

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DJI EUROPE B.V.,
Petitioner,

v.

TEXTRON INNOVATIONS INC.,
Patent Owner.

IPR2022-00163
Patent 10,243,647 B2

Before SCOTT A. DANIELS, MICHAEL R. ZECHER, and
FREDERICK C. LANEY, *Administrative Patent Judges*.

DANIELS, *Administrative Patent Judge*.

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

I. INTRODUCTION

DJI Europe B.V. (“DJI” or “Petitioner”) filed a Petition requesting *inter partes* review (“IPR”) of claims 1–8, 10–13, and 15–25 of U.S. Patent No. 10,243,647 (Ex. 1001, “the ’647 patent”). Paper 2 (“Pet.”). Textron Innovations, Inc., (“Textron” or “Patent Owner”) filed a Preliminary Response to the Petition. Paper 6 (“Prelim. Resp.”). Based on the Board’s authorization, Petitioner then filed a Preliminary Reply to Patent Owner’s Preliminary Response. Paper 7 (“Prelim. Reply”). Patent Owner similarly filed a Preliminary Sur-Reply. Paper 10 (“Prelim. Sur-Reply”).

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Upon consideration of the arguments and evidence presented by Petitioner and Patent Owner, we are persuaded that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing the unpatentability of at least one of the challenged claims. *See* 35 U.S.C. § 314(a). Accordingly, we institute an *inter partes* review of the challenged claims.

A. *Real Parties in Interest*

Petitioner states that DJI Europe B.V., SZ DJI Technology Co. Ltd., DJI Technology, Inc., iFlight Technology Company Limited, and DJI Research LLC are the real parties in interest. Pet. 76. Patent Owner states that it is the patent owner and a real party in interest, and that Bell Textron Inc. and Textron, Inc., are also real parties in interest. Paper 4, 2.

B. *Related Matters*

The parties indicate that the ’647 patent has been asserted against Petitioner in *Textron Innovations Inc. v. DJI Europe B.V. et al.*, No. 6:21-cv-00740 (W.D. Tex.) (“the infringement action”). Pet. 76; Paper 4, 2.

Patent Owner indicates that Petitioner has also filed a petition for *inter partes* review, case number IPR2022-00162, challenging U.S. Patent No. 9,162,752, which is also asserted in the infringement action. Paper 4, 2.

C. The '647 Patent (Ex. 1001)

The '647 patent, titled “Aircraft Visual Sensor System,” describes object sensing and display methods and apparatus including processing devices for obtaining and processing data from one or more sensors *and* camera image data “wherein the camera feed comprises a camera view of at least a portion of the aircraft.” Ex. 1001, 1:25–32. Also, a visual display is provided so a pilot can observe objects close to the aircraft including “a visual perspective of the object relative to the aircraft,” even if the object is outside the camera view. *Id.* at 1:35–37.

Figure 2A of the '647 patent illustrating visual sensor system 200, as highlighted by the Board, is reproduced below.

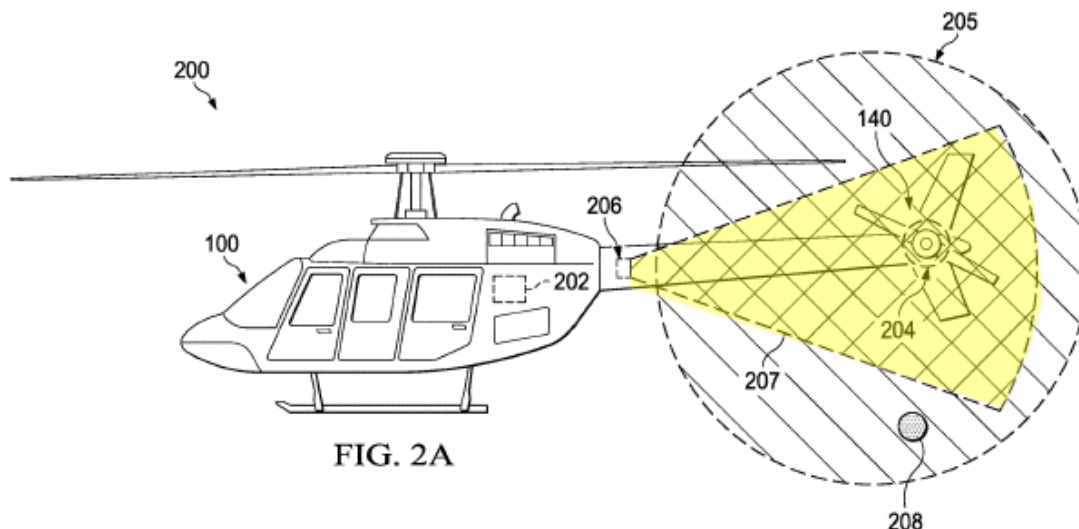


Figure 2A of the '647 patent, above, illustrates aircraft (rotorcraft) 100 having sensor 204 with sensor range 205 adjacent tail rotor 140 indicated by

the dashed circle, as well as camera 206 providing camera view 207 (highlighted in yellow) “that shows both the tail rotor 140 and any surrounding hazards,” such as object 208. *Id.* at 6:61–62, 7:55–58. Figure 2B of the ’647 patent, as highlighted by the Board, illustrating display 210, is reproduced below.

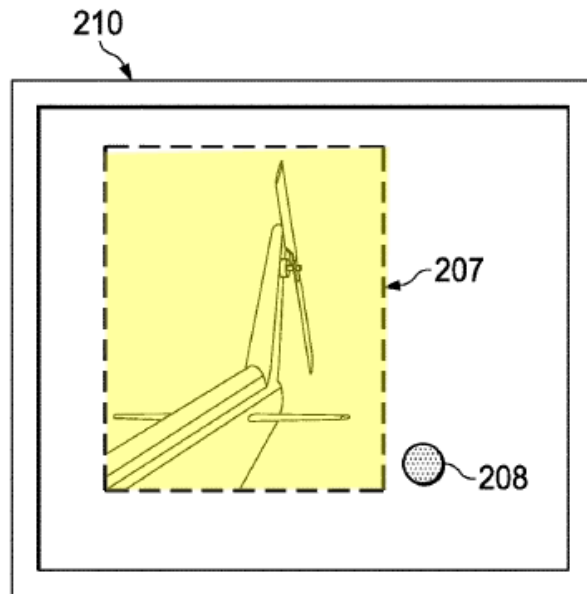


FIG. 2B

Figure 2B of the ’647 patent, above, illustrates visual display 210 depicting camera view 207 of the tail rotor (highlighted yellow), and a graphical representation of object 208 that is outside the camera view yet still visible in the display 210. *Id.* at 8:23–30. The ’647 patent explains that “[i]n this manner, the pilot can be provided with a view of hazards even when the hazards are outside the camera view.” *Id.* at 8:28–30.

The visual sensing apparatus and functions described above are implemented in an embodiment of the system shown by flow chart 600 in Figure 6 of the ’647 patent reproduced below.

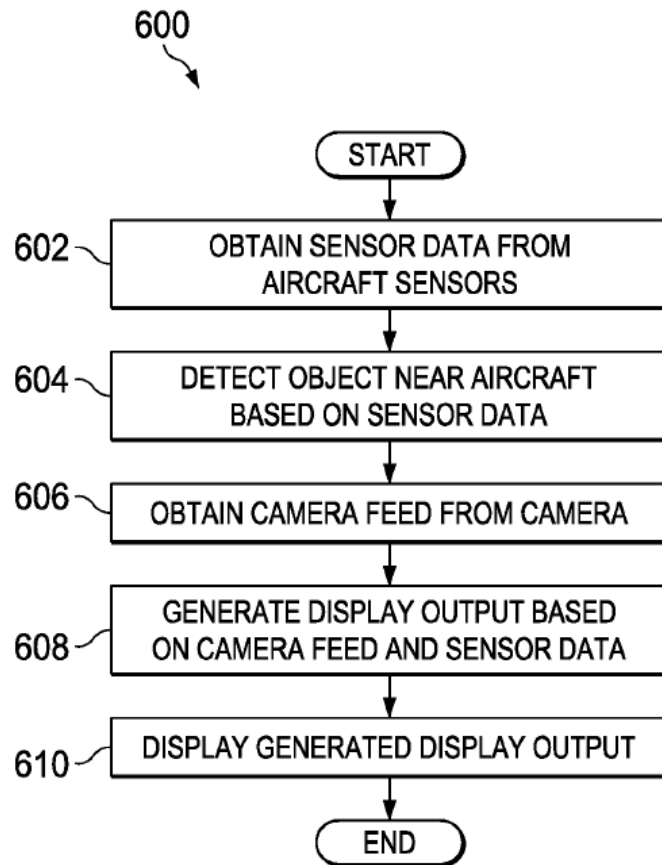


FIG. 6

Figure 6 of the '647 patent, above, is a flow chart describing steps for obtaining sensor data from aircraft sensors 602, obtaining camera feed 606 and displaying an output based on camera feed *and* sensor data 608, 610. *Id.* at 10:32–11:14. Similar to the embodiments in Figures 2A and 2B, the '647 patent describes that “[t]he display device, for example, may be a device that can be viewed by the pilot to provide context regarding the object detected near the aircraft.” *Id.* at 11:11–14.

D. Illustrative Claim

Claims 1, 16, 24, and 25 are independent. Each of claims 2–8, 10–13, 15, and 17–23 ultimately depend from one of independent claims 1 and 16.

Claim 1 is reproduced below and illustrates the claimed subject matter including certain limitations of importance italicized:

1. An apparatus, comprising:

[1a] a processing device configured to:

[1b] obtain sensor data from one or more sensors associated with a rotorcraft, wherein the one or more sensors are configured to detect information associated with an operating environment of the rotorcraft;

[1c] detect an object near the rotorcraft based on the sensor data;

[1d] obtain a camera feed from a camera associated with the rotorcraft, wherein the camera feed comprises a camera view of at least a portion of the rotorcraft;

[1e] *generate a display output based on the camera feed and the sensor data, wherein the display output comprises a visual perspective of the object relative to the rotorcraft;*

[1f] cause the display output to be displayed on a display device;

[1g] determine a physical characteristic of the object based on the sensor data; and

[1h] automatically adjust operation of the rotorcraft based on the determined physical characteristic of the object.

