

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALLSTATE INSURANCE COMPANY,
Petitioner,

v.

ATOS, LLC,
Patent Owner.

IPR2021-01449
Patent 9,846,174 B2

Before JONI Y. CHANG, KRISTINA M. KALAN, and JULIA HEANEY,
Administrative Patent Judges.

HEANEY, *Administrative Patent Judge.*

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

I. INTRODUCTION

Allstate Insurance Company (“Petitioner”) filed a Petition to institute an *inter partes* review of claims 1–5 of U.S. Patent No. 9,846,174 B2 (Ex. 1001, “the ’174 patent”). Paper 1 (“Petition” or “Pet.”). ATOS, LLC (d/b/a “RideMetric”) (“Patent Owner”) filed a Preliminary Response. Paper 5 (“Prelim. Resp.”).

Institution of an *inter partes* review is authorized by statute when “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.” 35 U.S.C. § 314(a) (2018). Upon consideration of the Petition, the Preliminary Response, and the evidence of record, we determine that Petitioner has established a reasonable likelihood that it would prevail in showing the unpatentability of at least one claim challenged in the Petition. Accordingly, we institute an *inter partes* review of all claims and all grounds asserted in the Petition.¹

A. *Related Proceedings*

The parties identify the following litigation involving the ’174 patent: *ATOS, LLC v. Allstate Insurance Company*, No. 1:20-cv-06224 (N.D. Ill.). Pet. 3; Paper 4 § II. Patent Owner identifies two additional patents involved in this litigation: US Patent Nos. 8,527,140 (“the ’140 patent”) and 9,152,609 (“the ’609 patent”). The ’174 patent incorporates by reference the disclosure of the ’140 patent. Ex. 1001, 1:18–28.

¹ *Guidance on the Impact of SAS on AIA Trial Proceedings* (Apr. 26, 2018), <https://www.uspto.gov/patents-application-process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial> (“SAS Guidance”); *see also SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018).

Patent Owner also identifies the following related IPR Petitions: IPR2021-01118 challenging the '140 patent; and IPR2021-01209 challenging the '609 patent. Paper 4 § II.

B. The '174 Patent

The '174 patent, titled “Computer-Implemented Methods and Computer Systems/Machines for Identifying Dependent and Vehicle Independent States,” describes detecting and analyzing “states” relating to the environment outside a portable device, such as a smartphone or tablet. Ex. 1001, code (54), 1:8–12. The patent describes using sensors on the portable devices to detect motion and determine if it is “vehicle dependent movement (acceleration, deceleration, accidents and cornering operational states, etc) ... [or] vehicle independent movement of the phone (movement caused by the user handling the phone, phone falling to the ground, etc).” *Id.* at 1:14–18. According to the patent, the methods of the invention can be used for a driver evaluation service, such as to score “driving riskiness, or fuel efficiency” and for detection “that a vehicle has started and stopped driving, automatically and transparently to the user.” *Id.* at 4:20–43.

The '174 patent incorporates by reference the '140 patent's disclosures about vehicle dependent and independent states. *Id.* at 1:20–28. Figure 1 of the '140 patent is reproduced below.

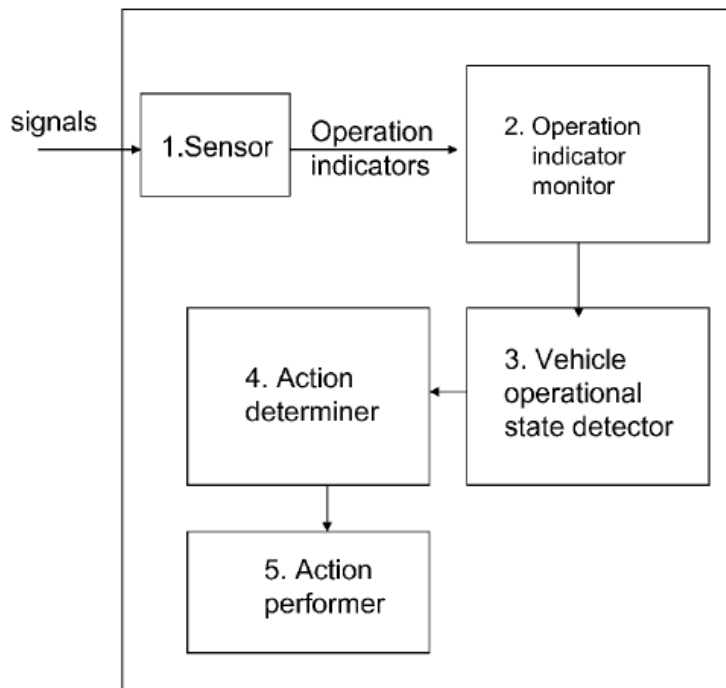


Figure 1 illustrates a portable device for taking action based on the state of the associated vehicle. Ex. 1014, 3:17–18. The top left corner of Figure 1 depicts a sensor receiving “signals” as an input and generating “[o]peration indicators” as an output. *Id.* at Fig. 1. The ’140 patent describes basing a decision to perform an action on “determining the operational state of a vehicle surrounding the portable device,” which in turn involves monitoring “an onboard sensor on the device.” *Id.* at 3:49–51. According to the ’140 patent, the sensor receives signals from the environment and converts them to “operation indicators.” *Id.* at 3:50–52. The operation indicators from the sensor “are forwarded to the operation indicator monitor unit (unit 2) which continuously monitors and collects the operation indicators over time.” Ex. 1001, 4:4–8. The monitor unit then forwards the operation indicators to an “operational state detector unit” that “uses pre-determined criteria which are a set of rules to help determine the operational state of the vehicle.” *Id.* at 4:8–12.

The '174 patent describes that it has “identified a unique condition that is associated with turning in a vehicle . . . that at the time of the turn, the vector of rotation will be roughly parallel to the vector of gravity.” *Id.* at 1:52–56. The patent describes using this condition to identify the probability of turning, but also determining that “[i]f the vectors of rotation and gravity are not roughly parallel, this is an indicator that the phone has been picked up, or fallen.” *Id.* at 1:54–65. Figure 1 of the '174 patent is reproduced below.

