

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 No. 10,958,840

ARASHI VISION (U.S.) LLC (D/B/A INSTA360)'S NOTICE OF APPEAL

via P-TACTS
Patent Trial and Appeal Board

via Email
Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
efileSO@uspto.gov

via CM/ECF
United States Court of Appeals for the Federal Circuit

INTRODUCTION

Arashi Vision (U.S.) LLC (d/b/a Insta360)’s (“Insta360”) appeal stems from the Patent Trial and Appeal Board’s Final Written Decision (Paper 51) (the “Final Written Decision”), entered on November 25, 2025, in the above-captioned *inter partes* review of United States Patent No. 10,958,840 (“the ’840 patent”). This notice is timely filed within 63 days of the Final Written Decision. 37 C.F.R. § 90.3(a)(1).

INSTA360’S APPEAL

Please take notice that—under 35 U.S.C. §§ 141(c), 142, 319; 37 C.F.R. §§ 90.2(a), 90.3(a); and Federal Rule of Appellate Procedure and Federal Circuit Rule 15—Insta360 hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision and all underlying decisions and orders in this action on which that decision is based.

INSTA360’S ISSUES ON APPEAL

Insta360’s issues on appeal include at least (37 C.F.R. § 90.2(a)(3)(ii)):

- (1) the Board’s conclusion that challenged claims 1-21 of the ’840 patent had not been shown unpatentable;
- (2) any findings, analysis, or determinations supporting or related to that issue, including but not limited to (a) the Board’s analysis and construction of the claim terms “stickiness parameter” and “low-light high-pass parameter”; and (b) the

Board’s analysis of the Petition and prior art, and its determination that the prior art fails to teach or suggest either a “stickiness parameter” or a “low-light high-pass parameter,” as construed by the Board; and

(3) all other issues decided adversely to Insta360 in any orders, decisions, rulings, or opinions in this action.

Simultaneously with this submission, Insta360 is filing a true and correct copy of this Notice of Appeal with the Director of the United States Patent and Trademark Office and a true and correct copy (or copies) of the same, along with the required filing fee, with the Clerk of the United States Court of Appeals for the Federal Circuit as set forth in the accompanying Certificate of Filing.

Dated: January 23, 2026

Respectfully submitted,

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CERTIFICATE OF FILING

The undersigned hereby certifies that, in addition to being electronically filed through P-TACTS, a true and correct copy of the above ARASHI VISION (U.S.) LLC (D/B/A INSTA360)'S NOTICE OF APPEAL is being filed via email with the Director on January 23, 2026, at efileSO@uspto.gov, the email address indicated on the United States Patent and Trademark Office's web page for the Office of the General Counsel.

The undersigned also hereby certifies that a true and correct copy (or copies) of the above ARASHI VISION (U.S.) LLC (D/B/A INSTA360)'S NOTICE OF APPEAL and the filing fee is being filed via CM/ECF with the Clerk's Office of the United States Court of Appeals for the Federal Circuit on January 23, 2026.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that on January 23, 2026, the above ARASHI VISION (U.S.) LLC (D/B/A INSTA360)'S NOTICE OF APPEAL was served in its entirety via electronic mail on the following:

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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*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

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”). We instituted an *inter partes* review under 35 U.S.C. § 314. Paper 11 (Dec. on Inst.). Patent Owner filed a Response (Paper 21, “PO Resp.”), Petitioner filed a Reply (Paper 28, “Pet. Reply”), and then Patent Owner filed a Sur-reply (Paper 34, “PO Sur-reply”).¹ An oral hearing was held. Paper 50 (“Tr.”).

We have authority to enter this final written decision (“Decision”) under 35 U.S.C. § 318(a). The standard for review is set forth in 35 U.S.C. § 316(e), which provides that “the petitioner shall have the burden of proving a proposition of unpatentability by a preponderance of the evidence.” For the reasons provided below, we determine that Petitioner has not met this burden of establishing unpatentability of any of the challenged claims.

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).

¹ Our citations are only to the public, redacted versions of these briefs because this paper does not discuss confidential information.

