, 19-25, 32, 63-66, 118). But again, the Petition does not explain how that somehow discloses that each node comprises a range based on a confidence measure at a respective node. The Petition cites twelve different pages scattered throughout Olson for this single-sentence conclusion, but never explains any of those citations. *Id.*; EX2050, ¶53. The Petition does not explain the significance of an information matrix or how it results in the claimed range for each node. Pet., 21; EX2050, ¶53.

Nor does the Petition explain the significance of chi-squared error and how it supposedly results in a claimed range for each node. Pet., 21; EX2050, ¶53.

Instead of presenting that explanation in the Petition, the Petition merely concludes that “[a] POSITA would understand that these disclose a range associated with each node based on a confidence measure” and cites three paragraphs of the Karam Declaration that span two pages. Those arguments in the declaration should be ignored as improperly incorporated by reference. *See Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12 at 9 (Aug. 29, 2014) (informative) (“practice of citing the Declaration to support conclusory statements that are not otherwise supported in the Petition also amounts to incorporation by reference”).

But even if considered, the Karam Declaration does not explain how references to an information matrix or chi-squared error disclose that each node comprises a range that is based on a confidence measure. EX2050, ¶53. For example, Olson explains in a section titled, “Interpretation of the Chi-Squared Error” that the chi-squared error is “the square of the Mahalanobis distance,” and that such distances are “used as plausibility tests: values above three ... strongly indicate either an error in z (e.g., a measurement outlier), the confidence Σ_i , or the state.” EX1004, 25. The Petition and expert declaration do not address this section, which shows that a chi-squared error is not a range for each node, but rather a statistical tool for indicating there is a problem with the map. EX2050, ¶53. Indeed, Olson

expressly states that “the X^2 error tells only about the errors of the constraints, *not the positions of the nodes.*” EX1004, 25-26. Thus, a POSITA would not understand Olson’s reference to chi-squared error as somehow disclosing that each node comprises a range based on a confidence measure. EX2050, ¶53.

Notably, the Petition takes an everything-but-the-kitchen-sink approach to the “range” limitation. The fact that the Petition relied on so many different disclosures within Olson without adequately explaining any of those disclosures indicates that Petitioners do not know what disclosure, if any, in Olson would correspond to the claimed “range” and further underscores that Olson does not disclose the claimed ranges for each node.

C. Petitioner Fails to Demonstrate Olson Associates Actions Undertaken by the Robot During Traveling with the Location and Position of the Robot on the Route on the Map (Limitations 1[b][3], 13[c], 25[c])

Each independent claim recites “associate [or associating] actions undertaken by the robot during traveling along the route with the location and position of the robot on the route on the map.” *See* Limitations 1[b][3], 13[c], 25[c]. The Petition fails to show this limitation is met for two independent reasons. First, the Petition fails to show disclosure of the claimed “actions.” Second, the Petition fails to show that any actions are “associate[d] ... with the location and position of the robot.”

1. Petitioner Fails To Demonstrate That Olson Discloses The Claimed Actions

The Petition argues that “[t]he actions undertaken by the robot include collection of sensor data ... and storage of that data in association with the location/position of the robot on the route on the map, as well as obstacle avoidance and route planning.” Pet., 22. The Petition further argues that “each of a robot’s motions through an environment are actions undertaken by a robot, and those motions are measured and associated with the robot’s location and position on the route on the map.” *Id.* Thus, the Petition argues that the “actions” include the collection of data used to generate the map and the movement of the robot along the route. *Id.* But a POSITA would not understand collecting data and moving the robot to correspond to the claimed actions. EX2050, ¶55. Rather, in the context of the patent and the claims, a POSITA would understand that the “actions” to be “associate[d]” with particular locations and positions of the robot are the other actions that a robot is designed to perform, such as turning on/off water and vacuuming. *Id.*

The claims themselves support this understanding. Here, each independent claim separately recites both “collect data by at least one sensor ... as the robot travels along the route” and “associate actions undertaken by the robot during traveling along the route.” See Limitations 1[b][1], 1[b][3], 13[a], 13[c], 25[a], 25[c]. Thus, the claims already recite collecting sensor data and moving the robot

along the route in addition to associating actions. If the “actions undertaken by the robot” included collecting sensor data and moving the robot, then the limitation of “associate actions undertaken by the robot” would be superfluous. EX2050, ¶56. A POSITA would not understand the claim in such a manner. *Id.*; *see also e.g., Voice Tech. Corp. v. Unified Patents, LLC*, 110 F.4th 1331, 1342-43 (Fed. Cir. 2025) (improper to “incorporate the steps recited in claim limitation [1.3] (deciding and selecting) directly into claim limitation [1.1] (receiving)” as that would “improperly impute other limitations into the claim term, rendering those other limitations superfluous.”).

Further, the claim language also confirms that the “actions undertaken by the robot” do not include traveling along the route because the recited actions are those “undertaken by the robot *during traveling along the route.*” It would not make logical sense that the actions undertaken by a robot during traveling along the route include the traveling along the route itself. EX2050, ¶57.