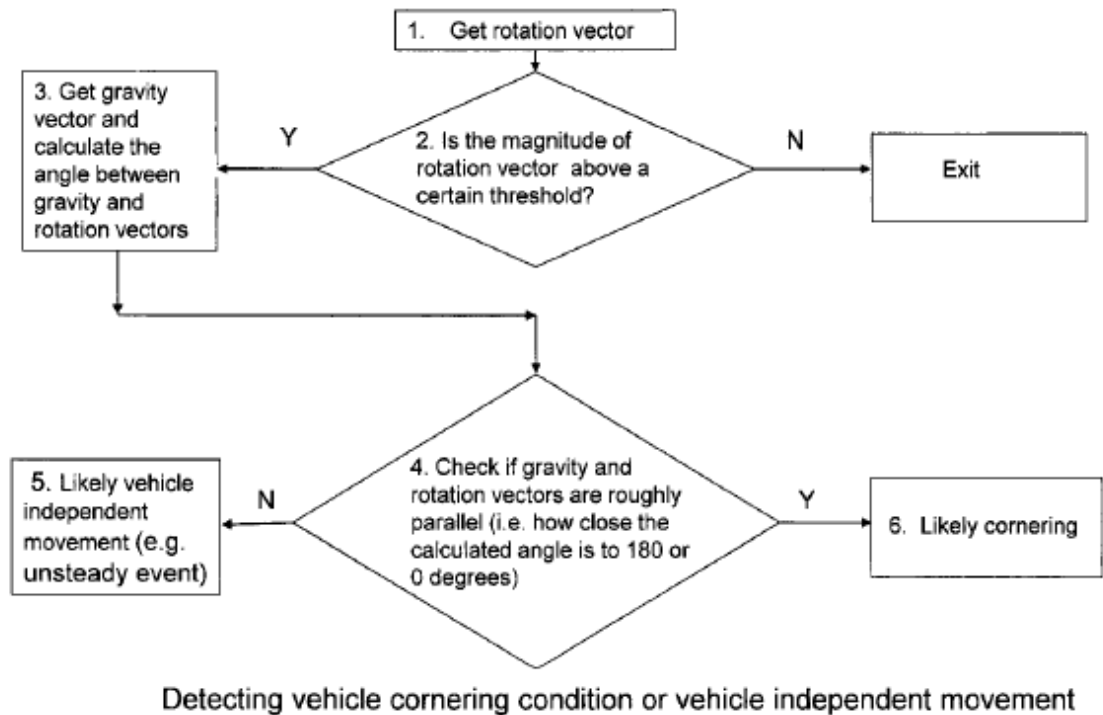


Figure 1 illustrates detection of vehicle cornering or independent movement. *Id.* at 66–67.

The '174 patent also describes detecting speed changes, and specifically “detecting whether a speed change vector is associated with acceleration or deceleration.” *Id.* at 2:14–19. Figure 2 of the '174 patent is reproduced below.

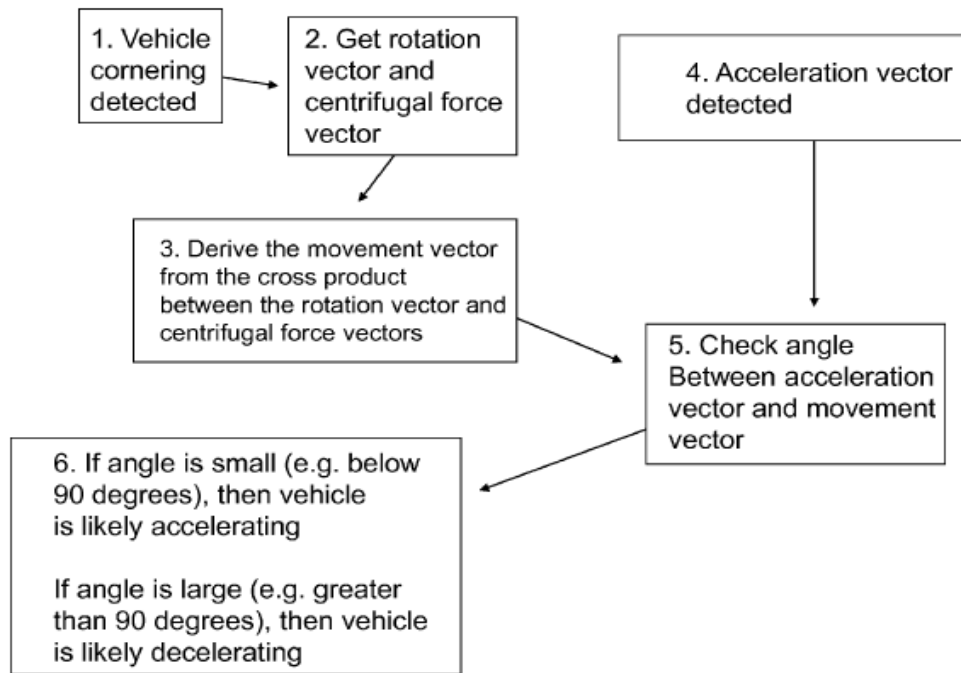


Figure 2: Detecting direction (accelerating or braking) of acceleration vector

Figure 2 illustrates detecting acceleration or braking of the acceleration vector. *Id.* at 4:1–2. In the initial steps of Figure 2, the rotation vector and centrifugal force vector of a turning vehicle are used to derive the movement vector, which is the cross product of those two vectors. *Id.* at 2:37–38. In step 5, the angle between the movement vector and acceleration vector is checked, and the result (step 6) determines if the vehicle is likely accelerating or decelerating. *Id.* at Fig. 2.

C. The Challenged Claims

Petitioner challenges claims 1–5 of the '174 patent. Pet. 1. Claim 2 depends from claim 1, and claim 4 depends from claim 3. Claims 1, 3, and 5, reproduced below, are illustrative of the subject matter of the challenged claims:

1. The method of detecting the condition of a vehicle turning, comprising estimating an angle of how closely a rotation vector is aligned with a gravity vector.
3. The method of detecting a direction of a speed change vector, comprising:
 - a. detecting a condition of a vehicle turning;
 - b. detecting a movement vector during the turn;
 - c. estimating the angle between movement vector and speed change vector;
 - d. determining that the speed change vector is acceleration vector if the estimated angle below certain threshold and determining that the speed change vector is deceleration vector if the estimated angle is above certain threshold.
5. The method of performing one or more actions on a portable device carried by an individual, comprising:
 - a. monitoring at least one operation indicator transparently to the individual, wherein the at least one operation indicator is created by an on-board component of the device when the portable device is located inside a vehicle;
 - b. detecting when the at least one operation indicator meets one or more predetermined criteria;
 - c. determining entirely or in part the following states based on the one or more predetermined criteria:
 - i. one or more vehicle independent states;
 - ii. one or more vehicle dependent states.

