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Paper 11
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARASHI VISION (U.S.) LLC (D/B/A INSTA360),
Petitioner,

v.

GOPRO, INC,
Patent Owner.

IPR2024-01165
Patent 10,958,840 B2

Before WILLIAM V. SAINDON, NABEEL U. KHAN, and BRIAN D. RANGE, *Administrative Patent Judges*.

SAINDON, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background and Summary

Arashi Vision (U.S.) LLC (d/b/a Insta360) ("Petitioner") filed a Petition (Paper 2, "Pet.") requesting an *inter partes* review of claims 1–21 ("the challenged claims") of U.S. Patent No. 10,958,840 B2 (Ex. 1001, "the '840 patent"). GoPro, Inc. ("Patent Owner") filed a Preliminary Response. Paper 7 ("Prelim. Resp.").[1]

We have authority to determine whether to institute an *inter partes* review under 35 U.S.C. § 314(b) and 37 C.F.R. § 42.4(a). The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that 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." For the reasons provided below, we determine that Petitioner has demonstrated a reasonable likelihood that at least one claim of the '840 patent is unpatentable, and we institute an *inter partes* review. 37 C.F.R. § 42.108(a).

Our findings of fact, conclusions of law, and reasoning discussed below are made for the sole purpose of determining whether the Petition meets the threshold for initiating review. This decision to institute trial is not a final decision as to the patentability of any challenged claim or the construction of any claim limitation.

[1] A redacted, publicly-accessible version of the Preliminary Response has been filed as Paper 8.

B. Real Parties in Interest

The parties both assert that they are the sole real parties in interest. Pet. 76; Paper 5, 2 (Patent Owner's Mandatory Notice).

C. Related Matters

The parties both identify *In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith*, Inv. No. 337-TA-1400 (USITC) and *GoPro, Inc. v. Arashi Vision Inc.*, No. 8:24-cv-00681-HDE-JCV (C.D. Cal.) as related matters outside the USPTO. Pet. 80–81; Paper 5, 2.

Related matters within the USPTO include: IPR2024-00984 (US Pat. 10,015,413); IPR2024-01052 (US Pat. 11,336,832); IPR2024-01164 (US Pat. 10,958,840); and IPR2024-01186 (US Pat. 10,574,894). Paper 5, 2.

D. Prior Art and Asserted Grounds

Petitioner's grounds rely on the following prior art references:

Name	Reference	Exhibit No.
Sokeila	US Pat. 8,994,838 B2, iss. Mar. 31, 2015	1011
Karpenko	US Pat. 9,071,756 B2, iss. June 30, 2015	1010
Zhou	US Pat. 9,674,438 B2, iss. June 6, 2017	1006
Cai	US Pat. 10,158,802 B2, iss. Dec. 18, 2018	1009
Bell Paper	Steven Bell, Alejandro Troccoli, and Kari Pulli, "A Non-Linear Filter for Gyroscope-Based Video Stabilization," *ECCV (4), Vol. 8692 of Lecture Notes in Computer Science*, pp. 294–308, Springer (2014).	1004

Petitioner asserts that the challenged claims would have been unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5–11, 14–16, 18, 19, 21	103	Zhou, Cai
4, 20	103	Zhou, Cai, Karpenko

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
12	103	Zhou, Cai, Sokeila
13, 17	103	Zhou, Cai, Bell Paper

Petitioner relies on the testimony of Aggelos Katsaggelos, Ph.D, a professor of Electrical and Computer Engineering who has taught courses in "digital image and video processing, including image and video compression, algorithms, analysis, and enhancement techniques." Ex. 1003 ¶ 6. Patent Owner relies on the testimony of Hassan Foroosh, Ph.D, a professor of Computer Science who has taught courses in "computer vision and 3D modeling, including 3D Computer Vision, Image Processing, Special Topics in 3D Computer Vision, and Visual Simulation." Ex. 2001 ¶¶ 8–9.

