

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

IPR2025-00222
U.S. Patent No. 9,232,158

**PETITIONER'S NOTICE OF APPEAL TO THE
UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

via P-TACTS
Patent Trial and Appeal Board

via Email
Director of the United States Patent and Trademark Office
efileSO@uspto.gov

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

Pursuant to 28 U.S.C. § 1295(a)(4)(A), 35 U.S.C. §§ 141(c), 142, and 319, and 37 C.F.R. §§ 90.2(a), 90.3, 5 U.S.C. §§ 701–706, and Federal Circuit Rule 15(a)(1), Petitioner Tesla, Inc. (“Petitioner”) provides notice that it appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision of the Patent Trial and Appeal Board (“Board”) entered July 1, 2026 (Paper 27), and from all underlying and related orders, decisions, rulings, and opinions regarding U.S. Patent No. 9,232,158 (“the ’158 patent”) in *Inter Partes* Review IPR2025-00222.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), the expected issues on appeal include, but are not limited to: the Board’s error(s) in determining that Petitioner has failed to demonstrate that challenged claims 15, 16 and 19 of the ’158 patent are unpatentable, and any finding or determination supporting or related to those determinations, as well as all other issues decided adversely to Petitioner in any orders, decisions, rulings, or opinions in *Inter Partes* Review IPR2025-00222.

Pursuant to 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a), this Notice is being filed with the Director of the United States Patent and Trademark Office and with the Patent Trial and Appeal Board. In addition, a copy of this Notice and the required docketing fees are being filed with the Clerk’s Office for the United States Court of Appeals for the Federal Circuit via CM/ECF.

Respectfully submitted,

Dated: September 1, 2026

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CERTIFICATE OF FILING

The undersigned hereby certifies that, in addition to being electronically filed through PTAB P-TACTS, a true and correct copy of the above-captioned PETITIONER'S NOTICE OF APPEAL TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT is being filed by email with the Director on September 1, 2026 at efileSO@uspto.gov.

The undersigned also hereby certifies that a true and correct copy of the above-captioned PETITIONER'S NOTICE OF APPEAL TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT 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 September 1, 2026.

Respectfully submitted,

Dated: September 1, 2026

/Jonathan R. Bowser/
Jonathan R. Bowser
Counsel for Petitioner
Registration No. 54,574

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6, this is to certify that a true and correct copy of the foregoing "Petitioner's Notice of Appeal to the United States Court of Appeals for the Federal Circuit" was served on counsel for Patent Owner as detailed below:

Date of service: September 1, 2026

Manner of service: Email: BTheiss@addyhart.com; rrigby@intven.com

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
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v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

IPR2025-00222
Patent 9,232,158 B2

Before KRISTEN L. DROESCH, SCOTT A. DANIELS, and
FREDERICK C. LANEY, *Administrative Patent Judges*.

LANEY, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

We have authority to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, Petitioner has established by a preponderance of the evidence that claims 1, 2, 4, 5, 8–11, 13, and 14 of U.S. Patent No. 9,232,158 B2 (Ex. 1001, “the ’158 Patent”) are unpatentable, but failed to carry its burden regarding claims 15, 16, and 19.

A. Background

Tesla, Incorporated (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1, 2, 4, 5, 8–11, 13–16, and 19 (“challenged claims”) of the ’158 patent (Ex. 1001, “the ’158 patent”). Intellectual Ventures II LLC (“Patent Owner”) filed a Request for Discretionary Denial. Paper 6 (“Request”). Patent Owner also filed a Preliminary Response to the Petition. Paper 7. Petitioner filed an Opposition to Patent Owner’s Request. Paper 8. On June 13, 2025, the Acting Director of the United States Patent and Trademark Office issued a Decision denying Patent Owner’s Request and resolving the discretionary denial issues. Paper 9. On July 8, 2025, we instituted review with respect to all grounds and challenged claims, as set forth in the Petition. Paper 10.