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. et al.*, 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); IPR2024-01064 (US Pat. 10,958,840); and IPR2024-01086 (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, 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,” <i>ECCV (4), Vol. 8692 of Lecture Notes in Computer Science</i> , 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
12	103	Zhou, Cai, Sokeila
13, 17	103	Zhou, Cai, Bell Paper

Petitioner relies on the testimony of Dr. 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 Dr. 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

In general, the '840 patent is directed to the stabilization of videos using smoothing techniques to ameliorate the motion of the camera during filming. Ex. 1001, 1:18–40. However, because stabilized video can exacerbate the appearance of motion blur, the stabilization can be attenuated when there is significant blurring. *Id.* at 17:61–18:24. The '840 patent considers several parameters for controlling how to smooth the video trajectory. *Id.* at 21:17–25. Most relevant to this Decision is the '840 patent's use of a “low-light high-pass parameter” and a “stickiness parameter.”

The '840 patent explains that the exposure time of the image capture device may be automatically adjusted based on light conditions. *Id.* at 19:15–17. In general, longer exposure times are used in low light conditions, and vice versa. *Id.* at 19:18–21. However, longer exposure times are associated with higher amounts of motion blur in the recorded video. *Id.* at 19:25–26. Thus, the low-light high-pass parameter controls smoothing based on exposure times. *See id.* at 21:59–22:21.

The “stickiness parameter” in the '840 patent is used to “control the extent by which preceding portion(s) of the (observed) trajectory impacts

determination of the smoothed trajectory.” *Id.* at 22:22–25. On one end, the stickiness parameter can be set to a value that causes motion to be “lazy,” i.e., to maximize the impact of prior motion, whereas on the other end, the parameter can be set to a value that does not consider prior motion. *Id.* at 22:26–33.

F. Challenged Claims

Claims 1–21 are challenged. Claims 1 and 16 are independent. Claim 1 is reproduced below, with the phrase “low-light high-pass parameter” and “stickiness parameter” underlined.

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 standard. PO Resp. 26–27. We use this agreed-upon standard 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. We construe the terms “stickiness parameter” and “low-light high-pass parameter,” which are both found in independent claims 1 and 16. No other terms require construction. *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)).

1. Stickiness Parameter

Claim 1 requires a step of determining a smoothed trajectory based on a “stickiness parameter.” Neither party provides a claim construction for this term, but both point to the same relevant disclosure of the ’840 patent, which states: “[a] stickiness parameter may refer to a parameter that controls the extent by which preceding portion(s) of the (observed) trajectory impacts determination of the smoothed trajectory.” Ex. 1001,

22:22–25; *see also* PO Resp. 38; Pet. Reply 15; PO Sur-reply 13 (each citing this passage of the '840 patent). The '840 patent further explains that the stickiness parameter takes a value that “may change the extent by which preceding portion(s) of the (observed) trajectory impacts determination of the smoothed trajectory.” Ex. 1001, 22:33–36. For example, a value of 1 “maximizes the impact of the preceding motion/position” and a value of 0 leads to not “taking the preceding portion(s) of the (observed) trajectory into account.” *Id.* at 22:26–33. Although these passages in the specification are clear that a stickiness parameter serves to control the extent by which *preceding* portions of the trajectory impacts determination of the smoothed trajectory, the parties dispute the extent by which *future* portions of the trajectory may *also* be considered. *See* PO Resp. 38–41; Pet. Reply 13–16; PO Sur-reply 13–16. The issue is whether the stickiness parameter requires or implies a “degree the system prefers the past,” *as opposed to the future*. PO Resp. 40–41; *see also* Pet. Reply 15; PO Sur-reply 13–14.

The '840 patent does not explicitly discuss the role of future data in its discussion of the stickiness parameter. That said, the entire focus of the disclosure on the stickiness parameter, cited above, is based on the extent to which *past* motion is considered. *See generally* Ex. 1001, 22:22–41. Petitioner’s declarant, Dr. Katsaggelos, testifies that the '840 patent is “agnostic as to what happens regarding the future frame[s].” Ex. 1017 ¶ 78; *see also id.* ¶¶ 76–84 (entire argument). On the other hand, Patent Owner’s declarant, Dr. Foroosh, testifies that a parameter that applies equally to past and future frames is “incapable of controlling the extent to which preceding portions impact determination of the smoothed trajectory.” Ex. 2018 ¶¶ 101–102.