E. Overview of the '840 Patent

The '840 patent describes itself as follows:

> Visual content is captured by an image capture device during a capture duration. The image capture device[] experiences change in position during the capture duration. The trajectory of the image capture device is smoothed based on a look ahead of the trajectory. A punchout of the visual content is determined based on the smoothed trajectory. The punchout of the visual content is used to generate stabilized visual content.

Ex. 1001, Abstract.

F. Challenged Claims

Claims 1–21 are challenged. Claims 1 and 16 are independent. Claim 1 is reproduced below.

> 1. A image capture system that stabilizes videos, the image capture system comprising:
>
> a housing of an image capture device;

an optical element carried by the housing and configured to guide light within a field of view to an image sensor;

the image sensor carried by the housing and configured to generate a visual output signal conveying visual information based on light that becomes incident thereon during a capture duration, the visual information defining visual content having the field of view, the field of view being larger than a size of a viewing window for generating stabilized visual content;

a position sensor carried by the housing and configured to generate a position output signal based on positions of the housing during the capture duration, the position output signal conveying position information that characterizes rotational positions of the housing at different moments within the capture duration; and

one or more physical processors configured by machine-readable instructions to:

determine a trajectory of the housing during the capture duration based on the position information, the trajectory reflecting the rotational positions of the housing at the different moments within the capture duration, the trajectory including a first portion corresponding to a first moment within the capture duration and a second portion corresponding to a second moment subsequent to the first moment within the capture duration;

determine a smoothed trajectory of the housing based on a look-ahead of the trajectory and one or more of a weight-balance parameter, a low-light high-pass parameter, and/or a stickiness parameter, the lookahead of the trajectory including use of a subsequent portion of the trajectory to determine a preceding portion of the smoothed trajectory such that a portion of the smoothed trajectory corresponding to the first portion of the trajectory is determined based on the second portion of the trajectory, the smoothed trajectory having smoother changes in the rotational positions of the housing than the trajectory, wherein the determination of the smoothed trajectory based on the look-ahead of the trajectory includes use of a temporal horizon of motion experienced by the image capture device, the temporal horizon enabling approximation of intentional motion

> of the image capture device while causing a delay in the determination of the smoothed trajectory;
>
> determine placement of the viewing window for the visual content with respect to the field of view of the visual content based on the smoothed trajectory of the housing, the viewing window defining one or more extents of the visual content to be included within a punchout of the visual content; and
>
> generate the stabilized visual content of a video based on the viewing window, the stabilized visual content including the punchout of the one or more extents of the visual content within the viewing window, wherein inclusion in the stabilized visual content of the one or more extents of the visual content within the viewing window effectuates stabilization of the visual content via selective cropping.

II. ANALYSIS

A. Legal Standards Used in the Merits Analysis

"In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")); *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

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 . . . 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 skill in the art; and (4) when in evidence, objective indicia of non-obviousness. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner asserts that:

> A person of ordinary skill in the art (POSITA) in the field of the '840 patent would have a bachelor's degree in engineering or computer science, or equivalent field, and two years of experience working on image or video processing, or digital cameras. Alternatively, a POSITA would have four years of experience working on image or video processing, or digital cameras. An advanced graduate degree in the disciplines cited above may make up for the work experience indicated above.

Pet. 6 (citing Ex. 1002 ¶ 32). Patent Owner applies the same definition. Prelim. Resp. 9. We use this agreed-upon definition for purposes of this Decision.

C. Claim Construction

Under 37 C.F.R. § 42.100(b), we apply the claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). That is, "the words of a claim 'are generally given their ordinary and customary meaning' . . . that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1312–13.

The parties both assert that no terms require a formal construction. Pet. 6–7; Prelim. Resp. 9–10. Reviewing the arguments set before us, we determine that no claims require construction to resolve a dispute between

the parties at this time. *Realtime, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.'") (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

D. Asserted Obviousness Over Zhou and Cai (Claims 1–3, 5–11, 14–16, 18, 19, 21)

Petitioner asserts that claims 1–3, 5–11, 14–16, 18, 19, and 21 would have been obvious in view of Zhou and Cai. Pet. 8–65. The present dispute between the parties can be resolved by an analysis of independent claim 1; we limit our analysis to that claim.