Patent Owner filed a response to the Petition (Paper 15, “PO Resp.” or “Response”) to which Petitioner filed a reply (Paper 17, “Pet. Reply” or “Reply”), and Patent Owner filed a sur-reply (Paper 18, “PO Sur-reply”).

In support of the Petition and Reply, Petitioner relies upon Declarations of R. Michael Guidash. Exs. 1004, 1044. In support of the Response, Patent Owner relies upon the Declaration of Eli Saber, Ph.D..

Ex. 2005. Petitioner filed a transcript of the Deposition of Dr. Saber.
Ex. 1048.

An oral hearing was held on March 24, 2026, and a transcript of the hearing is included in the record. Paper 24.

B. Real Parties-in-Interest

Petitioner and Patent Owner identify themselves as the real parties-in-interest. Pet. 85; Paper 3, 2.

C. Related Matters

Petitioner and Patent Owner both identify several district court litigations (some transferred, some terminated, and some pending) involving the '158 patent. Pet. 85–86, Paper 3, 2–3. Of particular note is *Intellectual Ventures I LLC et al. v. General Motors Company et al.*, 6:21-cv-01088 (W.D. Tex. October 19, 2021) in which the court construed several claim phrases. *See* Ex. 1015, 49, 52 (“GM Litigation”). Additionally, the parties identify several IPRs involving the '158 patent. Pet. 85–86, Paper 3, 3. Of particular note is IPR2022-00710 in which we previously construed several phrases. *See* Ex. 1002, 15–22 (“Toyota IPR”).

D. The '158 Patent

The '158 patent, titled “Large Dynamic Range Cameras,” relates to “[a] digital camera [that] includes a plurality of channels and a processing component operatively coupled to the plurality of channels.” Ex. 1001, codes (54), (57). “Each channel of the plurality of channels includes an optics component and a sensor that includes an array of photo-detectors” and “[t]he processing component is configured to separately control an integration time of each channel,” as well as, “combine data from the plurality of channels to generate an image.” *Id.* at code (57). The '158

patent suggests that this configuration with two or more camera channels enable a camera to have a wide dynamic range that is greater than the dynamic range obtained by a conventional digital camera with a single image sensor channel and one integration time. *Id.* at 4:41–64.

As shown below in annotated Figure 3 provided by Petitioner (Pet. 9), the '158 patent describes a digital camera subsystem 210 (gray) that includes multiple camera channels 260A-260D (blue), each channel including a respective sensor portion 292A-292D (red) and an optics portion 290A-290D (purple) that receives and transmits light (yellow) to the sensor portions. *Id.* at 7:17–33.