Ex. 1001, 12:28–49.

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–8, 10–13, and 15–25 would have been unpatentable based on the following grounds:¹

¹ Petitioner supports its challenges with a Declaration of William Singhose, Ph.D. (Ex. 1004). *See infra*.

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1	1, 2, 4–7, 10–13, 15– 17, 19–21, 23–25	103	Huang ² , Knight ³ , and Thoreen ⁴
2	3, 18	103	Huang, Knight, Thoreen, and Werner ⁵
3	8, 22	103	Huang, Knight, Thoreen, and Christoph ⁶
4	1, 2, 4–7, 10–12, 15– 17, 19–21, 23–25	103	Huang and Durand ⁷
5	3, 18	103	Huang, Durand, and Werner
6	8, 22	103	Huang, Durand, and Christoph
7	13	103	Huang, Durand, and Knight

II. ANALYSIS

A. Discretionary Denial of Institution Under 35 U.S.C. § 314

Patent Owner argues that “[t]he Board should . . . exercise its discretion to deny institution in view of the parallel district court litigation.” Prelim. Resp. 16 (citing *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”)).

1. Legal Standards

Institution of *inter partes* review is discretionary. See *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he [Patent and Trademark Office] is permitted, but never compelled, to institute an IPR

² Ex. 1005, U.S. Patent No. 10,683,006 B2 (iss. Jun. 16, 2020).

³ Ex. 1006, U.S. Patent No. 9,091,762 B2 (iss. Jul. 28, 2015).

⁴ Ex. 1007, U.S. Patent No. 9,047,771 B1 (iss. Jun. 2, 2015).

⁵ Ex. 1011, EP 1 536 978 B1, WO 2004/024498 (pub. Mar. 25, 2004).

⁶ Ex. 1009, U.S. Patent No. 8,473,189 B2 (iss. Jun. 25, 2013).

⁷ Ex. 1014, U.S. Patent Appl. Pub. No. 2014/0142838 A1 (pub. May 22, 2014).

proceeding.”); 35 U.S.C. § 314(a). The Board has held that the advanced state of a parallel district court action is a factor that may weigh in favor of denying a petition under § 314(a). *See NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 20 (PTAB Sept. 12, 2018) (precedential); Patent Trial and Appeal Board Consolidated Trial Practice Guide 58 & n.2 (Nov. 2019) (“Trial Practice Guide”), *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated>. We consider the following factors to assess “whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding”:

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

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

2. Facts

As noted above in Section I.B., the infringement action involves the ’647 patent. Petitioner is a party to the infringement action. The trial date in the infringement action is set for April 17, 2023. Prelim. Resp. 16; Pet. 74–

75. A final written decision in this proceeding will be due on or about June 8, 2023. Paper 3. The infringement action is in the early stages of fact discovery, the parties have filed their respective claim construction briefing including a Joint Claim Construction Statement, and Petitioner has served Prior Art Invalidity Arguments. Prelim Resp. 20–21. The parties’ claim construction hearing occurred on April 20, 2022 and thus fact discovery began April, 21, 2022 according to the Court’s exemplary trial schedule. Ex. 3001; *see also* Ex. 2007, 9 (Fact discovery set to begin “1 business day after *Markman* hearing.”). Petitioner has stipulated that “if the Board institutes, it will not pursue in the parallel proceeding the grounds raised in this IPR.” Prelim. Reply 2.

Upon consideration of these facts and circumstances under the *Fintiv* factors and the parties’ arguments as described below, we decline to exercise our discretion to deny the Petition.

3. *Factor 1: Whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted*

Fintiv states that, in previous Board decisions, the existence of a district court stay pending Board resolution of an *inter partes* review has weighed strongly against discretionary denial, while a denial of such a stay request sometimes weighs in favor of discretionary denial. *Fintiv*, Paper 11 at 6–8. Patent Owner argues that this factor supports denial or is neutral because Petitioner has not sought a stay in the infringement action. *See* Prelim. Resp. 16–17 (“Petitioner has neither requested a stay in the parallel district court litigation nor provided any indication that it would request a stay . . . this factor weighs in favor of discretionary denial or, at a minimum, is neutral.”). Petitioner contends this factor is neutral, pointing out that Patent Owner agrees. Prelim. Reply 5. The district court has not granted a

stay, Petitioner has not requested a stay, and there is no evidence as to whether a stay might be granted if an *inter partes* review were instituted. Consistent with the parties' arguments, we find that this factor is neutral.

4. *Factor 2: Proximity of the Court's trial date to the Board's projected statutory deadline for a final written decision*

The proximity factor in *Fintiv*, on its face, asks us to evaluate discretion in light of a trial date that has been set in a parallel litigation. *See Fintiv*, Paper 11 at 3, 5 (“*NHK* applies to the situation where the district court has set a trial date to occur earlier than the Board's deadline to issue a final written decision in an instituted proceeding”) (citing *NHK*, Paper 8). Similarly, in *NHK*, the Board expressed the concern that a trial before the deadline for a final written decision addressing the same prior art and arguments would have undermined the Board's objectives of providing an effective and efficient alternative to district court litigation. *NHK*, Paper 8 at 20 (citing *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16–17 (PTAB Sept. 6, 2017) (precedential as to § II.B.4.i)).

Although the scheduling order in the related district court litigation indicates a jury trial date of April 17, 2023, that date is by no means guaranteed. *See* Ex. 1016, 5 n.3 (The courts Scheduling Order stating that, “[i]f the actual trial date materially differs from the Court's default schedule, the Court will consider reasonable amendments to the case schedule post-Markman that are consistent with the Court's default deadlines in light of the actual trial date.”). The scheduled trial date, April 17, 2023, and due date for our final written decision, June 8, 2023, are less than two months apart. An important consideration is that the Board's due date is statutorily mandated whereas the trial due date is subject to many more factors that can cause

delays. Therefore, given the closeness of these two dates and the District Court’s recognition that the “actual trial date” may “materially differ[.]” from the scheduled date, this factor is neutral.

5. Factor 3: Investment in the parallel proceeding by the court and the parties

If, at the time of the institution decision, the district court has issued substantive orders related to the challenged patent, such as a claim construction order, this may weigh in favor of denial. *See Fintiv*, Paper 11 at 9–10. On the other hand, if the district court has not issued such orders, this fact weighs against discretionary denial. *Id.* at 10.

After being served with the complaint in the infringement action on July 27, 2021, Petitioner filed this IPR on December 1, 2021. Paper 3. In the infringement action the parties have each filed two briefs addressing claim construction issues, i.e., opening and reply briefs, as well as a Joint Claim Construction Statement. Ex. 3001. The district court held a claim construction hearing on April 20, 2022, and several weeks after the hearing, the district court issued a five-page claim construction order construing two claim phrases in the ’647 patent. Ex. 3002, 4–5.

The claim construction in the infringement action includes only two phrases from the claims of the ’647 patent and the parties’ relevant constructions are not diametrically opposed. Patent Owner contends that the phrases should be given their plain and ordinary meaning. *Id.* Petitioner’s proposed constructions mainly reiterate each claim phrase with minor editorial clarification. *Id.* We read Petitioner’s constructions in the infringement action essentially as the “plain and ordinary meaning” of the respective phrase that Patent Owner proposes. *Id.* In other words, the parties do not expressly dispute these phrases in the infringement action, or

any other terms or phrases in this proceeding. *See supra* Section II.D. Overall, we perceive minimal investment by the parties in either proceeding with respect to claim construction as it relates to the '647 patent.

In addition, the parties have exchanged initial infringement and invalidity contentions, including detailed invalidity claim charts addressing the prior art cited in this Petition. Exs. 2005, 2006, 2011. Yet we recognize that much work remains in this case as it relates to invalidity, and infringement and invalidity contentions are not due until June 16, 2022. Prelim. Resp. 21; Ex. 1016, 3. Overall, fact discovery is in its early stages, with document production ongoing and depositions not yet underway, expert reports are not yet due, and substantive motion practice is yet to come. Thus, although the parties and the Court have invested effort in the infringement action, significant efforts remain to be expended in the case before trial.

Although some investment of resources and effort has already been expended on claim construction, as well as initial invalidity and infringement contentions, because the infringement action is still in the early stages, there has not yet been a high level of investment of resources and effort that overlaps with this proceeding. *See, e.g.*, Prelim. Sur-Reply 3 (Patent Owner arguing that “the parties will have served final infringement and invalidity contentions only a week after the expected date of the institution decision.”). Thus, this factor weighs against exercising our discretion to deny institution.

6. Factor 4: Overlap between issues raised in the petition and in the parallel proceeding

“[I]f the petition includes the same or substantially the same claims, grounds, arguments, and evidence as presented in the parallel proceeding,

this fact has favored denial.” *Fintiv*, Paper 11 at 12. “Conversely, if the petition includes materially different grounds, arguments, and/or evidence than those presented in the district court, this fact has tended to weigh against exercising discretion to deny institution under *NHK*.” *Id.* at 12–13.

Petitioner does not specifically dispute the overlap, but argues that the Petition also challenges additional claims 3 and 18–21 “making the scope of this IPR distinct from the litigation.” Pet. 75. Petitioner has stipulated that, “if the Board institutes, it will not pursue in the parallel proceeding the grounds raised in this IPR.” Prelim. Reply 2. Patent Owner argues that this is not a sufficient stipulation to address concerns of duplicative efforts. Prelim. Sur-Reply 4 (citing *Verizon Bus. Network Servs. LLC v. Huawei Techs. Co. Ltd.*, IPR2020-01278, Paper 12 at 11–13 (PTAB Jan. 26, 2021)).

Patent Owner argues that, “[i]n the district court litigation, Petitioner is challenging ***all of the asserted claims*** using the ***same references*** and ***same grounds*** raised in the Petition.” Prelim. Resp. 23 (citing Exs. 2005, 2006). Considering Patent Owner’s assertion of the relative similarity between the challenges in the infringement action and this proceeding, Petitioner’s stipulation thus includes the same prior art and challenges in both proceedings and therefore covers a significant portion, if not all, of its current challenges as to invalidity of the ’647 patent in the district court. Because Petitioner’s stipulation minimizes the overlap between this proceeding and the litigation, we determine that this factor weighs against exercising discretion. *See Sand Revolution II, LLC v. Continental Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24 at 11–12 (PTAB June 16, 2020) (informative) (a stipulation not to pursue overlapping patentability arguments in district court may mitigate concerns of potential overlap between arguments in parallel proceedings).