Independent claim 1 is an "image capture system that stabilizes videos." Ex. 1001, 30:6–7. The image capture system has a housing, optical element, image sensor, and position sensor. *Id.* at 30:8–18. In addition, it has one or more processors that determine: (i) a trajectory of the housing, (ii) a smoothed trajectory of the housing based on a look-ahead trajectory that uses "a temporal horizon of motion experienced by the image capture device," (iii) placement of a viewing window based on the smoothed trajectory, and (iv) stabilized video content. *Id.* at 30:19–67. The dispute before us is chiefly limited to item (ii) of this list, specifically to the use of a temporal horizon of motion.

At a high level, Petitioner's ground mainly relies on Zhou to teach each limitation of the claim except the use of a temporal horizon of motion, which Petitioner asserts is taught by Cai. *See* Pet. 10–40 (*passim*); *id.* at 31–37 (discussion of Cai). We provide a brief overview of Zhou and Cai before turning to the parties' positions and our analysis.

1. Zhou

Zhou discloses techniques for the stabilization of video captured in low light conditions, by taking into account motion blur. Ex. 1006, 1:15–17. Zhou estimates the amount of motion blur in a current frame by using motion data in past and future frames to change the strength of a video stabilization metric, which reduces the perceived motion blur. *Id.* at 3:3–10. The motion data comes from gyroscopes or accelerometers. *Id.* at 4:35–38. Zhou asserts that the benefit of its approach is that:

> [Zhou's] ability to look into the "future" provides it a unique ability to anticipate abrupt movements in the future and begin adjusting the strength value o[r] values before the abruptness occurs so that visible jumps or glitches in the final video sequence may be reduced or eliminated.

Id. at 10:1–5.

2. Cai

Cai also discloses techniques for video stabilization. Ex. 1009, 1:14–16. In particular, Cai is concerned with improving video stabilization by determining whether the movement of the frame is from jitter motion (i.e., zero motion) or intentional motion (i.e., non-zero motion). *Id.* at 3:58–4:11. Cai performs this determination by looking into some number of future frames and deciding whether the movement between frames is larger than some threshold value. *Id.* at 5:15–27; *see also id.* at 8:53–55 (using "some number N of future frames").

3. Petitioner's Ground

Petitioner asserts that Zhou teaches an image capture system that has a housing, optical element, image sensor, and position sensor as claimed. Pet. 10–18. Petitioner then asserts that Zhou teaches one or more processors that

determine: (i) a trajectory of the housing, (ii) a smoothed trajectory of the housing based on a look-ahead trajectory, (iii) placement of a viewing window based on the smoothed trajectory, and (iv) stabilized video content. *Id.* at 18–31, 37–42. These aspects of the ground are not in dispute at this time.

The disputed "temporal horizon of motion experienced by the image capture device" limitation is part of the broader limitation: "determining a smoothed trajectory of the housing based on a look-ahead of the trajectory." Petitioner starts with Zhou for determining a smoothed trajectory based on a look-ahead. Pet. 23–31. In particular, Petitioner points to Zhou's use of "techniques . . . for stabilizing video images using . . . a *look-ahead* buffer comprising a number of video input frames." *Id.* at 23 (citing Ex. 1006, 2:61–64). For the temporal horizon of motion limitation, Petitioner points to Cai's review of some number of future frames to characterize the video as having zero motion or not. *Id.* at 32–34.