Ex. 1001, 4:58–60; 4:64–5:7; 5:12–24.

D. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Ground	Challenged Claim(s)	35 U.S.C. ²	Reference(s)/Basis
1	1–4	§ 103	Kleppner ³
2	1, 2	§ 103	Johnson ⁴ , Kleppner
3	3, 4	§ 103	Abramson ⁵ , Kleppner
4	5	§ 102	Schwartz 2010 ⁶
5	5	§ 102	Kim ⁷

Pet. 4. Petitioner relies on the Declaration of William R. Michalson, Ph.D. (Ex. 1003).

II. ANALYSIS

A. *Claim Construction*

Petitioner proposes constructions for the terms “operation indicator” and “on-board component.” Pet. 11–15. Patent Owner disputes Petitioner’s proposed construction for “operation indicator” and proposes its own construction, and argues that we need not construe “on-board component.” Prelim. Resp. 6–10.

² The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the ’174 patent issued from an application filed after March 16, 2013, we apply the AIA versions of the statutory bases for unpatentability.

³ Daniel Kleppner, et al., AN INTRODUCTION TO MECHANICS, McGraw Hill Book Company, 1973 (Ex. 1007).

⁴ Derick A. Johnson, et al., “Driving Style Recognition Using a Smartphone as a Sensor Platform,” 2011 14th International IEEE Conference on Intelligent Transportation Systems Washington, DC, USA. October 5–7, 2011 (Ex. 1010).

⁵ US Patent No. 8,750,853 B2 to Abramson, et al., issued June 10, 2014 (Ex. 1009).

⁶ US Patent Pub. No. 2010/0204877 A1 by Schwartz, published Aug. 12, 2010 (Ex. 1008).

⁷ Korean Registered Patent Number 10-0775006 to Kim, S., et. al., issued Nov. 8, 2007 (Ex. 1005).

Both of these terms, “operation indicator” and “on-board component,” appear only in claim 5. Claim 5 is at issue in Grounds 4 and 5, but no issue in Ground 4 turns on construction of either claim term. As to Ground 5, for the reasons discussed below, we need not decide at this stage of the proceeding whether Kim discloses an “operation indicator” under either party’s proposed construction, because we determine that Petitioner has met the threshold for institution based on other claims and grounds asserted in the Petition. *See SAS Guidance*.

Therefore, at this stage of the proceeding, no issue turns on our construction of “operation indicator” or “on-board component,” and we determine we need not construe either term. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“we need only construe 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))). This does not constitute a determination regarding the persuasiveness of either party’s arguments; we leave claim construction as an open question for the parties to address during trial. In that regard, we remind Patent Owner that any argument not raised in its Patent Owner response pursuant to 37 C.F.R. § 42.120 may be deemed waived.

B. Level of Ordinary Skill in the Art

Factors pertinent to a determination of the level of ordinary skill in the art include “(1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field.” *Envtl. Designs, Ltd. v.*

Union Oil Co., 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.*

Petitioner argues a person of ordinary skill in the art at the time of the invention “would have been someone with a bachelor’s or master’s degree in the field of mechanical engineering, electrical engineering, or physics or with a bachelor’s or master’s degree in a related field and at least three years of experience in designing or developing portable device systems.” Pet. 4 (citing Ex. 1003 ¶ 52). Petitioner further argues the “Skilled Artisan would have been aware of the types of portable devices discussed below and would have known how to utilize the portable devices and their accelerometers to detect motion while inside a vehicle,” and “would have known how to model the forces on moving objects in line with Newtonian Mechanics.” *Id.*

Patent Owner does not dispute the level of ordinary skill in the art. For purposes of this decision, we adopt Petitioner’s definition of the level of ordinary skill in the art because it is consistent with the ’174 patent and the asserted prior art.

C. Principles of Law

“Anticipation requires that every limitation of the claim in issue be disclosed, either expressly or under principles of inherency, in a single prior art reference,” *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1255–56 (Fed. Cir. 1989), and that the claim limitations be “arranged or combined in the same way as recited in the claim[],” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008).

However, “the reference need not satisfy an *ipsissimis verbis* test.” *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009).

A claim is unpatentable under 35 U.S.C. § 103 if “the differences between the subject matter sought to be patented 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 available, evidence such as commercial success, long felt but unsolved needs, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *see KSR*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls.”).

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. Reaching this conclusion, however, requires more than merely showing that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the

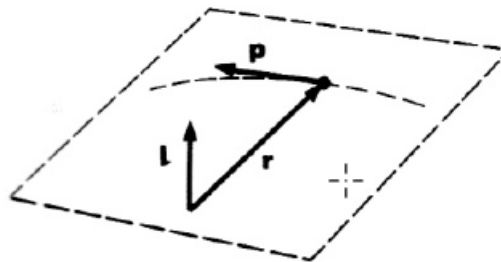
invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.”
Id.

D. Ground 1: Alleged Obviousness Based on Kleppner

Petitioner contends claims 1–4 would have been obvious over Kleppner. Pet. 27–48.

1. Kleppner (Ex. 1007)

Kleppner is a textbook titled “An Introduction to Mechanics.” Ex. 1007, xv. The text begins with an introduction to mathematical concepts to apply to physical problems, such as vector products, and the use of vectors to describe velocity and acceleration. *Id.* at xix, 6–14. Kleppner describes using the “right hand rule for vector multiplication,” such that if two trajectory vectors are in the xy plane, their vector product is in the positive z direction if the “sense of rotation” of the point about the origin is counterclockwise, and in the negative z direction if the rotation is clockwise. *Id.* at 234. This is illustrated in the figure reproduced below.