7. Factor 5: Whether the petitioner and defendant in the parallel proceeding are the same party

The petitioner here, and the defendant in district court, are the same party. Pet. 75. Because the petitioner and the defendant in the infringement action are the same party, this factor weighs in favor of discretionary denial.

8. Factor 6: Other circumstances that impact the Board's exercise of discretion, including the merits

Petitioner argues that the speed with which it filed its Petition, approximately 5 months after being served by Patent Owner with a complaint in the infringement action, and that the merits of its Petition are strong, should counter any factors weighing towards exercise of our discretion. Pet. 74.

Patent Owner argues that “Petitioner has failed to establish that any of the proposed grounds renders obvious a key limitation of the challenged independent claims (*i.e.*, ‘generate a display output based on the camera feed and sensor data, wherein the display output comprises a visual perspective of the object relative to the rotorcraft’).” Prelim. Resp. 26. Patent Owner also argues that, regardless of the merits, Factors 2–5 outweigh any merits of the case considered in Factor 6. *Id.* at 27 (citing *Samsung Electronics Co., Ltd. v. Clear Imaging Research, LLC*, IPR2020-01401, Paper 12 at 23–25 (PTAB Feb. 17, 2021)).

We are not persuaded that these additional arguments by Patent Owner lend weight to a determination that we should exercise our discretion. Only the overlap of the parties, Factor 5, weighs in favor of the Board exercising discretion in this case. Otherwise, the factors are either neutral or do not weigh in favor of discretionary denial. As discussed *infra*, we find that Petitioner has shown a reasonable likelihood that at least one claim in

the '647 patent is unpatentable. As set forth in our subsequent analysis, we determine that Petitioner has established a reasonable likelihood that a person of ordinary skill in the art would have found the prior art teaches generating a display output based on the camera feed *and* sensor data, as recited, for instance, in claim 1. Thus, at this preliminary stage, the merits are sufficiently strong enough to persuade us to institute an *inter partes* review.

9. *Holistic assessment of factors*

When considering the facts and evidence in this proceeding and in the infringement action, three *Fintiv* factors are neutral, one factor weighs towards, while two factors weigh against the Board exercising its discretion to deny. As we describe in detail below, the merits of Petitioner's challenges indicate that at least one of the challenged claims has been shown reasonably likely to be unpatentable. Thus, the weight of the factors lies in favor of the Board not exercising its discretion under § 314(a).

B. *Legal Standard*

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. 35 U.S.C. § 103; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). “[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.” *KSR*, 550 U.S. at 416 (citing *United States v. Adams*, 383 U.S. 39, 50–51 (1966)). The question of obviousness is resolved based on underlying factual determinations including: (1) the scope and content of

the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

C. Level of Ordinary Skill in the Art

Petitioner, supported by the testimony of Dr. Singhose, proposes that a person of ordinary skill in the art at the time of the '647 patent

would have been someone with at least the equivalent of a Bachelor's degree in mechanical engineering, aerospace engineering, electrical engineering, robotics or similar discipline covering principles on the design or operation of flight controls, cameras, and/or sensors for helicopters, drones, or other rotary craft, and one year of experience working on the design, development, implementation, or operation of such technologies. Significant experience could substitute for formal education, and significant education could substitute for work experience.

Pet. 7 (citing Ex. 1004 ¶ 49). Patent Owner agrees with, and reiterates this level of ordinary skill. Prelim. Resp. 6–7.

On this record, the level of ordinary skill in the art is not disputed and is consistent with our review of the technology and descriptions in the '647 patent and the asserted prior art references. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that “the level of skill in the art is a prism or lens through which a judge, jury, or the Board views the prior art and the claimed invention”). For purposes of this Decision, we rely on Petitioner's proposed level of ordinary skill in the art.

D. Claim Construction

We interpret a claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2020). Under this standard, we construe

the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* Furthermore, at this stage in the proceeding, we expressly construe the claims only to the extent necessary to determine whether to institute *inter partes* review. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e 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))).

Petitioner argues no claim terms require express construction “because the claims encompass the below prior-art mappings under any reasonable constructions consistent with the *Phillips* standard.” Pet. 8. Patent Owner proposes “the terms and phrases of the challenged claims of the ’647 Patent to have their plain and ordinary meaning.” Prelim. Resp. 14.

The parties do not dispute the meaning of any particular claim term, and our Decision does not turn on the meaning of any specific claim term. It is unnecessary at this stage to expressly interpret any term beyond any implicit interpretations or clarifications as to the plain and ordinary meaning reflected in our analysis below.

*E. Ground 1: Claims 1, 2, 4–7, 10–13, 15–17, 19–21, and 23–25
– Alleged Obviousness over Huang, Knight, and Thoreen*

On this record, Petitioner has established a reasonable likelihood of prevailing on its assertion that at least one of claims 1, 2, 4–7, 10–13, 15–17, 19–21, and 23–25 is obvious over Huang, Knight, and Thoreen for the reasons explained below.

1. *Huang (Ex. 1005)*

Titled “Apparatus and Methods for Obstacle Detection,” Huang describes moveable objects, such as unmanned aerial vehicles (“UAVs”), having “[s]ystems, apparatuses and methods for recognizing or detecting obstacles.” Ex. 1005, codes (54), (57). In particular, Huang describes an avoidance system “provid[ing] improved and efficient collision avoidance for movable objects, especially with regards to obstacles with particular thermal signals (e.g., for subjects such as human beings).” *Id.* at 1:48–51. Huang describes one embodiment of the invention having

a passive infrared sensor [(PIR)] on board a movable object, said passive infrared sensor configured to receive one or more heat signals from the obstacle; and one or more processors, collectively or individually configured to: calculate a distance from the movable object to the obstacle based on data from the passive infrared sensor; and determine whether to effect a collision avoidance maneuver for the movable object to avoid the obstacle based on the distance.

Id. at 2:24–32. Figure 5 of Huang, reproduced below, illustrates a UAV tracking and assessing an obstacle, e.g., a human being.

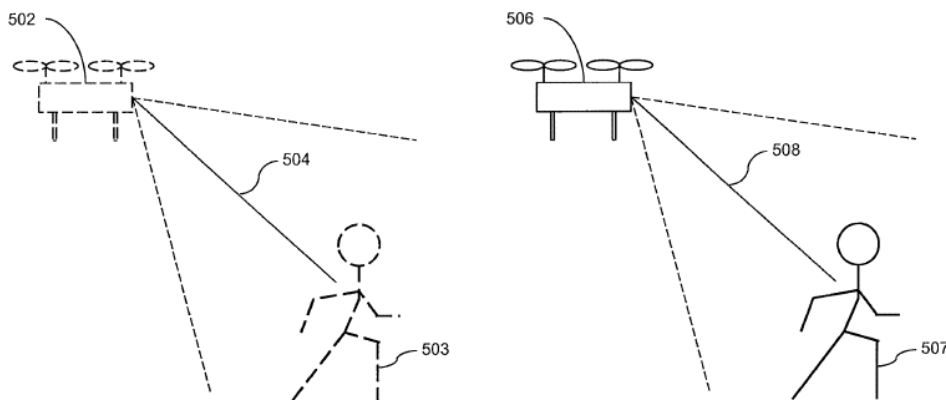


FIG. 5

Huang's Figure 5, above, illustrates a UAV at first location 502 detecting an obstacle and determining a first distance 504 to the obstacle, determining from a second position a second distance 508 to the obstacle after the obstacle has moved from position 503 to position 507. Figure 1 of Huang, reproduced below, is a flow chart illustrating four steps carried out by Huang's detection system.

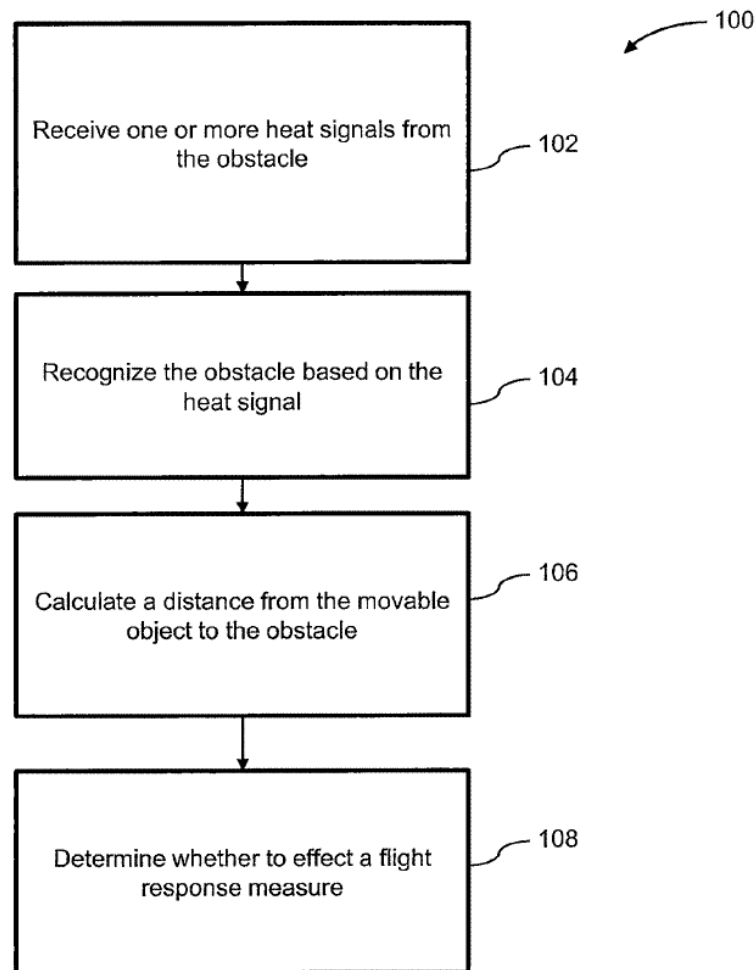


FIG. 1

Huang's flow chart in Figure 1, above, illustrates the steps of receiving heat signals 102, recognizing the obstacle based on the heat signal 104,

calculating a distance to the obstacle 106, and determining whether to change its flight path 108. *Id.* at 1:59–11:38.