To explain why it would have been obvious to combine these teachings, Petitioner first notes that both Zhou and Cai are directed to the same concern, namely, the stabilization of videos. Pet. 35–36 (citing Ex. 1006, Abstract; Ex. 1009, Abstract). Petitioner then notes that Zhou is at least somewhat concerned with identifying intentional motion, because it "analyz[es] the amount of movement in the 'future frames.'" *Id.* at 36 (quoting Ex. 1006, 7:5–6). Thus, Petitioner asserts that it would have been obvious to improve Zhou's video stabilization techniques by using the techniques in Cai for using future frames to characterize the video as having zero motion or not. *Id.*

4. Analysis

Our analysis focuses on the disputed issues, namely, whether Cai discloses a temporal horizon of motion (Prelim. Resp. 15–17), whether Petitioner has established a reason to combine having a reasonable expectation of success (*id.* at 17–23), and whether objective indicia establish non-obviousness (*id.* at 23–31).

a) "temporal horizon of motion"

Petitioner argues that the '840 patent provides no definition of "temporal horizon of motion," but describes the phrase in terms of determining "whether the position/motion of the image capture device at the moment was *intended* or not." Pet. 32 (quoting Ex. 1001, 15:6–15). Petitioner alleges that similar intentional/non-intentional motion discrimination features in Cai, which look ahead some number of frames into the future, are also a temporal horizon of motion. *Id.* at 32–33 (citing, e.g., Ex. 1009, 9:14–18).

Patent Owner argues that "temporal horizon involves assessing camera movement patterns over time to interpret the trajectory as either intentional or unintentional." Prelim. Resp. 15; *id.* at 16–17. Patent Owner argues that Cai's technique does not interpret motion as intentional or unintentional. *Id.* at 15–16.

On this record, we agree with Petitioner. In particular, zero motion is characterized in Cai as "jitter or shake" whereas non-zero motion is characterized as "an *intentional* slow movement of the camera." Ex. 1009, 6:12–14 (emphasis added); *see also id.* at 3:58–60 ("zero motion videos may be distinguished from videos with intended motion"). In order to determine whether motion is non-zero or zero (i.e., intentional or not), Cai looks some

number of frames into the future. *See, e.g.*, *id.* at 8:2–5 ("[t]he predicted trajectory is plotted using coordinates . . . five frames forward"), 8:53–55 ("[t]he planned trajectory can be made based on some number N of future frames"), 9:12–17 ("the smoothed trajectory from the zero motion stabilization is projected into future frames, for example, the next five frames"). Based on these disclosures in Cai, we find on this record that, contrary Patent Owner's argument, Cai is concerned with intentional motion, and that by determining intentional motion by looking some number of frames into the future, Cai teaches the "use of a temporal horizon of motion . . . enabling approximation of intentional motion."

Accordingly, we are sufficiently persuaded on this record that Cai's review of some number of future frames to discern whether there is an "intentional movement of the camera" teaches a temporal horizon of motion as claimed. Ex. 1009, 6:12–14.

b) Reason to Combine & Expectation of Success

As explained earlier, Petitioner asserts that it would have been obvious to improve Zhou's video stabilization techniques by using the techniques in Cai for using future frames to characterize the video as having zero motion or not. Pet. 36.

Patent Owner first argues that neither reference "offers any hint or suggestion of combining such reactive systems to create a proactive stabilization solution." Prelim. Resp. 17; *see also id.* at 17–19 (similar). Patent Owner has not offered a claim construction, or otherwise explained, how the claims require a "proactive stabilization solution." Thus, this argument is unpersuasive.

Patent Owner next argues that Zhou and Cai are technically incompatible. *Id.* at 20–23. In particular, Patent Owner argues that Zhou "uses buffering to adjust stabilization strength," whereas Cai uses buffering "for trajectory adjustment and distinguishing jitter from zero-motion or low-speed movements." *Id.* at 21–22 (emphasis removed). On this record, however, we are not provided with sufficient technical reasoning explaining how using the buffer for one purpose precludes its use for another purpose. Patent Owner cites its declarant, Dr. Foroosh, but his testimony merely repeats Patent Owner's arguments without any meaningful elucidation. *Id.* at 22 (citing Ex. 2001 ¶ 70); 37 C.F.R. § 42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight."); *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022) (precedential). On this record, we are shown no technical impediment with using the buffer in Zhou for distinguishing non-zero motion by looking ahead some number of frames, as proposed in the Petition.