The specification further confirms that collecting sensor data and moving the robot are not the recited actions. For example, the patent explains that in the context of a floor cleaning robot, the robot “may associate certain actions (e.g., turning, turning on/off water, spraying water, turning on/off vacuums, moving vacuum hose positions, gesticulating an arm[,], raising/lowering a lift, moving a sensor, turning on/off a sensor, etc.) with particular positions and/or trajectories.” EX1001, 7:32-

39; *see also id.*, 6:22-28, 22:49-57; EX2050, ¶58. The specification further explains that associating actions with locations and positions on a route on a map is to teach the robot where to go and what to do when it gets there. EX1001, 6:8-32; EX2050, ¶58. The specification never suggests that the data collection that can occur by simply moving the robot along the path are the “actions” “associate[d]” with particular positions on route on the map. EX2050, ¶58; *see generally* EX1001.

Accordingly, the “actions undertaken by the robot during traveling along the route” in limitations 1[b][3], 13[c], and 25[c] do not include the collection of data used in generating a map or the traveling along the route itself. Petitioners’ arguments that data collection and moving the robot along the route are the required actions fail. EX2050, ¶¶54-55.

2. Petitioner Fails To Demonstrate That Any Actions Are “Associated” With A Location And Position

Even if data collection and moving along the route were sufficient to show the claimed “actions,” the Petition fails to demonstrate that Olson discloses that such actions are “associat[ed]” with the location and position of the robot on the route on the map. Here, the Petition at best argues that a robot performs data collection or moves at certain locations. Pet., 22. But Petitioners fail to demonstrate that Olson’s processing device *associates* the action of data collection or moving *with* a location and position on the route on the map, rather than the action merely happening at a location. *See e.g.* EX1001, 22:49-52 (explaining that “information can be associated

with each cell [in a map], such as by associating each cell to another data structure and/or using a data structure with more dimensions.”); EX2050, ¶59.

The Petition also argues that Olson uses information measured from a robot’s motions and scans “to characterize edges that connect nodes to each other.” Pet., 22-23. But that merely describes map generation. EX2050, ¶61. Moreover, the Petition at best argues that *measurements* from scans and movements are stored—*not* the actions of scanning and moving themselves. EX2050, ¶60. Worse, the Petition does not demonstrate that even if those measurements were stored, that they are stored “with the location and position of the robot on the route on the map.” *Id.* For example, the Petition identifies no disclosure in Olson that after a route on a map is generated, that the original sensor scan data or original odometry measurements can be recovered at a particular location and position on a route on a map. *See* Pet., 22-23; EX2050, ¶60. Thus, the Petition fails to demonstrate that any “actions undertaken by the robot during traveling” are associated with any particular location and position on the route on the map. EX2050, ¶62.

Accordingly, the Petition fails to demonstrate that Olson anticipates any claim.

V. GROUND 2 FAILS TO DEMONSTRATE ANTICIPATION BY STACHNISS

In Ground 2, Petitioner asserts that Stachniss anticipates claims 1-11, 13-23, and 25-35. Ground 2 fails to demonstrate anticipation because Stachniss does not

disclose all elements of the claims as arranged in the claims. Rather, Stachniss is a book chapter that discusses *various different* techniques for robotic mapping and Ground 2 mixes descriptions from those distinct techniques. That approach fails to demonstrate anticipation as a matter of law. Further, similar to Ground 1, Stachniss does not disclose “associat[ing] actions undertaken by the robot during traveling along the route with the location and position of the robot on the route on the map.”

A. Ground 2 Mixes Separate and Distinct Disclosures Within Stachniss for Anticipation (All Claims)

As explained above, a reference does not anticipate a claim, even if every limitation is disclosed within the reference, unless “all of the limitations [are] arranged or combined in the same way as recited in the claim.” *NetMoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008).

There is no dispute that Stachniss describes multiple, distinct techniques for robotic mapping. The Petition admits that Stachniss “describes *several SLAM methods*.” Pet., 46. Stachniss is a book chapter that “begins with a definition of the SLAM problem,” (EX1005, 1154), and explains, “We review the three major paradigms from which many published methods for SLAM are derived: (1) the extended Kalman filter (EKF); (2) particle filtering; and (3) graph optimization. We also review recent work in three-dimensional (3-D) SLAM using visual and red green blue distance-sensors (RGB-D), and close with a discussion of open research

problems in robotic mapping.” EX1005, 1153. Stachniss further suggests that each of these major paradigms are separate and distinct because, “there is no single best solution to the SLAM method” and “[t]he method chosen by the practitioner will depend on a number of factors, such as the desired map resolution, the update time, and the nature of the features in the map, and so on.” *Id.*, 1154; EX2050, ¶¶64-65.