Id. at 234. The figure reproduced above shows vectors r and p in a plane, with the vector L at a right angle to the motion of the particle at the intersection of the r and p vectors. *Id.*

2. Analysis

Claim 1

Petitioner contends it would have been obvious to perform the method of claim 1 based on Kleppner and the knowledge of a skilled artisan.

Petitioner argues that Kleppner discloses a gravity vector by representing a gravitational force on an object as “gravitational force W ” with a vector pointing straight down, in addition to multiple examples applying the principles of mechanics. Pet. 28 (citing Ex. 1007, 49, 61, 72–73, 84, 107, 335; Ex. 1003 ¶ 154). Petitioner argues that Kleppner discloses a rotation vector as “the vector used to describe the angular momentum of an object in circular motion” which is “the cross product between its momentum and position vectors.” *Id.* at 29 (citing Ex. 1007, 6, 233). Petitioner relies on Kleppner’s illustration of angular momentum vector L as having a direction perpendicular to the plane of an object’s motion. *Id.* (citing Ex. 1007, 233–234; Ex. 1003 ¶ 155). Petitioner argues Kleppner discloses that the direction of vector L , i.e., positive or negative, depends on whether the object is turning clockwise or counterclockwise, which corresponds to “the condition of a vehicle turning” as recited in claim 1. *Id.* at 30 (citing Ex. 1007, 234; Ex. 1003 ¶ 156). Petitioner argues that Kleppner thus discloses a relationship between the gravity vector and rotation vector of an object, including how closely they are aligned, i.e., “when an object’s rotation vector points upwards or downwards, it is aligned with the gravity vector (which for the purposes of a car or object traveling in a plane will point downwards), and the object is turning.” *Id.* at 31 (citing Ex. 1007, 234; Ex. 1003 ¶¶ 157–158).

Petitioner further argues that Kleppner discloses “*estimating an angle*” as recited in claim 1, because it discloses how to calculate the angle between two vectors, and includes a section detailing “Mathematical Approximating Methods” “using simple approximate expressions instead of exact but complicated formulas.” Pet. 31–32 (citing Ex. 1007, 6, 9, 39–47, 49; Ex. 1003 ¶ 159). Petitioner further argues that to the extent Kleppner does not expressly disclose “*estimating an angle*,” a person of ordinary skill in the art would have known how to estimate the angle between two vectors, with a reasonable expectation of success. *Id.* at 32–33 (citing Ex. 1003 ¶¶ 159–160).

Patent Owner argues Petitioner has not cited to any portion of Kleppner that teaches a rotation vector, and that Kleppner’s angular momentum vector L is not a rotation vector because it depends on vehicle momentum, rather than being determined from a portable device’s sensor, as described in the ’174 patent. Prelim. Resp. 22–23. Patent Owner further argues that Kleppner’s angular momentum vector is different from the ’174 patent’s rotation vector because the angular momentum vector exists even if the trajectory is a straight line and no rotation is occurring, whereas the rotation vector is determined “at the time of the turn.” *Id.* at 23 (citing Ex. 1001, 1:54–57; Ex. 1007, 234).

Patent Owner further argues Kleppner does not disclose the relationship between a gravity vector and a rotation vector, and does not teach how those vectors could be utilized to determine whether a vehicle is turning. *Id.* at 24. Patent Owner argues that Kleppner teaches the gravity vector and angular momentum vector in different chapters of the text. *Id.* at 24–25. Patent Owner argues that Kleppner’s unrelated disclosures on

these vectors, and teachings of basic principles of vector algebra, do not teach how to estimate the angle between the vectors. *Id.* at 25–26. Patent Owner further argues that Kleppner teaches away from the method of claim 1 because under Kleppner’s teachings, if a vehicle were to turn while on a slope, its angular momentum vector would not be aligned with the gravity vector. *Id.* at 27 (citing Ex. 1007, 233–234). Patent Owner asserts that the ’174 specification explains, by contrast, that the vector of rotation is not affected by the slope of the turn. *Id.* (citing Ex. 1001, 1:54–57).

On the present record, we are persuaded that Petitioner has shown sufficiently at this stage of the proceeding that a person of ordinary skill in the art would have been able to perform the method of claim 1 based on Kleppner’s teachings. We do not agree with Patent Owner’s arguments for several reasons. Patent Owner’s arguments do not reasonably credit the knowledge of a person of ordinary skill in the art; for example, a person of ordinary skill in the art would have been able to combine teachings from different chapters of Kleppner, an introductory mechanics textbook. Similarly, a person of ordinary skill in the art would have understood the application of Kleppner’s teachings to a turning vehicle, and a portable handheld device. Indeed, our determination of the level of ordinary skill in the art at this stage of the proceeding (which Patent Owner has not disputed), includes experience in designing or developing portable device systems, knowledge of how to use portable devices, and knowledge of how to model forces on moving objects using Newtonian Mechanics. *See supra*; *see also* Ex. 1003 ¶ 160. Further, in view of the level of skill in the art, we do not agree with Patent Owner’s assertion that a person of ordinary skill would be

unable to estimate an angle between two vectors, or understand how such an angle can be used to determine if an object is turning.

Patent Owner's argument that Petitioner and Dr. Michalson do not sufficiently explain how Kleppner's angular momentum vector describes the rotation of an object also is not persuasive. As discussed above, Dr. Michalson explains that Kleppner's angular momentum vector can be used to determine the occurrence of a turn because the direction of an angular momentum vector for an object in circular motion depends on whether the object is turning clockwise or counterclockwise. *See* Ex. 1003 ¶¶ 155–158. Even though an angular momentum vector may exist when an object is not turning, as Patent Owner argues, that does not negate the fact that the direction of an angular momentum vector also indicates clockwise or counterclockwise motion, as Kleppner and Dr. Michalson explain.

As to Patent Owner's argument that Kleppner does not teach the method of claim 1 because Kleppner does not disclose detecting a rotation vector from the sensors of a portable device (such as its gyroscope), we do not find this argument persuasive because claim 1 does not require use of a sensor. Although the '174 patent describes embodiments that use the sensors of a portable device to determine a rotation vector, Patent Owner has not argued that claim 1 is limited to sensor embodiments, and we decline to decide that issue at this stage of the proceeding. Similarly, although Patent Owner argues that Kleppner does not teach how to determine if a vehicle is turning while on a slope, Patent Owner has not argued that claim 1 is limited to a vehicle turning on a slope, nor proposed that the term "aligned with" would exclude Kleppner's teaching as to the relationship between the gravity vector and rotation vector for an object turning in a horizontal plane.