We review this testimony based on the strength of the underlying factual basis. 37 C.F.R. § 42.65(a); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 294 (Fed. Cir. 1985) (“Lack of factual support for expert opinion going to factual determinations, however, may render the testimony of little probative value . . .”). Here, the underlying factual basis is not very strong for either witness. That said, we find that Dr. Foroosh’s testimony is more logically sound and consistent with the ’840 patent disclosure. Based on our reading of the specification, we find a clear indication that “stickiness” has to do with the past. In order to control “the extent by which *preceding* portion(s) . . . impacts determination of the smoothed trajectory” (emphasis added), one must control the degree by which the past frames impact determination. And to control the degree of the past’s influence, one must, as a consequence, favor the past over the future. That is, the frame of reference of the stickiness parameter is the past. The specification could have used a time-agnostic term, like a “nearness” or “adjacency” parameter, but it did not. Thus, the fact that “stickiness” is used in conjunction with “preceding” indicates that it deals with a preference for preceding frames. On this basis, we find Dr. Katsaggelos’s testimony less persuasive than Dr. Foroosh’s.

That said, we do not construe a stickiness parameter as *prohibiting* consideration of future frames. Instead, we determine that the stickiness parameter’s value determines the impact of the preceding portions, versus the following portions. The ’840 patent recognizes this, when it says that a stickiness parameter value of “1,” representing a “lazy” stabilizer that maximally favors the past, would not override a violation of the margin constraint based on the look-ahead (i.e., would not allow the viewing

window to fall out of bounds in the event of large future motion). *See* Ex. 1001, 22:26–30; *see also id.* at 12:61–13:29 (acknowledging that favoring the past may lead to a conflict with the viewing window determination), 15:39–60 (adjusting the viewing window to ensure it does not violate a margin constraint). Thus, while a past-favoring parameter by necessity favors the past over the future, it does not prohibit consideration of the future.

In view of the above, we construe the claimed “stickiness parameter” as a parameter that controls the extent by which preceding portions of the trajectory impacts determination of the smoothed trajectory, with an understanding that in order to favor *preceding* portions, to some extent, the parameter must relatively disfavor *following* portions.

2. *Low-Light High-Pass Parameter*

We incorporate our claim construction analysis of “low-light high-pass parameter” from our companion decision in IPR2024-01164. There, we construed “low-light high-pass parameter” to mean, in the context of the ’840 patent, “a parameter that controls the amount or strength of smoothing used in motion blur compensation by allowing more high frequencies to pass through based on low-light conditions.” IPR2024-01164, Paper 51, 8–14.

D. *Asserted Obviousness Over Bell and Shi*

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 focus our analysis on 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 low-light high-pass parameter” or a “stickiness parameter,” as well as a “temporal horizon of motion,” (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 whether the prior art teaches either of the two listed parameters.

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 considering 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. *Analysis*

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.

Patent Owner disputes whether Zhou teaches a smoothed trajectory using a “low-light high-pass parameter” or a “stickiness parameter.” *See generally* PO Resp. 32–42.

a) Zhou's Alleged Disclosure of a Low-Light High-Pass Parameter

As to the disputed low-light high-pass parameter, Petitioner asserts that Zhou discloses “ways to ‘more effectively stabilize low light video.’” Pet. 24 (quoting Ex. 1006, 2:60–61). In particular, cited portions of Zhou describe a video stabilization operation to determine the amount of smoothing applied to the video, based on the amount of motion blur. *See, e.g.*, Ex. 1006, 2:19–22, 3:3–8, 7:47–51 (cited at Pet. 25). Notably, Zhou states that “if the amount of blur in the image is larger (typically found in darker images with longer integration times), smaller stabilization strengths may be employed.” Ex. 1006, 6:46–49 (cited at Pet. 25). Zhou describes that the opposite is true for brighter images. *Id.* at 6:41–46.