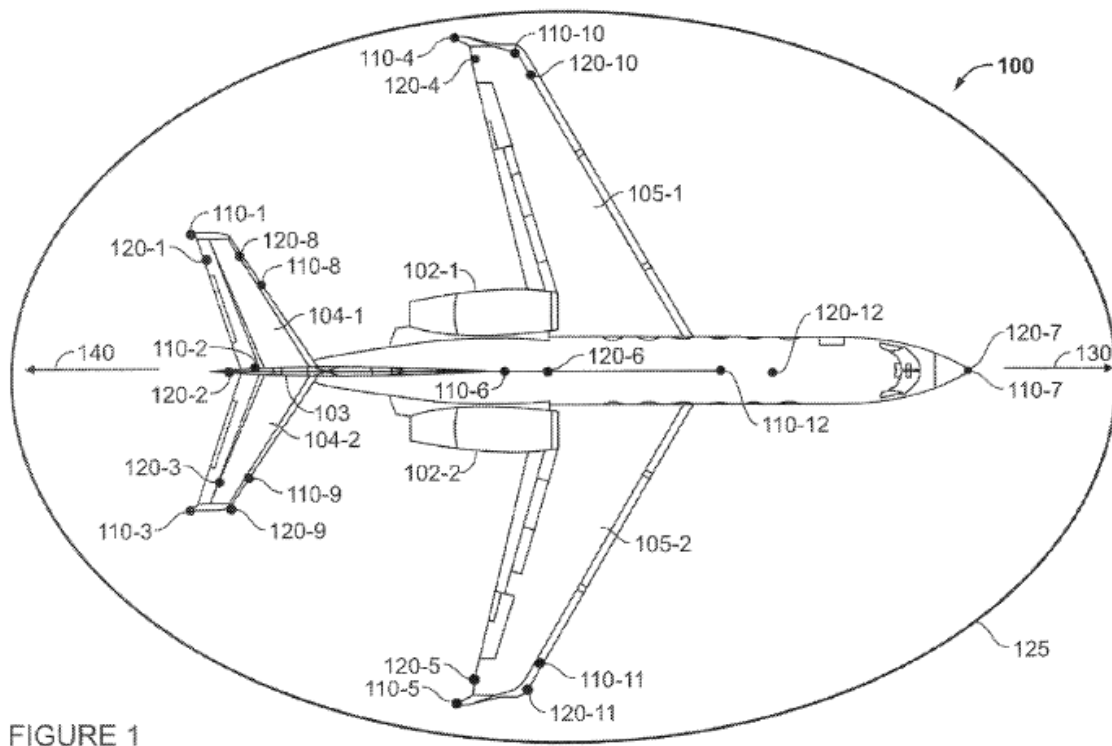
In one embodiment of the UAV system, in accordance with step 102, above, “one or more heat signals from a target may be received (e.g., by PIR sensors). The heat signals may be for example, infrared radiation ranging in wavelength from 0.2 to 20 um, as described herein. The target may comprise the obstacles as referred herein, including objects and subjects such as human beings, cars, buildings, animals, etc.” *Id.* at 15:9–16. At step 104, when detected, the “obstacle may be recognized as a type of obstacle (e.g., human) due to the filter limiting the range of wavelengths impinging upon the PIR sensor surface.” *Id.* at 15:27–30. Once detected and recognized, the UAV may apply several flight response measures, “(e.g., tracking a target, sending an alert or a warning signal, altering a flight path, etc[.]).” *Id.* at 15:36–37. For example, to track a target

the flight response measure may comprise maintaining a desired distance (e.g., a trailing distance) from the target (e.g., obstacle). For example, a target may be detected and a distance may be calculated, as previously described herein. A desired trailing distance (e.g., threshold distance) may be determined (e.g., 5 m, predetermined) and a peak output signal of the PIR sensors may be measured and monitored.

Id. at 15:45–52. The flight response measures include object avoidance, for example, if the distance to a recognized obstacle is within a predetermined distance “the collision avoidance maneuver may be to increase the altitude of the movable object, to decelerate the movable object, or to alter a direction of the moving course of the UAV.” *Id.* at 17:12–18.

2. *Knight (Ex. 1006)*

Knight is titled “Methods and Systems for Avoiding a Collision Between an Aircraft on a Ground Surface and an Obstacle.” Ex. 1006, 1:1–3. Knight explains that during aircraft ground maneuvering “the operator may fail to detect obstacles that are located in ‘blind spots’ in proximity to the aircraft.” *Id.* at 1:26–27. In particular, Knight describes an avoidance system including “a processor onboard an aircraft [that] receives a detection signal from one of a plurality of proximity sensors.” *Id.* at 1:61–66. Knight also describes that, in addition to detecting an object, in the system “a video image signal is transmitted from the processor to a display in the cockpit of the aircraft. The video image signal corresponds to a particular video imager that is associated with the particular proximity sensor that detected the obstacle.” *Id.* at 1:67–2:3. Knight’s Figure 1 is reproduced below.



Knight's Figure 1, above, illustrates aircraft 100 with proximity sensors 110-1 through 110-12 and video imagers 120-1 through 120-12 positioned in various locations on the aircraft. Figure 2, reproduced below, is a block diagram of collision warning and avoidance system 200.

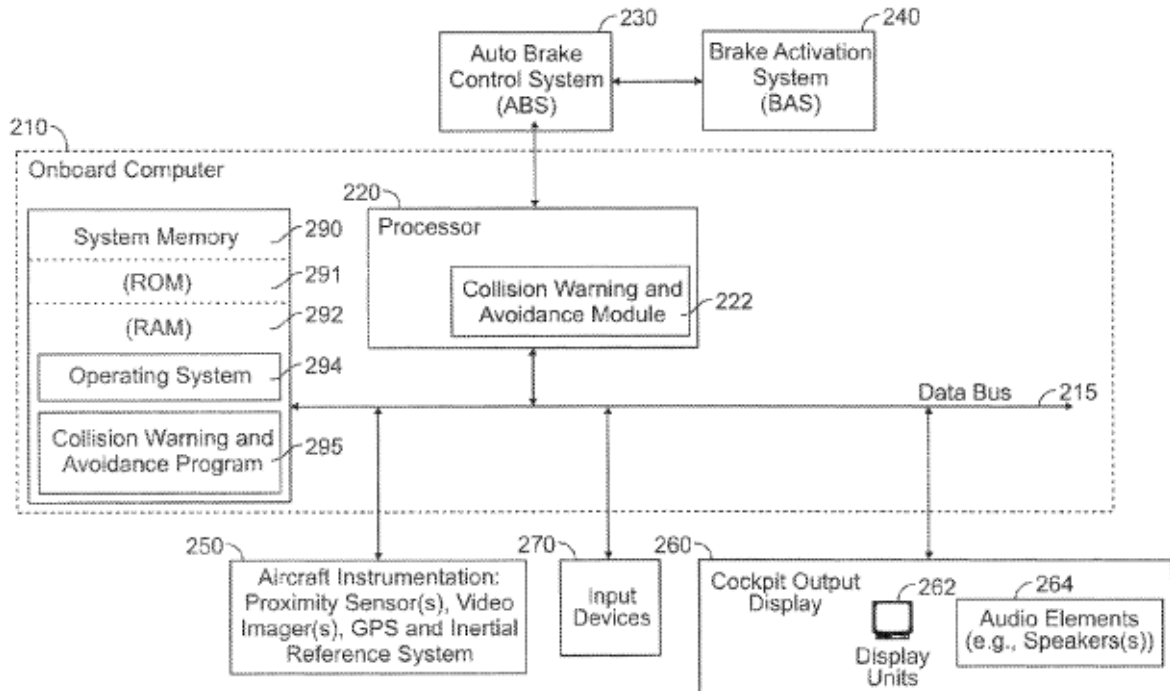


FIGURE 2

Knight's Figure 2, above, illustrates a block diagram of collision avoidance system 200 having aircraft onboard computer 210 including processor 220 receiving input from input devices 270 (e.g., proximity sensors, video imagers) and providing information based on processed input data to an operator via cockpit output display 260.

3. *Thoreen (Ex. 1007)*

Titled "Systems and Methods for Ground Collision Avoidance," Thoreen describes an aircraft having "[a] system for displaying guidance aids to a crew for ground obstacle avoidance, particularly wingtip

clearance.” Ex. 1007, codes (54), (57). Thoreen explains that the inventive “systems utilize a ground maneuvering camera system to portray guidance and stay out regions on the displayed image to help pilots easily determine their proximity to potential threats before the incidents occur.” *Id.* at 2:18–22. Thoreen’s Figure 1 illustrating an aircraft and camera viewing angles, is reproduced below.

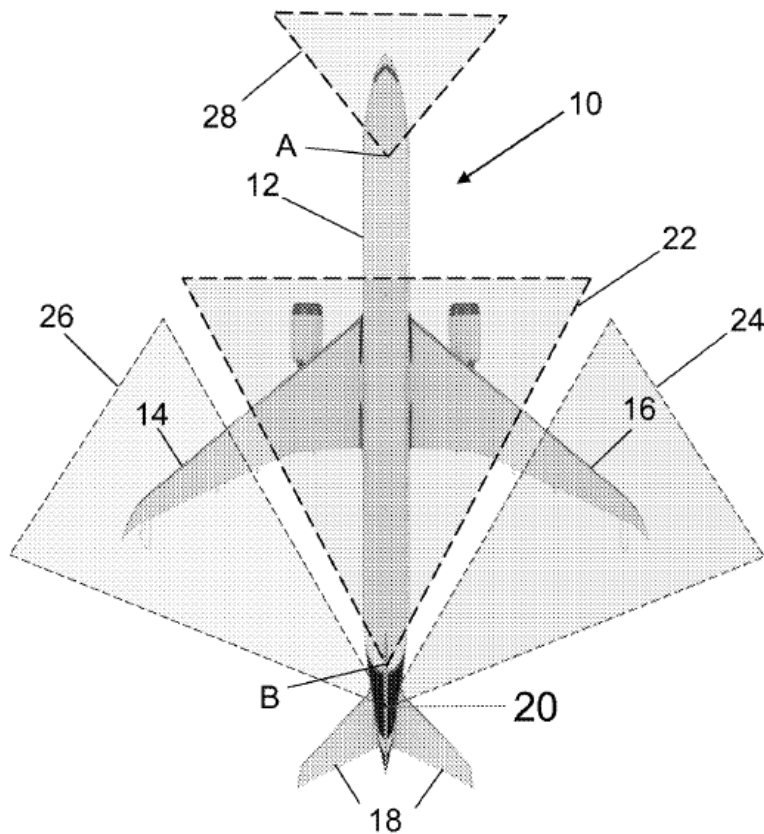


FIG. 1

Thoreen’s Figure 1, above, illustrates a top plane view of aircraft 10 having four video cameras capturing images in four respective fields of view 22, 24, 26, and 28. *Id.* at 6:4–10. Thoreen’s Figure 11 is reproduced below.