In Section 46.2, Stachniss discusses “three basic SLAM paradigms,” namely, Extended Kalman Filters (“EKF”) (§46.2.1), Particle Methods (§46.2.2), and Graph-Based Optimization Techniques (§46.2.3). EX1005, 1157-1166; EX2050, ¶66. Then, in Section 46.3, Stachniss describes two other types of SLAM, namely, Visual SLAM and RGB-D SLAM. EX1005, 1166-69; EX2050, ¶66. But even within these broad “paradigms,” Stachniss discusses multiple distinct techniques. For example, when discussing EKF, Stachniss describes “the vanilla Kalman filter,” as well as another version where, “[w]ith a few adaptations, EKF SLAM can also be applied in the presence of uncertain data association.” EX1005, 1157-58 (emphasis omitted). Stachniss also discusses “extensions to the EKF SLAM algorithms that achieve scalability, for example through submap decomposition,” and another “related family of approaches ... which operates on the inverse of the covariance matrix.” *Id.*, 1159. When discussing “Particle Methods,” Stachniss mentions FastSLAM and DP-SLAM. *Id.*, 1159-62. And when discussing Graph-Based

methods, Stachniss lists over a dozen different graph-based SLAM implementations. *Id.*, Table 46.1, 1162-66.

The Petition never sorts between these separate and distinct disclosures, but rather, treats Stachniss like a box of parts that it can mix and match for anticipation. EX2050, ¶67. Notably, the Petition repeatedly discusses Stachniss’s “system” or “robot,” as if Stachniss disclosed one type of robot. *See* Pet., 50-51. (“Stachniss further discloses that *its system* travels *the robot*”), *id.* at 60 (“The actions undertaken by *the robot* include collection of sensor data using, for odometers, lasers, range sensors, cameras, and RGB-D sensors”). But there is no such thing as “Stachniss’s system” or “Stachniss’s robot” because Stachniss is an overview of many different techniques and different robots made by different groups of researchers. EX2050, ¶67.

As explained in further detail below, the Ground 2 arguments for Claim 1 are based on a hodgepodge of different disclosures that do not demonstrate anticipation as a matter of law. EX2050, ¶¶64, 68. Further, because the Ground 2 arguments for the remaining independent claims, 13 and 25, rely on cross-references to the Claim 1 arguments, those arguments also fail to demonstrate anticipation. Pet., 73, 75.

1. Petitioner Relies on Different Sensors from Different Robots
(Limitation 1[b][1])

Limitation 1[b][1] recites “collect data by at least one sensor coupled to the robot as the robot travels along the route in an environment.” Petitioner argues that “Stachniss describes a *multitude of robot-mounted sensors* which are used to collect data,” and “[f]or example, the robots can be coupled with sensors in the wheels or motors, a global positioning system, laser scanners, and visual sensors (e.g., cameras).” Pet., 52. This argument alone combines different sensors from different robots that implement different SLAM techniques. For example, Stachniss describes GPS in the context of the FastSLAM algorithm, an implementation of the Particle Method paradigm. EX1005, 1160-61; EX2050, ¶69. Stachniss describes laser scanners in the context of graph-based SLAM. EX1005, 1164; Ex2050, ¶69. And Stachniss describes cameras in the context of Visual or RGB-D SLAM. EX1005, 1166; EX2050, ¶69.

Further, Stachniss highlights that different sensors have different benefits or drawbacks. EX1005, 1166 (“In comparison to laser scanners, cameras provide a fire hydrant of information, making online processing nearly impossible until recent increases in computation have become available.”); *id.*, 1168 (“Visual information offers a tremendous source of information for loop closing, not present in the canonical 2-D laser SLAM systems developed in the early 2000s.”); EX2050, ¶70.

Stachniss never describes a system that has simultaneously has all these different sensors, and the Petition cannot demonstrate anticipation by combining these sensors. EX2050, ¶70.

2. The Petition Relies on Numerous Different Disclosures for Limitation 1[b][2]

Limitation 1[b][2] recites several requirements relating to map generation, including: (a) “generat[ing] a map of the environment and a route on the map in real-time,” (b) “the map being generated concurrently with the collection of the data as the robot travels along the route in the environment,” (c) “the map corresponding to a representation of the environment,” (d) “the map including information directed to location and position of the robot along the route in the environment,” (e) “the map being generated based on measurements taken by the at least one sensor at each one of a plurality of nodes along the route traveled by the robot,” (f) “each one of the plurality of nodes comprising a range,” and (g) “the range of each one of the plurality of nodes being based on confidence measure at a respective node.” The Petition argues that Stachniss anticipates Limitation 1[b][2], but its argument draws from numerous different and distinct disclosures within Stachniss and fails to demonstrate that Stachniss discloses all limitations in the same way as the claim. Pet., 53-59; EX2050, ¶71.

First, for the “real-time” and “the map being generated concurrently with the collection of the data” limitations, the Petition relies on at least two distinct SLAM

paradigms. The Petition first quotes Stachniss at 1164-65 for “‘incremental’ graph-based methods” that Petitioner argues “can be executed at each step of the mapping process” and “on-the-fly [real-time] mapping.” Pet., 56 (quoting EX1005, 1164-65). There, Stachniss was describing “Graph-Based Optimization Techniques.” Next, the Petition cited a different section of Stachniss for “‘online processing’ of visual data for real-time mapping” and relied on Stachniss’s Figure 46.11, shown below.