At this stage of the proceeding, Petitioner's showing that Kleppner teaches detecting if an object traveling in a horizontal plane is turning persuades us Petitioner has demonstrated a reasonable likelihood that Kleppner teaches the method of claim 1.

Patent Owner's argument that Kleppner teaches away from claim 1 is not persuasive, because Patent Owner has not identified anything in Kleppner that discourages determining if a vehicle is turning based on estimating the alignment of rotation and gravity vectors.

On this record, we determine that Petitioner sufficiently explains how a person of ordinary skill in the art would have used Kleppner's teachings to arrive at the method of claim 1 with a reasonable expectation of success. Accordingly, Petitioner demonstrates a reasonable likelihood that claim 1 would have been obvious over Kleppner.

Claim 2

Claim 2 depends from claim 1 and additionally recites "estimating the probability of the vehicle turning as a function of the angle between the rotation vector and the gravity vector." Ex. 1001, 4:61–63. Petitioner contends Kleppner discloses this limitation because it teaches that for a turning vehicle on a flat plane, the angle between the rotation vector and the gravity vector is either 0 or 180 degrees; Petitioner explains that Kleppner's teaching is the same as the '174 patent specification: "If the angle is close to 180 or 0 then the probability will be close to 1." Pet. 35–36 (quoting Ex. 1001, 2:7–11; citing Ex. 1007, 234; Ex. 1003 ¶¶ 157, 174).

Petitioner further argues that to the extent Kleppner does not expressly disclose "*estimating the probability*," a person of ordinary skill would have known techniques for determining a probability related to vehicle actions

because such techniques were well-known in the art by July 2013. Pet. 36–37 (citing Ex. 1009; Ex. 1012; Ex. 1003 ¶ 176). Petitioner further explains that Kleppner’s disclosure of estimation techniques and the usefulness of probabilities in determining driving events would have motivated a person of ordinary skill in the art to modify Kleppner, to the extent it does not expressly disclose estimating probability. *Id.* at 37 (citing Ex. 1007, 6–9; Ex. 1012, 198; Ex. 1003 ¶ 178).

Patent Owner argues that Kleppner does not disclose angles between rotation vectors and gravity vectors, estimates of a probability of a vehicle turning, or relationships between angles and probabilities. Prelim. Resp. 30–31. Patent Owner further argues that even though the concepts of probabilities, angles, and estimating were well-known, those general concepts are far removed from “the use of a particular type of angle for estimating the probability of a particular type of driving event” as required by claim 2. *Id.* at 31.

Having considered the evidence and arguments presented by both parties on the present record, we are persuaded that Petitioner has shown sufficiently that Kleppner teaches the method of claim 2. To the extent Patent Owner’s arguments as to claim 2 rely on or are similar to its arguments as to claim 1, we do not find them persuasive for the same reasons as discussed above. For example, Patent Owner’s argument that claim 2 is directed to “a particular type of angle for estimating the probability of a particular type of driving event” (Prelim. Resp. 31) implies claim 2 should be limited to a particular type of turning, but Patent Owner has not made that argument. Patent Owner also does not respond to Petitioner’s assertion that the ’174 patent describes estimating the

probability of turning merely as “[whether] the angle [between gravity vector and rotation vector] is close to 180 or 0 then the probability will be close to 1.” Ex. 1001, 2:7–11. Further, Patent Owner’s argument that page 234 of Kleppner “does not disclose angles between rotation vectors and gravity vectors” or “relationships between angles and probabilities” does not consider how a person of ordinary skill in the art would have understood Kleppner’s teaching, which would not have been limited to Kleppner’s express disclosure. Prelim. Resp. 30–31.

On this record, we determine that Petitioner sufficiently explains how a person of ordinary skill in the art would have used Kleppner’s teachings to arrive at the method of claim 2 with a reasonable expectation of success. Accordingly, Petitioner demonstrates a reasonable likelihood that claim 2 would have been obvious over Kleppner.

Claim 3

Petitioner contends it would have been obvious to perform the method of claim 3 based on Kleppner and the knowledge of a skilled artisan, and relies on the argument and evidence regarding Kleppner discussed *supra* to show how Kleppner discloses the steps that claim 3 has in common with claim 1. We discuss below Petitioner’s contentions as to the additional limitations of claim 3.

Claim 3 recites “[t]he method of detecting a direction of a speed change vector, comprising.” Ex. 1001, 4:64–65. Petitioner contends Kleppner’s acceleration vector corresponds to claim 3’s “*speed change vector*” and that a person of ordinary skill in the art would have understood Kleppner as describing that the acceleration vector is the derivative of the velocity vector. Pet. 38–39 (citing Ex. 1007, 14, 17–18; Ex. 1003 ¶ 184).

Claim 3 recites “detecting a movement vector during the turn.”

Ex. 1001, 4:67. Petitioner contends Kleppner discloses the condition of an object turning, including the directions of the relevant vectors during a turn, because it teaches position vector $\mathbf{p}$ for an object traveling in the x-y plane turning around a circle of radius $\mathbf{r}$, along with its rotation vector $\mathbf{L}$. Pet. 40 (citing Ex. 1007, 234; Ex. 1003 ¶ 191). Petitioner further contends Kleppner teaches that for the same object in circular motion, acceleration vector $\mathbf{a}$ is directed radially inward, and the centripetal force vector will point in the same direction as the acceleration vector, under Newton’s Second Law of Mechanics, $F = ma$. *Id.* at 40–41 (citing Ex. 1007, 15, 18; Ex. 1003 ¶¶ 104, 191). Thus, Petitioner argues, the cross product of the rotation vector and centrifugal force vector for a turning object is the movement vector. *Id.* at 41 (citing Ex. 1003 ¶ 192).