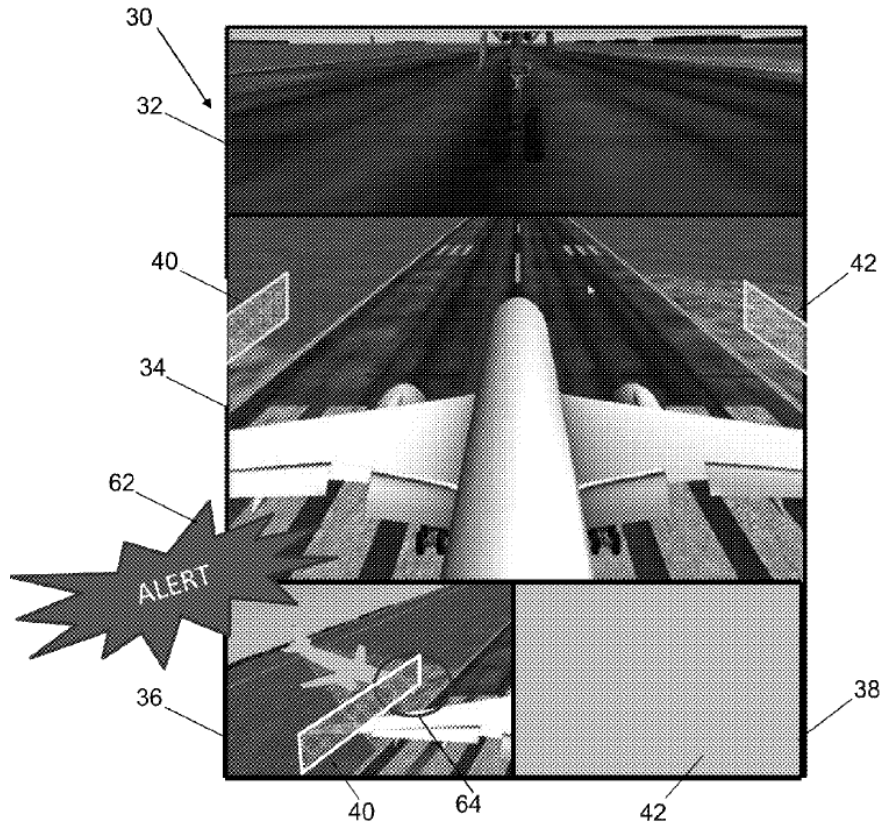


FIG. 11

Thoreen's Figure 11, above, is a screenshot from a visual cockpit display. *Id.* at 5:41–48. The displayed image shows the relative proximity of a second aircraft as well as a superimposed projection plane 40 providing a visual indication to a pilot of a potential collision with the second aircraft. *Id.* at 10:36–43. Thoreen explains that the aircraft

computer system could be further programmed to compare the location of the other aircraft to the projected locations of the left wingtip represented by the projection plane 40 and then, if the former is separated from the latter by a distance less than a specified threshold, activate an audible or visible alert signal. For example, a visible alert signal could be generated by highlighting or changing the color of the projection plane 40.

Id. at 10:48–55.

4. *Independent Claim 1*

Independent claims 1, 16, 24, and 25 are substantively similar as they include many of the same limitations, one difference being in the preamble, for example, claim 1 recites “a processing device configured to,” and claim 16 recites a “non-transitory machine accessible storage medium having instructions stored thereon.” Ex. 1001, 12:27–14:59. All four independent claims include the same limitation of “generat[ing] a display output based on the camera feed and the sensor data, wherein the display output comprises a visual perspective of the object relative to the rotorcraft.” *Id.* We consider initially, by way of example, the elements of claim 1.

a) *Petitioner’s Arguments*

(1) *Preamble [1a] – An apparatus comprising:
a processing device configured to*

To the extent the preamble of claim 1 and “a processing device configured to” are treated as limiting, Petitioner argues that Huang discloses computer system 1100 including processing unit 1104 that is “configured to analyze sensor data, detect and recognize obstacles, determine whether to effect a ‘collision avoidance maneuver,’ and ‘automatically’ ‘effect the collision avoidance maneuver.’” Pet. 17 (citing Ex. 1005, Fig. 11, 2:23–63, 3:42–52, 4:66–5:45, 29:16–30:3).

(2) *Limitation [1b] – obtain sensor data from
one or more sensors associated with a rotorcraft,
wherein the one or more sensors are configured to
detect information associated with an operating
environment of the rotorcraft;*

Petitioner argues that Huang discloses a rotorcraft, e.g., a UAV, using sensors for detecting an object and that Huang explains “one or more sensors may be configured to detect relevant data[,] such as information relating to

the . . . surrounding environment, or the objects and obstacles within th[at] environment.” Pet. 19 (quoting Ex. 1005, 22:59–64, 7:3–9:55) (alterations in original). Petitioner contends that Huang teaches using PIR sensors that receive heat signals from the object or obstacles. *Id.*

(3) *Limitation [1c] – detect an object near the rotorcraft based on the sensor data*

Petitioner argues that Huang discloses “PIR sensors receive the obstacle-specific heat signal, generate an ‘output signal,’ and transmit that signal to a processing unit, where it is measured.” Pet. 21 (citing 10:42–11:31).

(4) *Limitation [1d] – obtain a camera feed from a camera associated with the rotorcraft, wherein the camera feed comprises a camera view of at least a portion of the rotorcraft;*

For limitation 1[d], Petitioner argues that Huang teaches using a camera associated with the rotorcraft to obtain sensor data, such as image data and a camera feed, from the camera. Pet. 22–23 (citing Ex. 1005, 3:42–52, 22:59–64, 29:33–38, 24:38–39). Petitioner argues further that Knight also discloses obtaining a camera feed, that together with other sensor data “generate[s] ‘detection signals’ and send[s] them to a processor to detect and determine a distance and direction of the obstacle relative to the aircraft.” *Id.* at 23 (citing Ex. 1007, 7:12–8:21, 10:4–42). Petitioner asserts that a person of ordinary skill in the art would have been motivated to combine Huang and Knight “to improve the situational awareness of the movable object,” i.e., the UAV. *Id.* (citing Ex. 1004 ¶ 97). According to Petitioner, Huang teaches using different types of sensors including PIR sensors and cameras that would “provide a broad range of data about objects near the movable object.” *Id.* at 24 (citing Ex. 1005, 23:18–22). Relying on

testimony from Dr. Singhose, Petitioner reasons that “[w]ith more information, *Huang*’s movable object can make informed decisions about which ‘flight response measure’ to implement.” *Id.* (citing Ex. 1004 ¶ 97). Dr. Singhose testifies that “[c]ombining *Knight* and *Huang* in this way would involve applying a known technique (using a processing unit to obtain data from cameras and sensors), to a known system (*Huang*’s collision avoidance system), in order to achieve a predictable result (obstacle detection and avoidance).” Ex. 1004 ¶ 97.

Petitioner concedes that neither *Knight*, nor *Huang*, teach explicitly “a camera view of at least a portion of the rotorcraft.” Pet. 25. Petitioner argues that Thoreen discloses an aircraft avoidance system including “a camera with a view that captures images of at least a portion of the aircraft, and a display unit that displays those images.” *Id.* (citing Ex. 1007, Fig. 11, 2:38–3:23, 4:49–5:4). Petitioner argues that *Knight* teaches that camera views are important “so that (i) the aircraft can make automatic adjustments depending on the obstacle’s location, or (ii) an operator can determine which actions should be taken to avoid collisions.” *Id.* at 26 (citing Ex. 1006, 11:21–55; Ex. 1004 ¶ 101). And, although *Knight* does not disclose having the camera view include the rotorcraft specifically, Dr. Singhose testifies that a person of ordinary skill in the art would have understood from Thoreen that “[r]e-orienting a camera to show perceived objects and portions of the aircraft nearest those objects would provide important context and understanding.” Ex. 1004 ¶ 101.

(5) Limitation [1e] – generate a display output based on the camera feed and the sensor data, wherein the display output comprises a visual perspective of the object relative to the rotorcraft

Limitation 1[e] has two parts, the first entails using *both* the camera feed and sensor data to display the detected object relative to the rotorcraft. Second, the limitation requires providing a view of the object relative to the rotorcraft.

Petitioner acknowledges that, while Huang discloses sensor data and using a camera, it does not explicitly disclose generating a display based on both sensor and camera data. Pet. 28. Petitioner argues that using both sensor and camera data to generate a display output “would have been obvious to the skilled artisan in view of *Knight* and *Thoreen*.” *Id.* (citing Ex. 1004 ¶ 105). According to Petitioner, Knight captures camera images around the aircraft and sends these images to a processor, along with sensor data from sensors around the aircraft. Knight’s Figure 2, as annotated by Petitioner, is reproduced below.