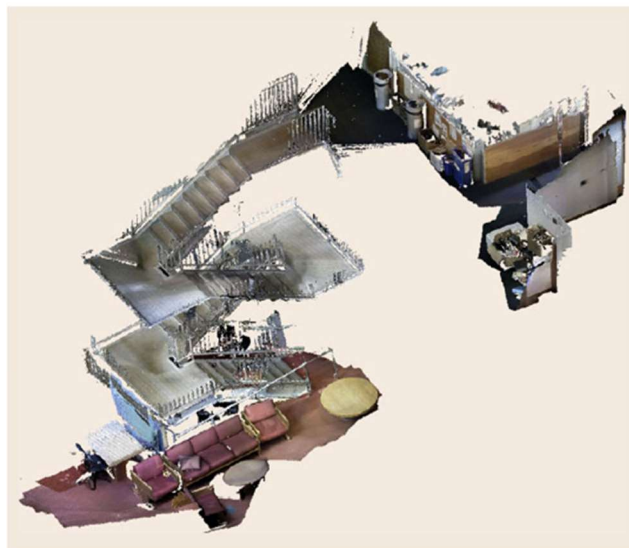


Fig. 46.11 Spatially extended KinectFusion output produced in real-time with Kintinuous (after [46.139])

Pet., 57 (citing EX1005, Fig. 46.11). But this figure and discussion appears in Stachniss’s discussion of Visual and RGB-D SLAM. EX1005, 1169; EX2050, ¶72.

Petitioner’s reliance on Figure 46.11 is further misplaced because this figure shows “KinectFusion,” which is a “modeling system that tracks the 3-D pose of a *handheld* Kinect while concurrently reconstructing high-quality scene 3-D models.” *Id.* In other words, there is no robot involved in Figure 46.11. EX2050, ¶73.

Stachniss expressly describes KinectFusion as part of “[a]n emerging area for *future* research.” EX1005, 1169.

Second, for the “range of each one of the plurality of nodes being based on confidence measure” limitation, the Petition relies on at least two different SLAM paradigms. EX2050, ¶74. First, the Petition cites Equation 46.18. Pet., 58. The Petition admits this equation is “for a graph-based SLAM approach.” *Id.*; *see also* EX1005, 1163 (discussing equation 46.18 under Graph-Based Optimization Techniques).³ The Petition then switches to relying on Figure 46.2, which is from Stachniss’s discussion of EKF SLAM techniques. Pet., 58-59; EX1005, Fig. 46.2, 1158. Again, the Petition admits that this discussion relates to “an EKF mapping algorithm.” Pet., 58; EX2050, ¶74.

Thus, for just Limitation 1[b][2], the Petition relies on at least Stachniss’s discussions of Graph-Based SLAM, Visual SLAM and RGB-D SLAM, and EKF SLAM techniques. EX2050, ¶75.

3. Petitioner Relies on Different Sensors from Different Robots for Limitation 1[b][3]

For Limitation 1[b][3], Petitioner argues that “[t]he actions undertaken by the robot include collection of sensor data using, for odometers, lasers, range sensors,

³ The Petition also does not explain how that Equation 46.18, or Equation 46.9 (cited on the previous page), discloses a “range.” Pet., 57-58.

cameras, and RGB-D [sic] sensors.” Pet., 60. As discussed above, Stachniss describes these sensors in the context of different robots that implement different SLAM techniques. *Supra* Section V.A.1; EX2050, ¶76. Indeed, Petitioner’s supporting citations are from different sections of Stachniss describing different techniques. Pet., 60 (citing EX1005, 1153-54 (introduction & overview), 1158-59 (EKF SLAM discussion), 1163-64 (graph-based SLAM discussion), 1166-69) (Visual and RGB-D SLAM discussion); EX2050, ¶76.

4. Petitioner Fails to Demonstrate Anticipation by Relying on Different Disclosures

As described above, Petitioner’s arguments for Claim 1 rely on numerous different SLAM techniques implemented by different robots with different sensors. A POSITA would understand these techniques are separate and distinct because, as Stachniss explains, “there is no single best solution to the SLAM method” and “[t]he method chosen by the practitioner will depend on a number of factors[.]” EX1005, 1154; EX2050, ¶77.

Further, Stachniss explains these techniques are different with their own advantages and drawbacks. For example, the Petition relies on “online” SLAM for the “real-time” and “generated concurrently” limitations. *See* Pet., 56. But Stachniss does not only discuss “online” SLAM, but also “offline” or “full SLAM,” where the mapping is done *after* data collection is completed. EX2050, ¶¶78, 66. Stachniss differentiates between the “full SLAM problem” which “involves estimating the

posterior over the entire robot path together with the map” from the “online SLAM problem” which “seeks to recover the present robot location, instead of the entire path.” EX1005, 1155; *see also id.*, 1156 (“We already encountered one such distinction: full versus online.”); 1162 (“[M]ost of the earlier techniques are offline and address the full SLAM problem.”); 1164 (“Most methods in the field are offline and they optimize for the entire robot path.”); EX2050, ¶78. Thus, because Stachniss describes both offline and online SLAM, and Petitioners never sort between the different disclosures, Petitioners have not demonstrated that “all of the limitations [are] arranged or combined in the same way as recited in the claim.” *NetMoneyIN*, 545 F.3d at 1371; EX2050, ¶¶79-80.