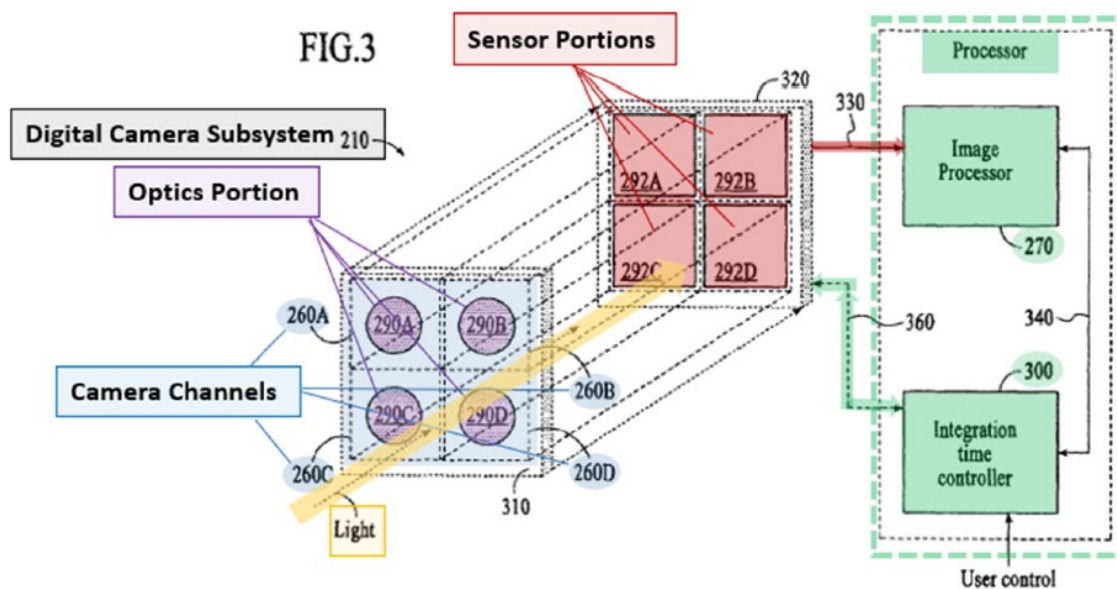


Figure 3 is a block diagram of a digital camera subsystem 210 in accordance with the invention disclosed by the '158 patent. The '158 patent describes subsystem 210 as also including “an image processor portion 270 [green] (referred to as image processor 270) and an integration time controller portion 300,” which are coupled to the sensor portions via communication

couplings or links, e.g., signal lines 330 (red arrow) and 360 (green arrow). *Id.* at 8:32–35. The controller “provides integration time control for each of the camera channels” and the image processor “generates a combined image based at least in part on the images from two or more of the camera channels.” *Id.* at 8:32–38, 8:63–66.

E. Illustrative Claim

Petitioner challenges claims 1, 2, 4, 5, 8–11, 13–16, and 19 of the ’158 patent. Pet. 1. Claims 1, 9, and 15 are the independent claims. Ex. 1001, 25:31–39, 26:5–14, 26:30–39. Independent claim 1 is directed to an image capture device with a plurality of sensors and optics components, as well as, a processing component. *Id.* at 25:31–39. Claims 2, 4, 5, and 8 depend from claim 1. *Id.* at 25:40–26:4. Independent claim 9 is directed to a system similar to the image capture device described in claim 1. *Id.* at 26:5–14. Claims 10, 11, 13, and 14 depend from claim 9. *Id.* at 26:15–29. Claim 15 is directed to a method of operation for a system similar to the system described in claim 15. *Id.* at 26:30–39. Claims 16 and 19 depend from claim 15. *Id.* at 26:40–54.

Independent claims 1 and 9 are illustrative and are reproduced below with bracketed labels employed by Petitioner to facilitate analysis and discussion.

- [1.0] An image capture device comprising:
 - [1.1] a plurality of sensors;
 - [1.2] a plurality of optics components, wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors; and
 - [1.3] a processing component configured to control an integration time of each sensor.

* * * *

[9.0] A system comprising:

[9.1] a plurality of channels, wherein each channel of the plurality of channels includes a sensor; and

[9.2.1] a processing component coupled to the plurality of channels,

[9.2.2] wherein the processing component is configured to determine an integration time of each channel of the plurality of channels,

[9.2.3] wherein the processing component is configured to combine data from the plurality of channels received to provide an image.

Ex. 1001, 25:31–39, 26:5–14.

F. Prior Art and Asserted Grounds

Petitioner asserts that one or more of the challenged claims would have been obvious on the following grounds (Pet. 11):

Claim(s) Challenged	35 U.S.C. §¹	Reference(s)
1, 2, 5, 8, 9, 11, 13–16, 19	103(a)	Matsushima ²
1, 2, 4, 5, 8–11, 13, 14	103(a)	Yu ³ , Miyazaki ⁴

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the challenged claims of the ’158 patent have an effective filing date before the effective date of the applicable AIA amendment, we refer to the pre-AIA version of 35 U.S.C. § 103.

² JP Publication No. 2003-319231, published November 7, 2003 (Ex. 1007, “Matsushima”).

³ US Patent No. 6,611,289 B1, issued August 26, 2003 (Ex. 1005, “Yu”).

⁴ US Patent No. 7,365,780 B1, issued April 29, 2008 (Ex. 1006, “Miyazaki”).