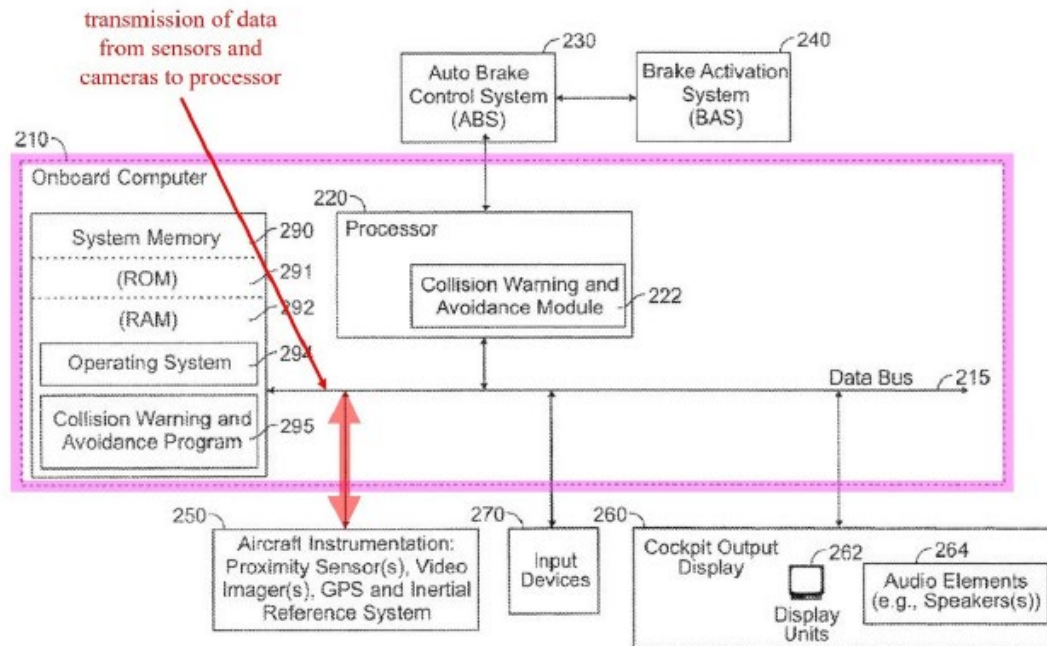


FIGURE 2

Petitioner’s annotated Figure 2 from Knight, above, is a system block diagram illustrating communication of aircraft instrumentation, including proximity sensor and video imager data at block 250, with processor block 220. Petitioner argues that “[t]he processor compiles the data, and a (i) video image and (ii) sensor location and calculated distance from the detected obstacle are simultaneously displayed on the display unit.” *Id.* at 29–30 (citing Ex. 1006, 7:25–8:43, 11:21–12:5; Ex. 1004 ¶ 108).

Dr. Singhose testifies that, “[b]ecause the display output transmitted from the processor and shown on the display unit combines camera image data and sensor data, it is my opinion that *Knight* discloses ‘generate a display output based on the camera feed and the sensor data.’” Ex. 1004 ¶ 108.

Limitation [1e] secondly requires a display, for the pilot or operator of the rotorcraft, to view the relative positioning of the object and the rotorcraft. Petitioner argues that “*Knight*’s camera feed (in view of *Thoreen*) captures obstacles **and** portions of the aircraft nearest those obstacles.” Pet.

30 (citing Ex. 1004 ¶ 108; Ex. 1006, 7:25–8:43, 11:21–12:5). According to Petitioner, a person of ordinary skill in the art would have considered that Knight, together with Thoreen, teaches using both image and sensor data to provide a display including a perspective view of the object relative to the rotorcraft to the operator or pilot because Thoreen discloses sensor data and a camera feed showing a portion of the rotorcraft and relevant obstacles in the camera view. *Id.* at 31 (citing Ex. 1004 ¶ 109).

(6) Limitation [1f] – cause the display output to be displayed on a display device

Petitioner argues specifically that Knight discloses sensors as well as cameras providing data and image capture that is processed to provide an output displayed on a display device. Pet. 32–33 (citing Ex. 1006, 7:25–8:43, 11:21–12:5; Ex. 1004 ¶ 115). Dr. Singhose testifies that a person of ordinary skill in the art would have been motivated to combine the display and sensor displays taught by Knight and Thoreen with Huang’s system because “an operator would need to view a display device in the cockpit to learn about the movable object’s surrounding environment.” Ex. 1004 ¶ 115.

(7) Limitation [1g] – determine a physical characteristic of the object based on the sensor data

Petitioner asserts that Huang “explains that obstacles radiate a heat signal ‘specific to the obstacle.’” Pet. 33 (quoting Ex. 1005, 10:17–19; Ex. 1004 ¶ 119). Dr. Singhose testifies that Huang’s “PIR sensors receive the obstacle-specific heat signal, and generate an ‘output signal’ that is transmitted to, and measured by, the processing unit.” Ex. 1004 ¶ 119 (citing Ex. 1005, 10:42–11:31). Petitioner argues that “[t]he processing unit compares the output signal to a ‘predetermined list of obstacle types’ in

memory and makes a determination about that obstacle.” Pet. 33 (citing Ex. 1005, 10:42–11:31; Ex. 1004 ¶ 119). According to Petitioner, the determination includes that “the ‘processing unit’ can determine if the object is human. It can also determine if an animal is cold blooded or warm blooded and big or small.” *Id.* at 33–34 (citing Ex. 1005, 11:1–31; Ex. 1004 ¶ 119).

(8) Limitation [1h] – automatically adjust operation of the rotorcraft based on the determined physical characteristic of the object

Petitioner argues that, once Huang detects the object or obstacle, “the processing unit assesses if it should perform an ‘appropriate’ flight response measure.” Pet. 34 (quoting Ex. 1005, 13:38–15:8; Ex. 1004 ¶ 122).

Petitioner points out that Huang describes that appropriate measures include “‘altering a direction of a moving course’ of the movable object.” *Id.* (quoting Ex. 1005, 14:4–35)(citing Ex. 1004 ¶ 122).

b) Patent Owner’s Arguments

Patent Owner presents essentially three arguments, first that Petitioner fails to explain why a person of ordinary skill in the art would have been motivated to combine Huang and Knight, and second, why there would have been a reasonable expectation of success. Prelim. Resp. 28–38. Third, Patent Owner argues that, even if a person of ordinary skill in the art would have combined Huang, Knight, and Thoreen, the proposed combination does teach limitation [1e]. *Id.* at 39–45.

(1) Whether Petitioner has provided sufficient motivation to combine Huang and Knight

Patent Owner argues that Petitioner fails to provide the necessary motivation and explanations as to *why* a person of ordinary skill in the art would have combined Knight’s obtaining and display of video images to

improve Huang’s collision avoidance system. Prelim. Resp. 29–30. Patent Owner argues that “[s]imply stating that the combination is the mere application of a known technique to a known system, without explaining why a POSITA [(person of ordinary skill in the art)] would have been motivated to seek out that particular technique to achieve the purported result, does not satisfy Petitioner’s burden.” *Id.* at 30 (citing *Ancestry.com DNA, LLC v. DNA Genotek Inc.*, IPR2016-01152, Paper 11 at 10 (PTAB Nov. 23, 2016)).

Petitioner did, however, explain why a person of ordinary skill in the art would have combined Huang and Knight. Petitioner reasoned that a person of ordinary skill in the art would have considered providing Huang’s processor with “sensor data from sensors and a camera feed from a camera to improve the situational awareness of the movable object.” Pet. 23 (citing Ex. 1004 ¶ 97). The evidence Petitioner relies on for this reasoning is initially Dr. Singhose’s testimony. Dr. Singhose testifies that “[a]n ordinarily skilled artisan would understand that providing *Huang*’s movable object with more information would allow it to make more informed decisions about the ‘flight response measure’ to implement (if any).” Ex. 1004 ¶ 97. In support of his testimony, Dr. Singhose relies on Huang itself, explaining that “[a]s *Huang* acknowledges, sensors of different types—PIR sensors and cameras—‘measure different types of signals or information,’ and can provide a broad range of data about the objects near the movable object.” *Id.* (citing Ex. 1005, 23:18–22).

Patent Owner asserts, as support for its argument, the Board’s Final Written Decision in *Ancestry.com*, IPR2016-01152, Paper 11. In that case the Board found that the combined references simply being in the same field of endeavor was not sufficient to support a rationale to combine the

references. *See Ancestry.com*, Paper 11 at 9 (The Board finding that “[t]he same field of endeavor analysis is merely the jumping-off point in reaching the determination of whether a claimed invention is obvious.”). Also in *Ancestry.com*, the Board found that Petitioner’s assertion that the combination “would have required no more than ‘[a]pplying a known technique to a known device (method, or product) ready for improvement to yield predictable results,’” was conclusory and “nothing more than a restatement of basic tests identified by the Supreme Court for determining whether an invention would have been obvious.” *Id.* at 10 (citing *KSR*, 550 U.S. at 417) (alteration in original).

Different from *Ancestry.com*, in this proceeding Petitioner has articulated a reason for combining Huang and Knight, that is—a person of ordinary skill in the art would have been motivated to provide Knight’s image data from a camera to Huang’s processing device “to improve the situational awareness of the movable object.” Pet. 23. Dr. Singhose’s testimony supports such reasoning, explaining that “[a]n ordinarily skilled artisan would understand that providing *Huang*’s movable object with more information would allow it to make more informed decisions about the ‘flight response measure’ to implement (if any).” Ex. 1004 ¶ 97. Moreover, Dr. Singhose points to evidence in Huang that it was known to use different types of sensors, including cameras, to provide information and data to generate control signals for a UAV. *Id.* (citing Ex. 1005, 23:18–22); *see also* Ex. 1005, 23:4–6 (Huang explaining that sensors include “vision sensors (e.g., imaging devices capable of detecting visible, infrared, or ultraviolet light, such as cameras)”). Based on this record, Petitioner has supported the proposed combination of Huang and Knight with articulated reasoning and evidentiary underpinnings to show that a person of ordinary

skill in the art would have been motivated to combine Huang and Knight. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (explaining the necessity to provide “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

(2) *Whether Petitioner sufficiently explained that a person of ordinary skill in the art would have had a reasonable expectation of success in combining Huang and Knight.*

Patent Owner argues that “Petitioner does not adequately explain **how** a POSITA could have combined the video imagers of *Knight* with the obstacle detection system of *Huang* or **why** a POSITA would have had a reasonable expectation of success in doing so.” Prelim. Resp. 34. Patent Owner argues that Petitioner’s explanations as to how the asserted references are combined is “not sufficient to establish that a POSITA could have combined the teachings of *Knight* with *Huang*, let alone with a reasonable expectation of success.” *Id.* at 36 (citing *Kinetic Techs., Inc. v. Skyworks Solutions, Inc.*, IPR2014-00529, Paper 8 at 16 (PTAB Sep. 23, 2014)). More specifically, Patent Owner argues that Petitioner has not shown sufficiently how ground maneuver cameras and sensors disclosed by *Knight*, would be applied to in-flight operation of Huang’s UAV. *Id.*