Claim 3 further recites “estimating the angle between the movement vector and speed change vector.” Ex. 1001, 5:1–2. Petitioner contends Kleppner discloses the directions and relationships of the movement vector and acceleration vector, and vector mathematics dictates that the component of the acceleration vector associated with the object’s speed around the circle will be parallel to the object’s movement vector or position vector. Pet. 42 (citing Ex. 1007, 18, 234; Ex. 1003 ¶ 195).

As to the final step of claim 3, Petitioner contends Kleppner teaches this limitation because it explains how to calculate the tangential component of acceleration, which is a “*speed change vector*,” based on tangential velocity. Pet. 43–44 (citing Ex. 1007; Ex. 1003 ¶¶ 200–201). Petitioner similarly argues that Kleppner teaches determining if the speed change vector is an acceleration or deceleration vector. *Id.* at 43–45 (citing

Ex. 1007; Ex. 1003 ¶¶ 203–206). Petitioner further contends that to the extent Kleppner does not disclose this limitation, a person of ordinary skill would have known how to apply the concepts of mechanics as taught by Kleppner to sensors in order to detect the conditions of a vehicle, because methods applying sensors like accelerometers and gyroscopes to detect turning events had already been developed. Pet. 45–46.

Patent Owner disputes that Kleppner discloses “any, let alone all, of the steps in claim 3.” Prelim. Resp. 32.

Patent Owner argues Petitioner has not shown that Kleppner discloses “*detecting a movement vector during the turn*” because Petitioner misinterprets the top left figure on Kleppner page 234. Prelim. Resp. 32–33. That figure is reproduced *supra* at II.D.1. Patent Owner argues Kleppner’s figure does not disclose “position vector **p**” as Petitioner asserts (*see* Pet. 40 (identifying radius **r** and position vector **p**)), but rather identifies the position vector as **r** and the momentum vector as **p**. *Id.* at 33 (citing Ex. 1007, 233–234).

We agree with Patent Owner that Petitioner’s argument that Kleppner discloses a movement vector appears to be based on a misinterpretation of the figure and text on page 234. Further, Petitioner’s explanation as to how Kleppner calculates a speed change vector is also based to some extent on Petitioner’s interpretation of Kleppner page 234. Accordingly, on this record and absent clarification from Petitioner, we cannot determine if Petitioner has sufficiently shown that Kleppner discloses the step of “detecting a movement vector during the turn” or subsequent steps of claim 3 related to the movement vector.

This is not a determination regarding the persuasiveness of Patent Owner’s arguments regarding the sufficiency of Petitioner’s evidence and explanation as to claim 3 as a whole. We encourage the parties to address these issues further during trial.

Claim 4

Claim 4 depends from claim 3 and additionally recites “estimating the probability of the speed change vector to be an acceleration or deceleration vector—as a function of the angle between the speed change vector and the movement vector.” Ex. 1001, 5: 8–11. Our questions as to the sufficiency of Petitioner’s showing as to claim 3 apply to claim 4 as well. Accordingly, we encourage the parties to address Petitioner’s challenge to claim 4 based on Kleppner further during trial.

E. Ground 2: Alleged Obviousness Based on Johnson and Kleppner

Petitioner contends claims 1 and 2 would have been obvious over the combination of Johnson and Kleppner. Pet. 48–53.

1. Johnson (Ex. 1010)

Johnson is titled “Driving Style Recognition Using a Smartphone as a Sensor Platform,” and describes a method for monitoring driver behavior “that is inexpensive, accessible, and intelligently uses the sensors available on a mobile phone,” using “Dynamic Time Warping (DTW) and smartphone based sensor-fusion (accelerometer, gyroscope, magnetometer, GPS, video) to detect, recognize and record [aggressive driving] actions without external processing.” Ex. 1010, 1609.

Johnson's system, named MIROAD, utilizes the rear-facing camera, accelerometer, gyroscope and GPS (for event location and speed only) of a mobile phone. Figure 1, reproduced below, shows how the coordinate axes of the phone are assigned.

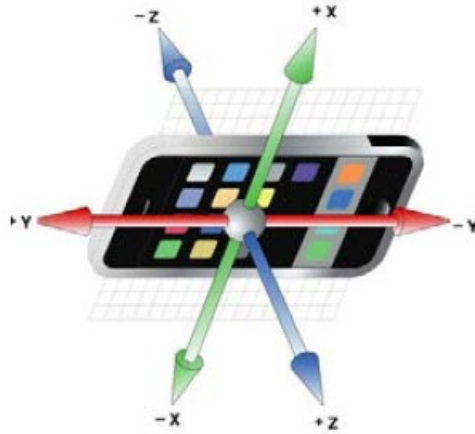


Figure 1 shows a mobile phone, rotated on its side for mounting on a vehicle dashboard, with x, y, and z axes identified. *Id.* at 1610–1611. The system uses accelerometer, gyroscope and magnetometer (compass) sensors to detect and classify vehicle movement, to detect turning and lateral movement. *Id.* at 1611.

2. Analysis

Petitioner argues that Johnson discloses methods for detecting driving actions using the accelerometer and gyroscope of a smartphone. Pet. 48–49 (citing Ex. 1010, Abstract, 1611; Ex. 1003 ¶ 163). Petitioner relies on Kleppner as teaching the mathematical relationships of vectors for an object traveling in a plane, and that a person of ordinary skill in the art would have been able to estimate the angle between those vectors with a reasonable expectation of success, as discussed in Ground 1 above. *Id.* at 49–50.

Petitioner argues Kleppner and Johnson are analogous art to the '174 patent because all three references involve estimation of rotation vectors as related to the gravity vector for a turning object, and are in the same field of “the physics of turning.” *Id.* at 50 (citing Ex. 1007, 234; Ex. 1010, 1611, Ex. 1001, claim 1). Petitioner argues it would have been obvious to implement the disclosure of Kleppner in Johnson’s smartphone because the combination would have implemented known teachings of physics and smartphones detecting vehicle rotation, to achieve a predictable result with a reasonable expectation of success. *Id.* at 51 (citing Ex. 1003 ¶ 170).