B. Petitioners Fail to Demonstrate Stachniss Discloses Associating Actions Undertaken by the Robot During Traveling Along the Route with the Location and Position of the Robot on the Route on the Map
(Limitations 1[b][3], 13[c], 25[c])

As discussed above, Limitations 1[b][3], 13[c], and 25[c] recite “associate [or associating] *actions undertaken by the robot* during traveling along the route with the location and position of the robot on the route on the map.” Stachniss is focused on robotic mapping and never mentions any actions undertaken by robots or that any such actions are “associate[d]” with a location and position on the route on the map. *See generally* EX1005; EX2050, ¶81. The Petition fails to demonstrate that Stachniss discloses this limitation for several reasons.

First, the Petition fails to identify any **actions** are associated with a location and position. Rather, the Petition at best argues that “**sensor data**,” not **actions**, “is associated with a location and position.” Pet., 60. Specifically, the Petition argues that a robot’s “motion through an environment as measured by odometers and LIDAR and data collection via sensor measurement (e.g., camera scans) are actions undertaken by the robot” and concludes that “the **data produced by these actions** are associated with nodes, for example, when they are stored in a matrix representing the graph.” Pet., 60-61. But **data** collected from sensors are not **actions**. EX2050, ¶82. The claim recites associating **actions**, not storing sensor **data**. *Id.*

Second, as discussed above, the “actions undertaken by the robot” do not include the collection of data used for generating the map or route or the movement of the robot along the route. *Supra* Section IV.C.1; EX2050, ¶83. The Petition fails to identify any action other than the collection of data and the robot’s movements along the route. *Id.*; Pet., 60-62.

Third, even under Petitioners’ arguments, Petitioners fail to demonstrate that Stachniss actually **stores** sensor data with a location and position of the robot on the route on the map. Petitioner suggests that “data produced by [sensors] ... are stored in a matrix representing the graph,” but never identifies any disclosure of storing sensor data in a matrix. Pet. 61; EX2050, ¶84. To be sure, sensor data is used in generating a map. But Petitioners do not identify any disclosure about then storing

the underlying sensor data with the location and position on the generated map. EX2050, ¶84. Indeed, Stachniss does not mention or suggest that for a given location on the map, a robot could recover the original sensor data used in generating the map. *See generally* EX1005; EX2050, ¶84.

C. Petitioners Fail to Demonstrate Stachniss Discloses That Each of the Nodes Comprises a Range Based on a Confidence Measure at a Respective Node
(Limitations 1[b][2], 13[b], 25[b])

Petitioners identify a single portion of one of Stachniss’s many algorithms as teaching “each node is associated with a range corresponding to a confidence measure.” Specifically, Petitioner claims that “Stachniss depicts a range associated with the uncertainty of the position of each node for both poses and landmarks in Figure 46.2 (below), in the context of an EKF mapping algorithm.” Pet., 58-59. But nowhere does the Petition identify a “confidence measure” in Stachniss, much less that any range is “based on” that confidence measure. EX2050, ¶85. Nor does Stachniss at Figure 46.2 disclose any “measure” of confidence. *Id.*; EX1005, Fig. 46.2. Petitioners argue that the ranges of Stachniss can change as a robot detects a particular landmark twice. Pet., 59. But Petitioners do not explain or identify this process as a “confidence measure.” Indeed, this disclosure in Stachniss does not depict any determined or calculated measure, much less a “confidence measure.” EX2050, ¶86.

Accordingly, Petitioners fail to demonstrate that Stachniss anticipates any claim. EX2050, ¶87.

VI. GROUNDS 3 AND 4 FAIL TO DEMONSTRATE OBVIOUSNESS

The Petition addresses Grounds 3 and 4 in a single section, purporting to combine Olson with Fong (Ground 3) and Stachniss with Fong (Ground 4). These arguments fail.

A. Grounds 3 and 4 Do Not Address Limitations 1[b][2], 13[b], and 25[b]

As discussed above, Grounds 1 and 2 fail to disclose multiple requirements within Limitation 1[b][2], 13[b], and 25[b]. Grounds 3 and 4 do not address Limitations 1[b][2], 13[b], or 25[b]. Pet., 82-87. Thus, Grounds 3 and 4 do not resolve these deficiencies and fails to demonstrate that the combination of Olson and Fong and Stachniss and Fong disclose Limitations 1[b][2], 13[b], or 25[b]; EX2050, ¶89.

B. The Combinations of Olson or Stachniss with Fong Do Not Address the Petition's Reliance on Numerous Different Disclosures within Olson and Stachniss

As discussed in Sections IV.A.2 and V.A, *supra*, the Petition fails to demonstrate anticipation in Grounds 1 and 2 because the Petition relied on different disclosures within both Olson and Stachniss. Ground 1 relied on Olson's different disclosures of a batch algorithm and online algorithm. *Supra* Section IV.A.2. Ground 2 relied on numerous different disclosures about different SLAM techniques

and different sensors within Stachniss. *Supra* Section V.A; *see also* EX2050, ¶90. Although Grounds 3 and 4 are styled as obviousness grounds, that alone does not resolve the deficiencies with Grounds 1 and 2 because the Petition never acknowledged that it was combining different disclosures within Olson and Stachniss. EX2050, ¶91. The Petition thus never presents a clear combination of disclosures within Olson or Stachniss, any motivation to combine those disclosures, or reasonable expectation of success. Accordingly, Grounds 3 and 4 fail to demonstrate obviousness.