II. ANALYSIS

For each Ground, Petitioner provides an element-by-element analysis to demonstrate either how Matsushima renders unpatentable claims 1, 2, 5, 8, 9, 11, 13–16, and 19 (Ground 1) or how the combination of Yu and Miyazaki renders unpatentable claims 1, 2, 4, 5, 8–11, 13, and 14 (Ground 2). Pet. 11–78. Petitioner’s contentions are largely undisputed, except regarding whether there is a sufficient showing of a processing component configured to control an integration time of each sensor or channel, as the challenged independent claims recite (i.e., elements 1.3, 9.2.2, 15.1); whether there is sufficient showing of control of integration time “during a frame,” as recited in claim 2; and whether there is a sufficient showing of different integration times across channels, as recited in claims 11 and 16. See PO Resp. 18–58. We focus our discussion below accordingly.

A. Principles of Law

“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 § 103(a) 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.

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 *U.S. v. Adams*, 383 U.S. 39, 50–51 (1966)).

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 (i.e., secondary considerations). *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Here, the record contains no evidence of objective indicia of non-obviousness.

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.*

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or

more of these or other factors may predominate in a particular case. *Id.* Moreover, these factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355.

Petitioner contends that a person of ordinary skill in the art “at, and before, the earliest claimed priority date of the ’158 patent . . . would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field and 2–3 years of experience in digital imaging systems,” adding that “[l]ess experience may be sufficient with additional education, and likewise, less education may be sufficient with additional work experience.” Pet. 6–7 (citing Ex. 1003 ¶¶ 16–18). Patent Owner does not offer a competing definition or dispute Petitioner’s articulation. Based on the entire record, we adopt Petitioner’s characterization of the level of skill for one of ordinary skill in the art because that characterization, we find, is consistent with the ’158 patent and the asserted prior art.

C. Claim Construction

We construe each 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) (2019). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have

frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’”).

For “completeness,” Petitioner identifies that “[t]erms in the Challenged Claims were construed by the Board in the Toyota IPR and by the Court in [the GM Litigation].” Pet. 7 (citing Ex. 1002, 14–18; Ex. 1015, 46–54). Petitioner represents that it “applies the prior art in this Petition in accordance with those constructions.” *Id.*

In the Toyota IPR, we held that: (1) “wherein each optics component of the plurality of optics components is configured to pass light to a sensor of the plurality of sensors” (emphasis omitted) is properly understood to mean “each of the plurality of optics components is configured to pass light separately to a distinct sensor of the plurality of sensors” and “excludes from the scope of claim 1 devices that rely on a common optics component to pass light to multiple camera channels” (Ex. 1002, 19); and (2) “plurality of channels” is properly understood to mean “multiple independent structures that separately pass light to a different respective sensor” and “excludes from the scope of claims 9 and 15 devices that rely on a common optics component to pass light to multiple camera channels” (*id.* at 20). Petitioner contends that those constructions are not in dispute here because “[t]he Petition’s Grounds do not rely on a common optics component to pass light to multiple camera channels.” Pet. 8.

In the GM Litigation, the Court construed “integration time” as “the time the image sensor collects and integrates signal from the scene.” Pet. 8 (citing Ex. 1015, 49).

Still, three disputes require resolution: (1) the meaning of the requirement that an integration time be controlled, determined, or identified

“of each” sensor or “for each” channel; (2) the meaning of the adopted construction of “integration time”; and (3) the meaning of “during a frame.”

1. control / determine / identify an integration time of each sensor/each channel—the “each” requirement

Claim 1 requires “a processing component configured to control an integration time of each sensor.” Ex. 1001, 25:38–39. Claim 9 requires a processing component “configured to determine an integration time of each channel of the plurality of channels.” *Id.* at 26:9–11. Claim 15 requires “identifying an integration time for each of a plurality of channels.” *Id.* at 26:31–33. The dispute is whether “each” requires that an integration time be determined on a per-channel basis (responsive to the individual sensor or channel), or whether it is satisfied by a single, system-level integration value applied in common across the sensors.