Considering Patent Owner’s argument, *how*, in this context is first a technical question, and *why* there would be an expectation of success relates to the level of skill and knowledge in the art. Petitioner points out that Huang and Knight are both directed to sensor and data processing systems for obstacle detection and avoidance with fixed and rotary wing aircraft. Pet. 24 (citing Ex. 1004 ¶ 98; Ex. 1005, 6:40–47, 21:4–31, 22:44–58, 28:62–64). Petitioner provides evidence that *both* Knight and Huang (i) use sensors and cameras, (ii) send data to a processor, and (iii) assess and avoid

obstacles. *Id.* at 24–25. Petitioner asserts that “[i]t would have only been a matter of adjusting *Huang*’s processing unit to receive and process camera feeds. And this adjustment is within the level of skill in the art.” *Id.* at 25 (citing Ex. 1004 ¶ 98). As support for this argument, Dr. Singhose testifies that

[u]tilizing the method of *Knight* would have only been a matter of adjusting *Huang*’s processing unit to receive and process camera feeds. Making such an adjustment would have been within the level of skill in the art. In fact, it was well known in the art at that time to use cameras and sensors together to collect data about objects near an aircraft and convey that data to a processor to assess the surrounding environment.

Ex. 1004 ¶ 98.

We appreciate that Dr. Singhose does not explain in excruciating technical detail how electronic data signals from different sensors are sent, processed, and displayed to a user on a display screen. On the other hand, Patent Owner does not demonstrate any reason to question that the use of common sensor and camera data processing technology in both ground avoidance and in-flight avoidance was well known and within the level of ordinary skill in the art, as Petitioner contends. *See* Prelim. Resp. 37 (Patent Owner arguing that the combination of *Knight* and *Huang* “likely would have required a number of modifications in order to be successful for which Petitioner fails to address.”). For example, Patent Owner has not, on this record, explained and provided evidence undermining Petitioner’s contention, supported by Dr. Singhose, that it was within the level of ordinary skill in the art “to properly scale the video imagers to be able to detect objects much further away and much sooner” during in-flight

operation.⁸ *Id.* These factual determinations, e.g., whether it is difficult or beyond the level of ordinary skill in the art to acquire qualitative and quantitative variables detected by different sensor and camera sources that can be coded as raw data and output as useful, processed data for a combined display to a user, can be developed during trial.

On the record before us, we are persuaded that Petitioner’s arguments and evidence show that a person of ordinary skill in the art would have had a reasonable expectation of success in combining, sensing, processing, and displaying sensor data from different types of sensors in an electronic object avoidance system, regardless of whether these functions occur in-flight or during ground maneuvering.

(3) Limitation [1e] – Whether the combination of Huang, Knight and Thoreen teaches the limitations of element [1e]

Claim limitation [1e] requires:

A processing device configured to . . . generate a display output *based on the camera feed and the sensor data*, wherein the display output comprises a visual perspective of the object relative to the rotorcraft;

Ex. 1001, 12:29–42. Patent Owner argues that the references alone or in combination fail to disclose the limitations of [1e]. Prelim. Resp. 39. Patent Owner argues specifically that, contrary to Petitioner’s challenge, “*Knight* does not teach or suggest ‘combin[ing] camera data and sensor data’ to generate a display output.” *Id.* at 41 (citing Ex. 2001 ¶ 68) (alteration in original). Patent Owner argues that “*Knight* merely describe[s] *separately*

⁸ We note that the claims of the ’647 patent do not differentiate between in-flight and ground operation of an aircraft and that rotorcraft, such as helicopters and UAVs, may be in-flight, but horizontally stationary, e.g., hovering, so that aircraft speed is not an issue.

displaying (i) a raw video image from the video image signal and (ii) a diagram and/or symbolic representation of the aircraft and an indicator associated with the obstacle.” *Id.* at 42–43 (citing Ex. 2001 ¶ 71).

We note, however, that claim 1 does not use the word “combine” or “camera data and sensor data.” Claim limitation [1e] recites “generat[ing] a display output *based on* the camera feed and the sensor data.” Ex. 1001, 12:29–42. Patent Owner’s argument appears to reference Patent Owner’s Declarant, C. Douglas Locke Ph.D., who makes a reference in his declaration to a quote from the Petition as to why Knight meets limitation [1e]. *See* Ex. 2001 ¶ 68 (quoting Pet. 30). At the very least this argument appears to import extraneous limitations into claim 1 that are not there, and Patent Owner has not provided any express explanation of why we should do so.⁹

To the extent Patent Owner is arguing that Knight does not disclose “generat[ing] a display output *based on the camera feed and the sensor data*,” as the claim properly reads, we disagree based on the evidence at this stage of the proceeding. Ex. 1001, 12:39–40 (emphasis added). Knight’s Figure 2 illustrates aircraft instrumentation 250 including “Proximity Sensor(s), Video Imager(s), GPS and Inertial Reference System.” Ex. 1006, Fig. 2. Aircraft instrumentation 250 is shown communicating via data bus 215 with onboard computer 210 for processing and cockpit output display 260 for display to an aircraft operator. *Id.* In addition, the flow chart in

⁹ To the extent it is even relevant based on the plain and ordinary meaning of the claims, the declarants’ disagreement over whether Knight teaches “combining” or “separately” displaying data from the camera feed and proximity sensor, is a factual dispute best left for development at trial. *Compare* Ex. 1004 ¶ 108, *with* Ex. 2001 ¶ 71.

Figure 3 shows Knight's system acquiring "video images of regions around the aircraft via video imagers" at block 320 concurrently with proximity sensors detecting "potential obstacles in vicinity of aircraft" at block 325. Ex. 1006, Fig. 3. Based on this data, the flow chart expressly discloses at block 355 to "[d]isplay a video image of a particular region around the aircraft that includes the detected obstacle on a cockpit display." *Id.* Knight also describes that

[i]n some implementations of block/task/step 355, an aircraft diagram (e.g., a symbolic representation of the aircraft) along with a symbolic representation of the detected obstacle relative to the aircraft is displayed to provide the operator with an indication of the position of the detected obstacle relative to the aircraft.

Ex. 1006, 11:56–61. Overall, a plain reading of Knight's specification reveals that the display presents data from both video imagers and proximity sensors in the aircraft cockpit to "provide[] the operator with a visual indication of where the obstacle is located with respect to the aircraft, and also provides the operator with a visual aid for determining what actions to take to avoid a collision." *Id.* at 11:51–55.

5. *Dependent claims 2, 4–7, 10–13, and 15*

Claim 2 recites "wherein the processing device is further configured to determine a location of the object relative to the rotorcraft based on the sensor data." Ex. 1001, 12:50–52. To meet this limitation, Petitioner argues that Huang teaches the use of PIR sensors and using "the strength of the PIR sensor's output signal, to determine a 'distance from the movable object to the obstacle.'" Pet. 35 (citing Ex. 1005, 11:39–13:37; Ex. 1004 ¶ 127). Patent Owner does not substantively address dependent claim 2 arguing that Petitioner "has not shown that the *Huang, Knight, and Thoreen* combination

renders obvious every element of independent Claims 1 and 16.” Prelim. Resp. 45.

Considering our analysis for independent claim 1 and Petitioner’s argument and evidence as to claim 2, for purposes of institution we are persuaded that Petitioner has shown a reasonable likelihood that a person of ordinary skill in the art would have combined Huang, Knight, and Thoreen to render claim 2 obvious.

The remaining dependent claims 4–7, 10–13, and 15 recite various limitations including determining the size and type of the sensed object (claims 4 and 5), utilizing a plurality of sensor technologies (claims 6 and 7), detecting an object near a specific part of the rotorcraft (claim 8), triggering a warning regarding the detected object (claims 10–13), and adjusting a flight path of rotorcraft based on the detected object (claim 15). Ex. 1001, 12:62–13:42. Patent Owner does not substantively address these dependent claims. Prelim. Resp. 45. We have considered, and based on the record at this point in the proceeding, accept as our own, Petitioner’s arguments and evidence set forth at pages 36–44 of the Petition. Accordingly, we determine that Petitioner has shown a reasonable likelihood that claims 4–7, 10–13, and 15 would have been obvious in view of Huang, Knight, and Thoreen.

6. *Claims 16, 17, 19–21, and 23–25*

a) *Independent claims 16, 24, and 25*

As discussed above, independent claims 16, 24, and 25 are very similar to independent claim 1 and include many of the same limitations. Section II.E.4. All three independent claims include the same disputed limitation as [1e], namely “generat[ing] a display output based on the camera feed and the sensor data, wherein the display output comprises a

visual perspective of the object relative to the rotorcraft.” *See, e.g.*, Ex. 1001, 15:6–9 (Claim 25 reciting same limitation as claims 1, 16, and 24). Petitioner addresses the limitations of independent claims 16, 24, and 25 with similar arguments as for claim 1. *See generally* Pet. 44–48, 51–53. Patent Owner argues that, because Petitioner has not shown claim 1 would have been obvious over Huang, Knight, and Thoreen, independent claims 16, 24, and 25 also would not have been obvious over the combination of Huang, Knight, and Thoreen for the same reasons. Prelim. Resp. 44–45.

Based on our analysis for claim 1, above, as well as considering the arguments made by Petitioner as to claims 16, 24, and 25, on the record before us we are persuaded that Petitioner has shown a reasonable likelihood that independent claims 16, 24, and 25 would have been obvious over Huang, Knight, and Thoreen. Pet. 44–48, 51–53.

b) Dependent claims 17, 19–21, and 23

Dependent claim 17, like dependent claim 2 discussed above, adds the additional limitation of determining a location of the object based on sensor data. Ex. 1001, 13:65–67. Dependent claims 19–21 correspond to dependent claims 5–7 reciting various limitations including determining the type of the sensed object, (claims 19 and 20), and utilizing a plurality of sensor technologies, (claims 20–21). *Id.* at 14:11–31. Dependent claim 23 corresponds to dependent claim 15 and adjusting a flight path of rotorcraft based on the detected object. *Id.* at 12:62–13:42.