C. The Combinations of Olson or Stachniss with Fong Do Not Disclose Limitations 1[b][3], 13[c], and 25[c]

Grounds 3 and 4 attempt to combine Fong with Olson and Stachniss to disclose “associat[ing] actions undertaken by the robot during traveling along the route with the location and position of the robot on the route on the map.” Pet., 82-83. Petitioner argues that Fong’s robot “can identify rooms (locations) and divide its map into zones according to those rooms” and that “its robot can receive instructions to assume a quieter mode of operation while cleaning in a particular room (associate an action with a location on the map).” The Petition’s arguments mischaracterize Fong and fail for several reasons.

First, Fong does not associate actions with the “location and position of the robot on the route on the map.” Petitioner relies on Fong at 4:59-63, 6:36-44, and 6:64-7:2, but none of these sections disclose associating an action undertaken by the

robot with a location and position on the route on the map. EX2050, ¶¶92-93. Rather, Fong discloses that a robot identifies rooms (e.g., Zone A, Zone B, Zone C) based on a combination of (1) the identity of an RF transmitting device (e.g., an Internet of Things light bulb), (2) the received signal strength, and (3) remote control (the ability to modulate the RF transceiver). EX1006, 6:37-44. Fong then discloses that “the robot 200 may be commanded to clean the living room, in which case it can use its mobility and distance-dependent variation in signal strength to home on this room (even without a map).” *Id.* at 6:52-55. Thus, Fong does not associate actions with a location and position on a route on a map, but rather, tells a robot to perform an action based on the received signal strength from an RF transceiver. EX2050, ¶¶93-94.

Second, Fong describes that a robot can receive instructions transmitted to it, not that actions are associated with a location and position on the route on the map. The distinction is significant. The ’576 Patent describes associating actions undertaken by the robot with a location and position of the robot on the route on the map so that the robot can later navigate its route and perform those actions (e.g., cleaning at specific points on the route) autonomously. *See* EX1001, 6:8-32, 7:27-45; EX2050, ¶95. In contrast, Fong describes that the “system 100 (e.g., via instructions from the hub 110 to the robot 200) may instruct the robot 200 to return to the dock 600, move to a different, unoccupied zone, avoid the unoccupied zone,

or assume a quieter mode of operation.” EX1006, 6:64-7:2; Pet., 83 (citing same). Indeed, the Petition characterizes Fong’s disclosure as “its robot can *receive instructions* to assume a quieter mode of operation.” Pet., 83. But receiving a command is not the same as associating an action with a location and position of the robot on the route on the map. EX2050, ¶95. Indeed, in the Fong system, the robot could be at any location or position when the command is transmitted and received. *Id.* In other words, Fong’s transmitted command is independent of and not associated with the location and position of the robot on the route on the map. *Id.*

Third, Petitioner fails to address the entire limitation. The limitation requires associating actions with a location and position of the robot “on *the route* on the map.” The Petition never addresses “the route” portion of the limitation. *See* Pet., 82-83. Instead, the Petition at most argues that Fong discloses “associate an action with a location on the map.” *Id.*; EX2050, ¶96.

Thus, the Petition fails to demonstrate that Olson combined with Fong or Stachniss combined with Fong would render any claim obvious. EX2050, ¶97.

VII. GROUND V DOES NOT RESOLVE PRIOR DEFICIENCIES

Ground 5 combines Stachniss and Prassler and addresses only dependent claims 12, 24, and 36. Pet., 91-92. Thus, Ground 5 does not resolve any of the deficiencies identified for Ground 2. EX2050, ¶98.

**VIII. THE PETITION FAILS TO DEMONSTRATE THAT STACHNISS
(EX1005) AND PRASSLER (EX1007) ARE PRIOR ART**

The Board should deny institution because the Petition fails to demonstrate a reasonable likelihood that Stachniss and Prassler qualify as prior art printed publications to the '576 Patent. This failure affects three of the five asserted grounds, covering all 36 challenged claims. The Board should exercise its discretion to deny institution because it would not be an efficient use of the Board's time and resources to adjudicate complex technical issues where the majority of the grounds fail to demonstrate prior art status. *See* July 29, 2025 Memorandum from Chief Administrative Patent Judge Boalick to Patent Trial and Appeal Board Regarding Final Written Decision Procedures for AIA Trial Proceedings (requiring all final written decisions to address all grounds raised in the petition). Further the sort of evidentiary issues raised by Petitioners' failure to show that Stachniss and Prassler are prior art are better handled by the district court that is already considering Petitioner's invalidity arguments based on the *same* references. EX2021, 4.