We determine that the claims require a per-channel determination of integration time—that is, an integration time arrived at for each sensor or channel individually—and cannot be satisfied by a single global value merely applied uniformly across the sensors. We do not, however, read the independent claims to require that the per-channel integration times differ from one another.

Three considerations support this construction.

First, the claim language is distributive. The recitations pair “an integration time” with “each” sensor or channel (“an integration time of each sensor”; “an integration time of each channel”; “an integration time for each of a plurality of channels”). The ordinary meaning of this language is that, for every sensor or channel, an integration time of that sensor or channel is

controlled, determined, or identified. Claim 15's "for each of" phrasing is particularly indicative of that fact.

Second, the specification confirms this reading. The patent describes the integration time as determined for each channel: "[e]ach sensor is controlled under or with an independent signal integration time," and "each camera channel is controlled during a frame under an independent integration time," where "[t]he integration time for each channel can be automatically controlled and/or controlled in response to a user input." Ex. 1001, 3:45–52. It describes channels that "each operate[] independently under a different integration time." *Id.* at 4:23–24. And it describes "[a] processing component . . . configured to separately and simultaneously control an integration time of each channel," and channels having "independent signal integration time control." *Id.* at 5:3–6, 5:17–18. A construction permitting a single global integration value applied uniformly, with no per-channel determination, would be inconsistent with this description and with the patent's stated purpose of extending dynamic range by combining channel outputs captured under integration times suited to each channel. *Id.* at 3:53–64.

Third, the doctrine of claim differentiation locates the requirement of differing integration times in the dependent claims, not the independent claims. Claim 11 requires that "the integration time of at least one channel is relatively shorter than the integration time of at least one other channel," and claim 16 requires that "a first integration time of a first sensor is less than a second integration time of a second sensor." Ex. 1001, 26:18–20, 26:40–42. Were the independent claims themselves to require differing per-channel integration times, claims 11 and 16 would be redundant. The

independent claims therefore require a per-channel determination of integration time (which may yield equal values), while claims 11 and 16 add the further requirement that the values differ.

Patent Owner relies in part on the Board's decision in the Toyota IPR, which addressed the same '158 patent. In the Toyota IPR, the Board construed the requirement of controlling “an integration time of each sensor” as controlling the integration time of an individual sensor distinct from the other sensor(s). PO Sur-reply 1–2, 9 (citing Toyota IPR, Paper 13, 11–13). That decision is a different proceeding involving a different record, and is not binding here. Although the Board's construction in the Toyota IPR is consistent with the construction we reach, our construction here rests on the record developed in this case—which independently supports the per-channel-determination construction set forth above.

2. *“integration time”*

The parties dispute the meaning of “integration time”—more specifically, whether it is interchangeable with generic “exposure time”/ “exposure control” (Petitioner) or instead denotes the time during which the sensor collects and integrates charge, as distinct from exposure control (Patent Owner). *See* Pet. 60, 62 (Ex. 1003 ¶¶ 177, 182); PO Resp. 46 (Ex. 2017 ¶¶ 90, 96).

We adopt the definition clearly and unambiguously set forth in the specification, which was likewise adopted by the Court in the related litigation. *See* Pet. 7–8, 55; Pet. Reply 1–2 (district court construing the term to mean “the time the image sensor collects and integrates signal from the scene”). The specification states that the integrated photo-charge “is directly related to the time the image sensor collects and integrates signal

from the scene,” and that “[t]his is known as integration time.” Ex. 1001, 4:4–7. Accordingly, the ’158 patent demonstrates that the inventors indisputably acted as a lexicographer for the term “integration time.”

Patent Owner proposes to construe the term as “the time interval during which the image sensor collects and integrates signal from the scene.” PO Resp. 12. Petitioner responds that this proposal would alter the district court’s construction by adding the phrase “interval during which.” Pet. Reply 1. We decline Patent Owner’s proposed addition, which is unnecessary and inconsistent with the specification and district court construction.