Petitioner asserts that Zhou discloses “ways to ‘more effectively stabilize low light video.’” Pet. 24 (quoting Ex. 1006, 2:60–61); *see also id.* at 23–26 (entire argument). Patent Owner argues that Zhou’s image blur metric focuses on image analysis, not lighting conditions. PO Resp. 33–34; PO Sur-reply 11–12. Petitioner counters that “the ’840 patent similarly adjusts its smoothing based on that blur,” and that “Zhou’s blur compensation technique addresses videos taken in low-light conditions.” Pet. Reply 11 (citing, *e.g.*, Ex. 1006, 2:59–61, 4:5–8, 7:10–16; Ex. 1017 ¶ 58).

We have reviewed the cited evidence and are not persuaded that Zhou’s parameter is a low-light parameter merely because it is useful to address blur caused by low-light conditions. The “low-light” aspect of the claim requires that the parameter is based on low-light conditions, *i.e.*, that the low-light condition is causal (*e.g.*, triggers or adjusts the parameter, even if indirectly). In contrast, Zhou’s parameter is adjusted based on estimating

the blur, which is based upon image analysis. Ex. 1006, 3:3–15 (“techniques are disclosed herein for estimating the amount of motion blur . . . by using motion data . . . to adjust or modulate the strength of a video stabilization metric value,” 6:6–10 (“only the blur due to translation along the axes . . . are considered”); *see also* Ex. 2018 ¶ 33. Even if Zhou lowers stabilization strengths in darker images, Zhou makes this adjustment because the measured blur is larger, not because the light is lower. Ex. 1006, 6:38–62, Fig. 5C (showing that smoothing is adjusted based on measured blur). These are different ways to address motion blur, and in Zhou the low-light condition is not why the stabilization strength is lowered.

To put Zhou and the claimed invention in further contrast, the ’840 patent teaches to adjust the low-light high-pass parameter based on exposure time. *See, e.g.*, Ex. 1001, 19:12–26. Because exposure time is causally driven by lighting conditions, the low-light high-pass parameter is causally driven by lighting conditions. *Id.* at 21:61–22:21. However, measuring blur, in and of itself, is not causally based on low-light conditions because blur occurs in many situations (e.g., fast motion, improper exposure settings, lighting conditions). Although blur may be caused when there is sufficient movement during a low-light condition, the blur metric itself in Zhou is responsive to blur, not light. In our view, allowing blur, in and of itself, to be a “low-light” parameter merely because some blur occurs in some low-light conditions reads the limitation out of the claim. *See also* Tr. 42:6–20 (Patent Owner’s counsel discussing the provisional application, Exhibit 1021 at 22, and arguing that the fundamental “insight of the . . . inventors” was to skip complicated blur detection algorithms and focus simply “on the

exposure time”). Thus, we do not find that Zhou teaches a low-light parameter.

We also do not find that Zhou teaches a high-pass parameter. The Petition does not specifically address the “high-pass” aspect of the claim, instead focusing on the resulting motion blur correction. *See* Pet. 24–26. Patent Owner argues that Zhou’s stabilization does not differentiate between low or high frequencies. PO Resp. 35–36; PO Sur-reply 12. Petitioner responds that Zhou’s “technique allows high-frequency motion to pass” and even lowers stabilization strengths when blur is larger due to darker images. Pet. Reply 11 (citing, e.g., Ex. 1006, 6:45–54).

However, as we discussed above, Zhou’s system reacts to larger blur from darker images by measuring the blur, not by detecting or reacting to low light. Ex. 1006, 6:38–62, Fig. 5C. Further, merely allowing high frequencies is not the same as a high-pass parameter, which we have construed to require allowing *more* high frequencies to pass. *Cf.* Ex. 2020, 93:23–94:15 (Petitioner’s declarant, Dr. Katsaggelos, testifying that “low-pass” filter means that high frequencies are attenuated and that “high-pass” filter means that low frequencies are attenuated); Ex. 2021 (Dr. Katsaggelos making similar statements on an online course website). Zhou lowers stabilization strengths when blur is high, rather than manipulate high or low frequency portions of the image. Ex. 1006, 6:38–62, Fig. 5C. In other words, we are not persuaded that Zhou’s technique favors high frequencies over lower frequencies, and the mere presence of high frequencies in Zhou’s smoothed video is insufficient to find that Zhou has a high-pass parameter.