A. Legal Standard

"[A]t the institution stage, the petition must identify, with particularity, evidence sufficient to establish a reasonable likelihood that the reference was publicly accessible before the critical date of the challenged patent and therefore that there is a reasonable likelihood that it qualifies as a printed publication." *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (Dec. 20, 2019)

(precedential) (“*Hulu*”). “A given reference is ‘publicly accessible’ upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it.” *SRI Int’l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1194 (Fed. Cir. 2008) (citation omitted). In an IPR, there is no presumption in favor of finding that a reference is a printed publication. *Hulu*, Paper 29 at 16.

B. The Petition Improperly Incorporated Arguments by Reference

The Petition itself does not present any arguments explaining why Stachniss and Prassler were purportedly publicly accessible in January 2016. Pet., 8. Instead, the Petition cited paragraphs 28 and 33 of the Declaration of Dr. Mary Bolin, a purported expert on libraries. Pet., 6 (citing EX1008, ¶28), 7 (citing EX1008, ¶33). The Bolin Declaration then itself discusses various additional exhibits that were never cited in the Petition. EX1008, ¶¶26-28, 31-33. “This practice of citing the Declaration to support conclusory statements that are not otherwise supported in the Petition [] amounts to incorporation by reference.” *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR20145-00454, Paper 12 at 9 (informative) (Aug. 29, 2014). This incorporation by reference is improper. *Id.* Accordingly, the Petition failed to demonstrate in the Petition the public accessibility of Stachniss and Prassler. *See id.* at 10 (refusing to consider improperly incorporated arguments).

C. The Declaration Merely Repeats Inadmissible Hearsay

Even if the arguments in the Bolin Declaration were properly in the Petition, they could not establish the dates that Stachniss and Prassler qualify as prior art printed publications to the '576 Patent. Dr. Bolin is not a percipient witness. Bolin does not testify that she has any personal knowledge of when Stachniss and Prassler were actually made publicly available nor does she testify that she is a record custodian for the SpringerLink database from which she downloaded the references. *See generally* EX1008. Thus, Dr. Bolin does not and cannot testify as to when Stachniss and Prassler were actually publicly available.

Instead, Bolin *opines* that Stachniss and Prassler were publicly accessible in January 2016 based on the dates appearing in three documents: (1) a “First Online: 01 January 2016” date purportedly shown on a SpringerLink website printout, (2) the metadata for the PDF of Stachniss/Prassler purportedly showing “a creation date of July 2016,” and (3) a MARC record for the *Springer Handbook of Robotics* (2d ed.) purportedly “showing a creation date of March 31, 2016.” EX1008, ¶¶27-28, 32-33.

However, the dates appearing in those documents constitute out-of-court statements that are being offered for the truth of the matter asserted. As numerous PTAB panels have previously concluded, such dates appearing on the face of the references or in databases are inadmissible hearsay and insufficient to demonstrate

public accessibility. *See, e.g., Apple Inc. v. DSS Tech. Mgm't, Inc.*, IPR2015-00369, Paper 14 at 6 (Aug. 12, 2015) (date stamped by university library on a book was inadmissible hearsay when offered to prove public accessibility); *ServiceNow, Inc. v. Hewlett-Packard Co.*, IPR2015-00716, Paper 13 at 15-17 (Aug. 26, 2015) (date on face of reference and indications of the availability of the reference for download from online database were inadmissible hearsay); *Sophos Ltd. v. Open Text Inc.*, IPR2023-00732, Paper 23 at 15-19 (Nov. 2, 2023) (listing of a date in digital database insufficient to demonstrate public accessibility as of that date). Petitioner has not identified any applicable hearsay exception that would apply to these dates. *See Pet.*, 6-7.

Notably, the Petition itself does not cite any of those documents in support of public accessibility. *Pet.*, 6-7. Instead, these documents are cited exclusively within the Bolin Declaration, apparently so that they are relied upon by an expert under Federal Rule of Evidence 703. But Petitioners cannot circumvent the hearsay rules by merely presenting the hearsay under the guise of an expert declaration. “Rule 703 does not authorize admitting inadmissible evidence ‘on the pretense that it is the basis for expert opinion when, in fact, the expert adds nothing to the [inadmissible evidence] other than transmitting [it] to the [factfinder].’” *Wi-Lan Inc. v. Sharp Elecs. Corp.*, 992 F.3d 1366, 1374 (Fed. Cir. 2021) (quoting Charles Alan Wright, Arthur R. Miller & Victor J. Gold, *Federal Practice and Procedure* § 6274 (2d ed.

2020)). Here, the Bolin Declaration adds nothing beyond listing the dates appearing in the documents and accepting the earliest of the three dates as the publication date without question. EX1008, ¶¶28, 33.

Dr. Bolin’s testimony also does not fall within the ambit of Rule 703 because neither Petitioners nor Bolin demonstrate that the cited documents are a reliable indicator of public accessibility that an expert could rely upon. Notably, Dr. Bolin relies *exclusively* on the “01 January 2016” date in the SpringerLink website printout to assert that Stachniss and Prassler were “available in January 2016.” EX1008, ¶¶28, 33. But neither Petitioners nor Dr. Bolin established that the date listed on a SpringerLink website is a reliable indication of public accessibility. Indeed, the January 1, 2016 date is particularly suspect because January 1, 2016 was New Year’s Day, a holiday, and January 1 could merely represent a default date entry when a more specific date is unknown. And as shown in the cases cited above, the Board has consistently recognized that such dates, without more, do not establish public accessibility. *See also Smart Microwave Sensors GmbH v. Wavetronix LLC*, IPR2016-00488, Paper 57 at 25 (July 17, 2017) (“Regardless of whether the dates printed on [the references] are hearsay, even if admissible, such dates alone are accorded little weight to prove public accessibility (i.e., no greater weight than hearsay).”).