In applying this definition, we understand it in light of the distinction the specification expressly draws between integration-time control and exposure control. The specification states that “[e]xposure is the total amount of light allowed to fall on a sensor,” and that “[e]xposure control is control of the total amount of light incident on a sensor.” Ex. 1001, 4:35–45. “In contrast to exposure control,” the specification explains, the disclosed systems “use integration time control to control the time the electrical signal is integrated on a charge storage device (capacitance) within a sensor (pixel).” *Id.* at 4:43–52. The specification further describes the manner in which integration time may be controlled—“also referred to as ‘focal plane shutter’ control”—as “controll[ing] the time the electrical signal is integrated or accumulated by controlling a switch (e.g., charge integration switch) coupled or connected to the sensor,” and describes “independent control of the charge integration switch associated with each sensor.” *Id.* at 4:52–59.

We do not import the “charge integration switch” embodiment into the construction as a required structure; rather, we construe “integration time” according to the patentee’s express definition, understood consistently with the specification’s exposure-versus-integration distinction.

3. *“during a frame”*

The parties also dispute the meaning of “during a frame,” recited in dependent claim 2. Ex. 1001, 25:40–42. Petitioner contends the phrase means “during a period of time in which data for a single frame of an image is captured.” Pet. 9; Ex. 1003 ¶ 69. Patent Owner contends the phrase requires in-frame actuation of a focal-plane charge-integration gate while that frame’s data are being collected. PO Resp. 40–41; Ex. 2017 ¶¶ 146–148.

We construe “during a frame” to mean the period during which data for a single frame of an image is captured. The limitation is satisfied where the per-channel integration time is effectuated during the frame; it does not require that the integration time be re-determined mid-frame, nor does it require actuation of a “charge integration switch.” The specification’s only use of the phrase confirms this reading: “each camera channel is controlled during a frame under an independent integration time.” Ex. 1001, 3:45–50. Consistent with that usage, the specification describes selecting an integration time for each channel and then integrating the photo-signal “within a single frame of data,” and describes placing the charge-integration switch in a state to allow charge to accumulate for the selected period and then transferring the accumulated charge upon completion of the integration period. *Id.* at 4:51–54, 11:3–18.

We decline Patent Owner’s proposal to require in-frame actuation of a charge-integration switch, for the same reason we decline to import that structure into “integration time.” We also decline to read the phrase to require mid-frame re-determination of the integration time, because the patent’s own embodiment selects an integration time and then integrates charge during the frame under that selected time. Ex. 1001, 4:51–54, 11:3–18. So construed, “during a frame” is not redundant of the independent-claim limitation: it adds that the per-channel control occurs within a single frame (intrascene), as distinct from adjustment from one frame to the next (interscene).

For the purposes of this Decision, we need not construe explicitly any other claim term because only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019).

D. Overview of the Prior Art

1. Matsushima (Ex. 1007)

Matsushima, titled “Digital Camera” describes a digital camera “equipped with multiple imaging systems.” Ex. 1007, code (54), ¶ 1. The disclosed camera “has two independent imaging systems (a first imaging system 12A and a second imaging system 12B),” in which “subject images are formed on the light-receiving surfaces of CCD 18A and 18B via imaging optics 14A and 14B, respectively.” *Id.* ¶ 17. The first imaging system uses a wide-angle lens and the second uses a telephoto lens of longer focal length. *Id.* ¶¶ 9, 20.

The stated object of Matsushima is to “prevent unnatural boundary regions even when a telephoto captured image is combined in the center of a

wide-angle captured image, and . . . obtain images at various magnifications using a simple configuration.” Ex. 1007 ¶ 7; *see also id.* ¶ 11 (scaling down the telephoto image so that “the image quality in the center of the image [can] be improved”). Matsushima thus synthesizes a scaled-down telephoto image into the center of the wide-angle image and corrects the continuity of image data in the peripheral, or boundary, regions. *Id.* ¶¶ 11–12.