In sum, we are not persuaded that Zhou discloses a low-light high-pass parameter for two independent reasons.

b) Zhou's Alleged Disclosure of a Stickiness Parameter

As to the claimed stickiness parameter, Petitioner asserts that Zhou discloses a Gaussian weighting function that looks up to N frames before (and after) the current frame. Pet. 26–28 (citing, e.g., Ex. 1006, 7:32–25, 7:61–8:2, 9:15–18, Fig. 4). Notably, Zhou states that adjusting the parameters of the Gaussian weighting function “attributes more weight/significance to those entries *closer to* the current frame.” Ex. 1006, 9:15–18 (emphasis added). Patent Owner argues that Zhou’s Gaussian weighting function is “centered on the current frame and appl[ies] symmetrically to both past and future motion data.” PO Resp. 40; *see also id.* at 38–42 (entire argument); PO Sur-reply 13–16 (similar arguments). Put another way, Patent Owner argues that Zhou’s Gaussian weighting function has “no mechanism for expressing a preference for past frames.” PO Resp. 41. Petitioner responds that Zhou’s Gaussian weighting function allows control over the extent by which a given past frame impacts determination of the smoothed trajectory, and does not require a preference for the past. Pet. Reply 13–15.

In our construction of “stickiness parameter,” we determined that to control the extent by which *preceding* portions of a trajectory impacts determination, one must necessarily do so at the expense of the future portions. That is, the entire reason the ’840 patent uses the word “preceding” is to differentiate from “following.” Based on this claim construction, Petitioner’s position regarding the symmetrical Gaussian weighting function fails. A Gaussian weighting function, as used in Zhou, is symmetric about the mean, which is set at the current frame. Ex. 1006, 7:61–8:3 & Fig. 4 (setting “time=0” as the mean value as the “stabilization

strength S” as the standard deviation), 9:14–19 (varying stabilization strength S “has the effect of reducing the spread of the Gaussian weighting function” which “attributes more weight/significance to those entries *closer to the current frame*”) (emphasis added); *see also* Ex. 2020, 95:6–13 (Petitioner’s declarant, Dr. Katsaggelos, testifying as to the symmetrical nature of Gaussian functions); Ex. 2018 ¶ 102 (Patent Owner’s declarant, Dr. Foroosh, agreeing with Dr. Katsaggelos). Thus, we find that Zhou’s stabilization strength parameter controls the extent by which *proximate* portions of a trajectory impact determination. Although proximate portions include past portions, it includes an equal measure of future portions, meaning Zhou does not serve to control the extent that the past portions impact determination, because any past portion will be equally offset by a future portion. Thus, we find that Petitioner has not shown sufficiently that Zhou discloses the claimed stickiness parameter.

4. *Conclusion for the Prior Art Analysis*

In sum, we find that Zhou does not disclose the low-light high-pass parameter or the stickiness parameter. Petitioner’s grounds for both independent claims 1 and 16 rely on Zhou for teaching a low-light high-pass parameter or a stickiness parameter. Pet. 23–28, 64. Because we find Zhou does not teach these limitations, all of Petitioner’s grounds fall for this reason.

III. CONCLUSION

For the reasons given above, we determine that Petitioner has not established by a preponderance of the evidence that any claim of the ’840 patent would have been obvious in view of the prior art cited.

The following table summarizes the outcome of this proceeding:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–3, 5–11, 14–16, 18, 19, 21	103	Zhou, Cai		1–3, 5–11, 14–16, 18, 19, 21
4, 20	103	Zhou, Cai, Karpenko		4, 20
12	103	Zhou, Cai, Sokeila		12
13, 17	103	Zhou, Cai, Bell Paper		13, 17
Overall Outcome				1–21

IV. ORDER

In consideration of the foregoing, it is hereby

ORDERED that the record show that Petitioner has not established that any of claims 1–21 of the '840 patent are unpatentable;

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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