Accordingly, even if considered, the improperly incorporated arguments merely repeat inadmissible hearsay which, even if considered, are insufficient to prove public accessibility.

D. Dr. Bolin's Testimony Is Unreliable And Contradictory

Dr. Bolin's declaration is additionally not entitled to any weight because it is unreliable and contradictory. For example, Bolin provided the following opinion on the date Stachniss was available:

Based on the fact that Document 2 is found in the SpringerLink database with an availability date of January 1, 2016, with PDF properties showing a creation date of July 2016, and that a MARC record for the *Springer Handbook of Robotics*, second edition, 2016, is found in OCLC, showing a creation date of March 31, 2016,⁴ Document 2 was available in January 2016, and could have been found by a skilled researcher.

EX1008, ¶28.

Thus, in the same sentence, Bolin alleges that a reference was publicly available on January 1, 2016—months before Bolin alleges the reference was created and months before the purported MARC record was purportedly created. Bolin does not explain this contradiction. Bolin's opinion regarding Prassler is substantively identical and has the same contradiction. *Id.*, ¶33.

⁴ The date March 31, 2016 does not actually appear in the MARC record. EX1008, 435.

Additionally, although Bolin relies on purported MARC records for this opinion, Bolin's declaration shows that her reliance on MARC records is improper. For example, Dr. Bolin testified first that "The MARC record creation date reflects the date on which (or shortly after) the item was first acquired *and* cataloged." EX1008, ¶8. But in paragraph 12, Bolin differently testified that the "MARC record creation date reflects the date on which, or shortly after which, the item was first acquired *or* cataloged." *Id.*, ¶12. Thus, Bolin does not even consistently explain whether a MARC creation date reflects the date of acquisition, cataloging, or both. Bolin further admits that the actual date of acquisition or cataloging could be "shortly after" the supposed acquisition and/or cataloging renders shown in the MARC record. Thus, even by her own admission, MARC records cannot conclusively show the date any particular document was catalogued or acquired.

Bolin also concludes that the creation date of a MARC record "reflects when the underlying item is accessible to the public." EX1008, ¶13. But no evidence, not even her prior unsupported testimony, supports that conclusion. At best, Bolin previously explained, without evidence, that "[o]nce the MARC record is created ... it is instantaneously available to any OCLC-participating members, and therefore, available to the public." *Id.*, ¶8. But that only explains that a MARC record is available to other OCLC-members, not that the actual document is available for public access.

Further, Bolin asserts that the “date of creation for the MARC record appears in the fixed field (008), characters 00 through 05.” EX1008, ¶13. But then Dr. Bolin inexplicably relies on “Field 005” which she asserts “is a 16 digit field that records the date characters yyymmdd.” *Id.* Bolin asserts that “[t]he date entered on file never changes” and “[t]hese dates are automatically supplied by the OCLC system and cannot be changed by the user,” (*id.*), but then never addresses why these dates are different within the same MARC record.

For example, Dr. Bolin relied on a MARC record for the Olson reference (Attachment B to EX1008) to assert that the record was created on January 9, 2009. EX1008, ¶21. But the date field (005) shows “20230922064919.1” which would apparently correspond to September 22, 2023 under Bolin’s interpretation. EX1008, 28. Similarly, Dr. Bolin relied on MARC records for Stachniss and Prassler, but again did not explain why the field (005) showed “20250804215546.9” which would apparently correspond to August 4, 2025, while field (008) listed “160802.” EX1008, 435, 542.

Dr. Bolin never explains why those dates are different and no evidence explains what those dates even mean. Accordingly, Bolin’s reliance on MARC records and her testimony in general cannot establish the date these references were publicly available. Moreover, at the very least, Bolin’s declarations raise the kinds of evidentiary issues better handled in a district court.

IX. CONCLUSION

For the foregoing reasons, Brain respectfully requests the Board deny institution.

Respectfully submitted,

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Dated: February 19, 2026

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. §42.24(d), Counsel for Patent Owner Brain Corporation hereby certifies that this document complies with the type-volume limitation of 37 C.F.R. §42.24(b). This document contains approximately 10,415 words, including any statement of material facts to be admitted or denied in support, and excluding the table of contents, table of authorities, mandatory notices under §42.8, exhibit list, certificate of service or word count, or appendix of exhibits or claim listing.

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CERTIFICATE OF SERVICE

I hereby certify that, pursuant to 37 C.F.R. §42.6(e) and with the agreement of counsel for Petitioners, a true and correct copy of **PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,823,576 AND EXHIBITS** are being served electronically on February 19, 2026, to the e-mail addresses shown below:

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