Patent Owner argues neither Kleppner nor Johnson contemplate any “angle” between the two claimed rotation and gravity vectors, and do not teach a method of “estimating” this angle, as claimed. Prelim. Resp. 38. Patent Owner further argues that Kleppner and Johnson are not analogous art, “[n]othing in Johnson would motivate a skilled artisan to review a college physics textbook, and nothing in Kleppner would motivate a skilled artisan to review engineering articles about cars and smartphones.” *Id.* at 39.

We do not agree with Patent Owner that Kleppner and Johnson are not analogous art. Under *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004), we determine analogous art based on (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. According to Patent Owner, the '174 patent is directed to using the sensors of a portable device to accurately determine changes in operational state of a vehicle, such as vehicle cornering, using the relationship between vectors derived from the sensors’ output. Prelim. Resp.

3. On this preliminary record, Johnson describes monitoring driver behavior using sensors on a mobile phone (Ex. 1010, 1609), and Kleppner describes *inter alia* using vector operations to determine the direction of rotation of a moving object. *See supra* II.D.1. Thus, both references appear reasonably pertinent to the problem with which the inventors of the '174 patent were involved.

Further, to the extent Patent Owner's arguments are directed at the insufficiency of Petitioner's explanations as to Kleppner's teaching as discussed above for Ground 1, we do not agree with Patent Owner for the reasons we discuss under Ground 1.

As to additional arguments raised by Patent Owner as to claims 1 and 2, we view these contested factual issues as best addressed after further development at trial.

F. Ground 3: Alleged Obviousness Based on Abramson and Kleppner

Petitioner contends claims 3 and 4 would have been obvious over the combination of Abramson and Kleppner. Pet. 53–62.

1. Abramson (Ex. 1009)

Abramson is titled “Sensor-Based Determination of User Role, Location, and/or State of One or More In-Vehicle Mobile Devices and Enforcement of Usage Thereof,” and describes determining roles and usages of a mobile device within a vehicle. Ex. 1009, [54], 1:19–22.

Abramson discusses that “[d]rivers using a hand-held cellular phone or smartphone for talking, text messaging, and/or for executing other applications or ‘apps’ while driving has become a problem of near epidemic proportions.” *Id.* at 1:33–36. Abramson attempts to

identify the user of a particular mobile device (for instance, with respect to their role as a driver or passenger in the car), to identify various aspects of the usage of the device itself (for instance that the device is executing a text messaging application), and to identify instances when a mobile device deviates from its expected or regular operation.

Id. at 11:16–27.

2. Analysis

Petitioner argues that Abramson discloses a method for orienting a coordinate system of a mobile device containing an accelerometer to determine positive forward acceleration and negative forward acceleration. Pet. 54 (citing Ex. 1009, 45:21–23, 46:45–55, 53:5–32; Ex. 1003 ¶ 211). Petitioner relies on Kleppner for the same disclosures as discussed above in Ground 1, for claims 3 and 4. *Id.* at 56. Petitioner argues Kleppner and Abramson are analogous art to the '174 patent because all three references involve using vectors to describe an object that is turning, and are in the same field of “the physics of turning.” *Id.* at 57 (citing Ex. 1007, 234; Ex. 1009, 54:45–61; Ex. 1001, claim 3). Petitioner argues it would have been obvious to implement the teachings of Kleppner in Abramson’s smartphone because the combination would have implemented known teachings of physics and smartphone sensors detecting movement in a vehicle, to achieve a predictable result with a reasonable expectation of success. *Id.* at 58 (citing Ex. 1003 ¶ 218).

Patent Owner argues neither Kleppner nor Abramson disclose the steps of claims 3 and 4. Prelim. Resp. 40–44. Patent Owner further argues that Kleppner and Abramson are not analogous art. *Id.* at 43.

We do not agree with Patent Owner that Kleppner and Johnson are not analogous art. As discussed in Ground 2 above, the '174 patent is directed

to using the sensors of a portable device to accurately determine changes in operational state of a vehicle, such as vehicle cornering, using the relationship between vectors derived from the sensors' output. On this preliminary record, we find that both Abramson and Kleppner appear reasonably pertinent to the problem with which the inventors of the '174 patent were involved. *See Bigio*, 381 F.3d at 1325.

To the extent Patent Owner's arguments are directed at the insufficiency of Petitioner's explanations as to Kleppner's teaching as discussed above for claims 3 and 4 of Ground 1, however, we have the same concerns as to Petitioner's explanation of how Kleppner discloses a movement vector and speed change vector. *See supra* II.D.2. We invite the parties to brief these issues further during trial.

As to additional arguments raised by Patent Owner as to claims 3 and 4, we view these contested factual issues as best addressed after further development at trial.

G. Ground 4: Alleged Anticipation Based on Schwartz 2010

Petitioner contends Schwartz 2010 anticipates claim 5. Pet. 63–66.

1. Schwartz 2010 (Ex. 1008)

Schwartz 2010 is titled “Vehicle State Detection,” and relates to the detection of the state of a vehicle by a portable device carried by a user. Ex. 1008, code (54), ¶ 2. Schwartz describes a “method of detecting the stopping and starting of a car using an accelerometer in a portable device,” without a physical connection between the car and the portable device, and without reliance on GPS. *Id.* ¶¶ 12–13. Schwartz explains that an accelerometer is a type of vibrational sensing device, which can be used to determine the operational state of a vehicle by “measure[ing] forces over

time (i.e. the signals) and convert[ing] them into number of vibrations measured per second (operation indicators) and using rules set in a predetermined criteria to decide upon the state.” *Id.* ¶ 32.

Schwartz 2010 issued as the ’140 patent. Ex. 1014, code (65). Schwartz 2010 was cited during prosecution of the ’174 patent. Ex. 1001, code (56).

2. *Analysis*

35 U.S.C. § 325(d)

Patent Owner contends we should exercise our discretion under 35 U.S.C. § 325(d) to deny the Petition with respect to Ground 4 because the examiner considered Schwartz during prosecution. Prelim. Resp. 44–45. Patent Owner limits its contention to Ground 4 and does not request that we deny institution of the entire proceeding based on § 325(d).

In determining whether to institute review, under 35 U.S.C. § 325(d) “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” The following two-part framework is used to determine whether to exercise discretion under § 325(d) to deny institution:

- (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of the challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential).