Patent Owner does not substantively address these dependent claims. Prelim. Resp. 45. We have considered, and on the record at this point in the proceeding, accept as our own, Petitioner’s arguments and evidence set forth at pages 49–51 of the Petition. Accordingly, we determine that Petitioner

has shown a reasonable likelihood that claims 17, 19–21, and 23 would have been obvious in view of Huang, Knight, and Thoreen.

7. *Conclusion as to obviousness of claims 1, 2, 4–7, 10–13, 15–17, 19–21, and 23–25*

We are persuaded that Petitioner’s arguments and evidence have shown a reasonable likelihood that at least one of the challenged claims 1, 2, 4–7, 10–13, 15–17, 19–21, and 23–25 would have been obvious over Huang, Knight, and Thoreen.

F. *Ground 2: Claims 3 and 18 – Alleged Obviousness over Huang, Knight, Thoreen, and Werner*

On this record, Petitioner has established a reasonable likelihood of prevailing on its assertion that at least one of claims 3 and 18 would have been obvious over Huang, Knight, Thoreen, and Werner for the reasons explained below.

1. *Werner (Ex. 1011)*

Werner discloses a system and apparatus, including a camera and sensor devices, for monitoring the surrounding environment of a vehicle, for example, to assist a driver in safely parking the vehicle. Ex. 1011 ¶ 1. Werner explains that its system “has the advantage over the prior art that indicators of obstacles that are detected by the sensor apparatus are also overlaid in the camera image.” *Id.* ¶ 3.

2. *Claims 3 and 18*

Claims 3 and 18 depend ultimately from independent claims 1 and 16 respectively and each recite the limitations:

determine, based on the location of the object relative to the rotorcraft as indicated by the sensor data, that the object is outside the camera view; and

generate a visual representation of the object on the display view based on the location of the object relative to the rotorcraft.

Ex. 1001, 12:56–61. Petitioner argues that Werner teaches a system that uses sensors and cameras to detect objects around a vehicle and, if an object is detected outside the camera view “the camera’s image is overlaid [sic] with a representation of the object based on sensor data (location information) to ensure ‘a cohesive and uniform impression of the situation’ around a vehicle.” Pet. 57 (quoting Ex. 1011 ¶ 3) (citing Ex. 1011 ¶¶ 4, 9, 12, 19; Ex. 1004 ¶ 229). Petitioner provides the following annotated Figure 4 from Werner, which we reproduce below.

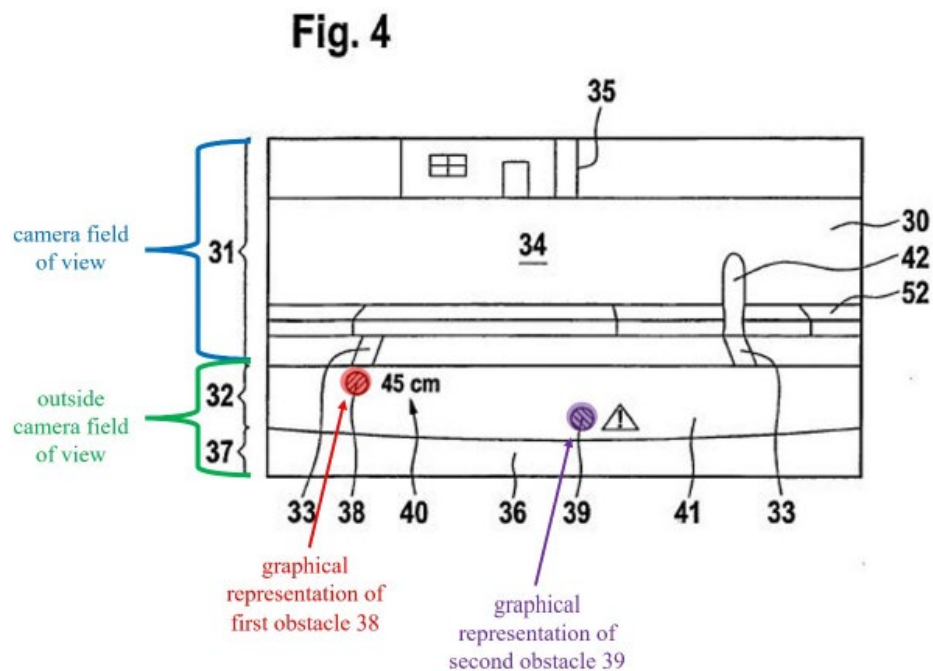


Figure 4 of Werner, above, as annotated by Petitioner, illustrating a graphical representation of obstacles 38, 39 superimposed on a visual display unit. Petitioner argues that a person of ordinary skill in the art would have been motivated to use Werner’s graphical representations to “provide a

‘clear interpretation of the maneuverability of the vehicle’ in its environment.” *Id.* at 59 (quoting Ex. 1011 ¶ 3) (citing Ex. 1004 ¶ 230).

Patent Owner does not substantively address this ground, arguing mainly that Werner does not cure the deficiencies in the Huang, Knight, Thoreen combination. Prelim. Resp. 46. We have considered, and on the record at this point in the proceeding, accept as our own, Petitioner’s arguments and evidence set forth at pages 56–60 of the Petition. Accordingly, we determine that Petitioner has shown a reasonable likelihood that claims 3 and 18 would have been obvious in view of Huang, Knight, Thoreen, and Werner.

G. Ground 3: Claims 8 and 22 – Alleged Obviousness over Huang, Knight, and Christoph

On this record, Petitioner has established a reasonable likelihood of prevailing on its assertion that claims 8 and 22 would have been obvious over Huang, Knight, Thoreen, and Christoph for the reasons explained below.

1. Christoph (Ex. 1009)

Christoph relates to a helicopter collision avoidance system that is specifically “designed to avoid a collision of a person with the tail jib,” i.e., the tail boom and rotor, of the aircraft. Ex. 1009, code (57). Figure 1 of Christoph is reproduced below.

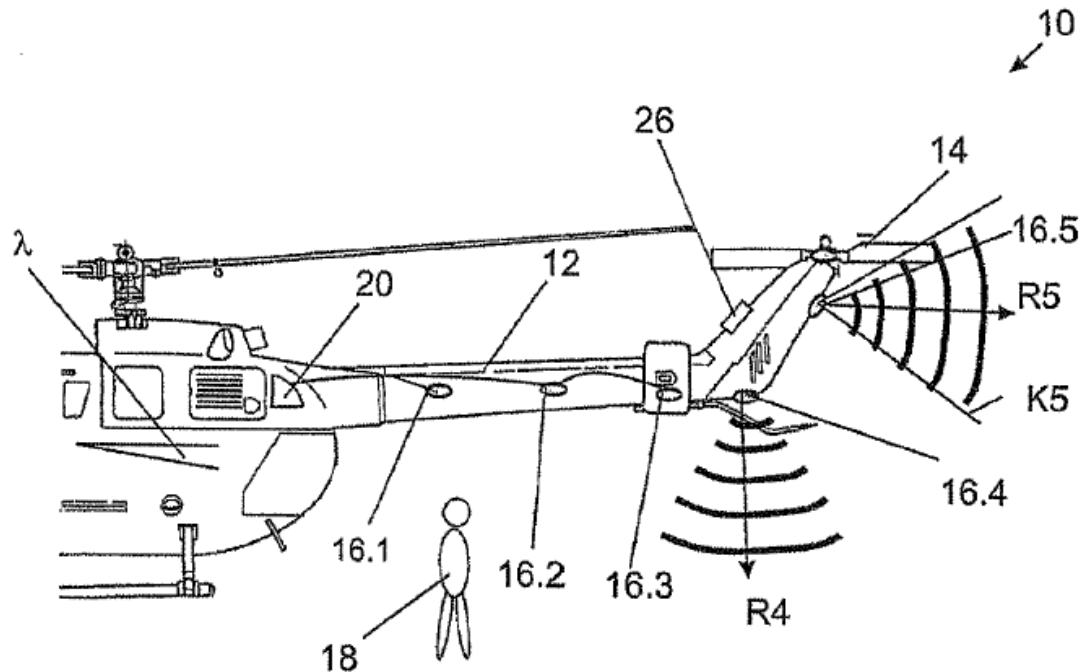


Figure 1 of Christoph, above, illustrates an object, for example person 18, in the vicinity of tail boom 12 and rotor 14. Ex. 1009, 3:35–37. Christoph describes proximity sensors 16.1–5 detecting the distance of person 18 from each respective sensor. *Id.* at 3:48–51.

2. Claims 8 and 22

Claims 8 and 22 depend from independent claims 1 and 16 respectively and recite “detect the object near the rotorcraft based on the sensor data further cause the machine to detect the object near a rotor of the rotorcraft.” Ex. 1001, 14:33–35. Petitioner argues that a person of ordinary skill in the art “would have been motivated to detect objects near a rotor on *Huang*’s movable object to avoid the risk of damage or injury associated with rotor collisions.” Pet. 61 (citing Ex. 1009, 1:11–30; Ex. 1004 ¶ 241).

Patent Owner does not substantively address this ground, arguing mainly that Christoph does not cure the deficiencies in the Huang, Knight, Thoreen combination. Prelim. Resp. 46–47. We have considered, and on

the record at this point in the proceeding, accept as our own, Petitioner's arguments and evidence set forth at pages 60–62 of the Petition.

Accordingly, we determine that Petitioner has shown a reasonable likelihood that claims 8 and 22 would have been obvious in view of Huang, Knight, Thoreen, and Christoph.

III. CONCLUSION

We determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one claim of the '647 patent. 37 C.F.R. § 42.108(c); *SAS Inst. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018); *see also PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (“Equal treatment of claims and grounds for institution purposes has pervasive support in *SAS*.”). We therefore institute trial on all challenges included in the Petition.

Our factual findings 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.

IV. ORDER

In consideration of the foregoing, it is:

ORDERED that *inter partes* review of the '647 patent is hereby instituted as to claims 1–8, 10–13, and 15–25 on all grounds set forth in the Petition; and

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

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