c) Objective Indicia

Patent Owner asserts that objective indicia establish non-obviousness. Prelim. Resp. 23–31. Patent Owner's position is underpinned by its evidence purporting to show its "dominant position in the U.S. action camera market," based on its "HyperSmooth technology" that it asserts "has garnered widespread industry recognition." *See generally id*. However, even if we were to accept Patent Owner's argument that it has a revolutionary and successful product, that does not mean that all claims of its patents would have been non-obvious. For us to give substantial weight to objective indicia of non-obviousness, a proponent must establish a nexus

between the evidence and the merits of the *claimed* invention. *ClassCo, Inc., v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016). "[T]here is no nexus unless the evidence presented is 'reasonably commensurate with the scope of the claims.'" *Id.* (quoting *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)); *see also Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) ("For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.") (cleaned up).

Patent Owner here has not attempted a nexus analysis in its Preliminary Response. At best, it improperly incorporates by reference a claim chart (Exhibit 2016) served in the related ITC proceeding. Prelim. Resp. 24; 37 C.F.R. § 42.6(a)(3) ("Arguments must not be incorporated by reference from one document into another document."). Even then, the claim chart appears to admit that claim 1 does not read on Patent Owner's technology. Ex. 2016, 30.[2] On this record, we cannot determine whether, or the extent to which, Patent Owner's assertions of non-obviousness are due to the claimed invention because of the failure to show nexus to the subject matter of the claims.

5. Conclusion for Zhou & Cai Ground

In summary, we determine on this limited record that Petitioner has shown sufficiently that Cai discloses the temporal horizon of motion

[2] Exhibit 2016 has been filed under seal. Therefore, we have not provided a quote from the exhibit in an abundance of caution, and because we need not disclose the specific language for the public to understand the reasons behind our conclusion that Patent Owner's nexus analysis is deficient at this stage of the proceeding.

limitation of claim 1 and that there would have been a reason to combine Zhou and Cai. We adopt Petitioner's remaining unchallenged assertions regarding claim 1 as our own. We are not persuaded by Patent Owner's objective indicia analysis, which is lacking a showing of nexus. In conclusion, we determine that Petitioner has demonstrated a reasonable likelihood of success in showing that the subject matter of claim 1 of the '840 patent would have been obvious in view of Zhou and Cai. No issue unique to any of the other claims in this ground is raised at this time.[3]

E. Remaining Grounds

None of the remaining grounds have any unique issue to address at this time. *See, e.g.*, Prelim. Resp. 19 ("these combinations fail for the same reason as Ground 1").

III. CONCLUSION

For the reasons given above, we determine that Petitioner has established a reasonable likelihood of success in showing that at least one claim of the '840 patent would have been obvious in view of the prior art cited. Accordingly, we institute *inter partes* review of all claims and grounds raised in the Petition. 37 C.F.R. § 42.108(a).

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[3] We note that Patent Owner also argues the "low-light high-pass parameter" limitation of claim 1 (which is an issue discussed in more detail in IPR2024-01164, decided concurrently herewith). Prelim. Resp. 10–14. The argument is moot because that limitation is one of three claimed alternatives and Patent Owner does not contest, at this time, Petitioner's showing regarding one of the alternative parameters. *See* Ex. 1001, 30:35–38 (claim 1 reciting "one or more of a weight-balance parameter, a low-light high-pass parameter, and/or a stickiness parameter"); Pet. 26–28 (asserting that Zhou teaches a stickiness parameter).

IV. ORDER

In consideration of the foregoing, it is hereby

ORDERED that the Petition requesting *inter partes* review of claims 1–21 of the '840 patent is *granted*; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), the *inter partes* review of the '840 patent commences 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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