Patent Owner contends Schwartz “was presented to the Office, as shown by the listing of [Schwartz] on the face of the ’174 patent, and Petitioner did not make a single argument regarding whether the Office erred.” Prelim. Resp. 45 (citing Pet. 63–66).

Because Patent Owner’s § 325(d) request is limited to Ground 4, it does not sufficiently implicate the Petition as a whole, or demonstrate that the same art set forth in the Petition was previously presented to the Office. In other words, Patent Owner’s § 325(d) request relates to Schwartz, but does not implicate Petitioner’s grounds based on any of the other references. As discussed above for Ground 1, we are persuaded that Petitioner demonstrates a reasonable likelihood it would prevail in showing that at least claim one of the ’174 patent is unpatentable. Therefore, under *SAS*, we institute review with respect to all claims and grounds asserted in the Petition, and Patent Owner’s § 325(d) request is moot at this stage of the proceeding.

Claim 5

Petitioner contends Schwartz 2010 discloses every limitation of claim 5, and provides a limitation-by-limitation analysis of claim 5 with specific citations to Schwartz 2010 and declaration support. Pet. 63–66. Specifically, Petitioner relies on Schwartz 2010’s proposed claim 1, which Petitioner asserts “is nearly identical to claim 5 of the ’174 Patent.” *Id.* at 27. Schwartz 2010’s proposed claim 1 is reproduced below.

A method of performing one or more actions on a portable device carried by an individual, comprising:
monitoring operation indicators continuously and transparently to the individual, wherein operation indicators are created by an on-board component of the portable device when the portable device is located inside a vehicle;

- detecting when the operation indicators meet one or more predetermined criteria;
- determining operational states of the vehicle based on the one or more predetermined criteria;
- determining the one or more actions based on the one or more operational states of the vehicle;
- performing the one or more actions on the portable device.

Ex. 1008, claim 1. For example, Petitioner contends that Schwartz 2010 discloses “*monitoring at least one operation indicator transparently to the individual*” (the first step of claim 5) because the first step of Schwartz 2010’s claim 1 is “*monitoring operation indicators continuously and transparently to the individual.*” Pet. 63–64. Petitioner provides similar contentions for the “detecting” step of claim 5. *Id.*

As to the final step of claim 5 (“determining entirely or in part the following states based on the one or more predetermined criteria: i. one or more vehicle independent states; ii. one or more vehicle dependent states.”), Petitioner argues that the following statement in the ’174 patent concedes that Schwartz 2010 discloses vehicle independent and dependent states:

[T]he various embodiments of the instant invention described herein can be utilized in conjunction with methods and/or devices described in U.S. Patent Vehicle state detection (Publication number U.S. Pat. No. 8.527.140 B2), whose specific disclosures about vehicle dependent states (e.g., acceleration, deceleration, accidents and cornering operational states, and others) and vehicle independent states, triggered when the portable device is moved independently of movement of the vehicle are hereby incorporated by reference herein in its entirety and are further referred to herein as the ‘STATE’ disclosure.

Pet. 65 (quoting Ex. 1001, 1:18–28). Petitioner further argues that Schwartz 2010 discloses vehicle independent and dependent states because it describes

training pattern recognition models to recognize states not associated with a vehicle's operation (independent states), as well as states involving whether the vehicle is moving or its engine is on or off (dependent states). *Id.* at 66 (citing Ex. 1008 ¶¶ 39–40, 43, 50–51; Ex. 1003 ¶ 274).

Patent Owner contends Schwartz does not anticipate claim 5 because it does not disclose “detecting vehicle independent events while the mobile device is in the vehicle” such as detecting “that a phone has fallen on the ground while driving.” Prelim. Resp. 47. Patent Owner argues that Schwartz 2010 does not disclose the final step of claim 5, because it merely discloses the states but not the step of determining vehicle independent states based on predetermined criteria while a portable device is in the vehicle. *Id.* at 46–48.

We disagree with Patent Owner's assertion that Schwartz 2010 does not disclose the final step of claim 5. As to detecting vehicle independent events while the mobile device is in the vehicle, Schwartz 2010's claim 1 expressly discloses “operation indicators are created by an on-board component of the portable device when the portable device is located inside a vehicle.” Ex. 1008, claim 1. Further, we determine that the '174 patent's description of the '140 patent's disclosures about vehicle dependent and independent states, triggered when the portable device is moved independently of movement of the vehicle, does concede that Schwartz 2010 discloses determining vehicle dependent and independent events based on predetermined criteria. Patent Owner's argument that this would be implausible because it would imply “Patent Holder committed the fatal blunder of admitting” that claim 5 was anticipated is not persuasive because

Patent Owner's intent or lack thereof is not relevant to a finding of anticipation. Prelim. Resp. 47.

Conclusion

Petitioner sufficiently identifies where Schwartz 2010 discloses every limitation of claim 5. Accordingly, Petitioner demonstrates a reasonable likelihood that claim 1 is anticipated by Schwartz 2010.

H. Ground 5: Alleged Anticipation Based on Kim

Petitioner contends Kim anticipates claim 5. Pet. 67–76.

Patent Owner disputes the sufficiency of Petitioner's allegations. Prelim. Resp. 49–55.

As discussed above, we have determined that Petitioner demonstrates a reasonable likelihood it would prevail in showing that claims 1, 2, and 5 of the '174 patent are unpatentable. Therefore, a detailed analysis of this ground is not necessary at this stage of the proceeding. *See PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute to require “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition.”). We invite the parties to address this ground at trial.

III. CONCLUSION

Based on the arguments in the Petition and the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in showing that at least one claim of the '174 patent is unpatentable. As such, we institute review as to all claims and grounds asserted in the Petition. *See PGS*, 891 F.3d at 1360.

Our factual findings, conclusions of law, and determinations at this stage of the proceeding are preliminary, and based on the evidentiary record

developed thus far. This is not a final decision as to the patentability of claims for which *inter partes* review is instituted. Our final decision will be based on the record as fully developed during trial. We remind Patent Owner that any argument not raised in its Patent Owner response pursuant to 37 C.F.R. § 42.120 may be deemed waived.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that an *inter partes* review of all challenged claims of the '174 patent is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '174 patent is hereby instituted commencing on the entry date of this Decision, and 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.

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Patent 9,846,174 B2

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