As to the operation and control of the sensors, Matsushima discloses that the subject images formed on CCD 18A and 18B are “subjected to signal charge conversion by each sensor in the CCD that corresponds to the amount of incident light,” and that “the accumulated signal charges are retrieved by CCD drive pulses applied by CCD drive circuits 20A and 20B.” Ex. 1007 ¶ 23. Each CCD has “a shutter drain via a shutter gate,” so that “the accumulated signal charges can be swept to the shutter drain by driving the shutter gates with shutter gate pulses”; in this way “the CCDs 18 have a so-called electronic shutter function that controls the accumulation time (shutter speed) of the charge accumulated by each sensor via shutter gate pulses.” *Id.* ¶ 24. A single “timing signal generating circuit (TG) 28 provides appropriate timing signals to the CCD drive circuits 20A and 20B,” as well as to the CDS [(correlated double sampling)] circuits and the A/D converters, “and each circuit is driven synchronously by timing signals applied from the timing signal generating circuit 28.” *Id.* ¶ 27.

For automatic-exposure (AE) control, Matsushima discloses that “the subject luminance (imaging EV value) is determined based on integration of the R, G, and B signals in a single frame by the integration circuits 60A and 60B, and the aperture value and shutter speed are determined based on this imaging EV value,” after which “the CCD 18A and CCD 18B charge

accumulation time is controlled using an electronic shutter to reach the determined shutter speed.” Ex. 1007 ¶ 34; *see also id.* ¶ 35 (“the charge accumulation time is controlled by the electronic shutters at the determined shutter speed”). The integration circuits 60A and 60B “divide the imaging screen into multiple blocks (for example, 64 blocks in an 8×8 format) and perform integration operations on the G signals received from each block.” *Id.* ¶ 38.

2. *Yu (Ex. 1005)*

Yu, titled “Digital Cameras Using Multiple Sensors With Multiple Lenses,” describes “improved digital cameras that use multiple image Sensors with multiple lenses.” Ex. 1005, code (54), 2:34–36. In one embodiment, the camera “uses four image sensors, each having its own lens, of which three image sensors are made responsive to the three primary colors and the fourth one made responsive to all intensity information.” *Id.* at 2:42–45.

Yu discloses that the camera’s digital image processing circuitry controls the operation of the image sensors using per-sensor feedback. Specifically, “[f]our independent feedback signals 332 are generated in circuitry 330 and determined from four digital image 352, 354, 356 and 358 resulting respectively from image sensors 302, 304, 306 and 308,” and those “[f]eedback signals 332 are then used respectively to control each of image sensors 302, 304, 306 and 308.” Ex. 1005, 6:31–38. Yu gives the example that if one sensor’s image “tends to be saturated,” then “a corresponding feedback signal can be generated to shorten the exposure time of image sensor 304.” *Id.* at 6:42–44. Yu further discloses that “control circuits 342, 344, 346 and 348 receive respectively the control signals 332 . . . and

independently and respectively control image sensors 302, 304, 306 and 308.” *Id.* at 6:54–60.

In connection with extending dynamic range, Yu describes an embodiment in which “three images from three color sensors can complement each other,” achieved “as a result of three images from three independent sensors, each being separately controlled with different exposure time and other system parameters.” Ex. 1005, 9:40–46.

3. *Miyazaki (Ex. 1006)*

Miyazaki, titled “Image Pickup Apparatus for Producing a Desired Frame of Image Signals,” describes a single-image-sensor digital camera in which a “CCD image sensor 14” captures an image, and “the controller 38 feeds an electronic shutter control signal to the CCD driver 36 for controlling the duration of charge storage in the CCD image sensor 14.” Ex. 1006, 9:11–14. For capturing a still image, Miyazaki controls shutter speed “by controlling the mechanical shutter and an electronic shutter.” *Id.* at 4:15–18. Miyazaki also describes a monitoring mode in which “the mechanical shutter is left open” while the system controller controls the electronic shutter to govern the charge-storage duration. *Id.* at 9:26–52.

E. *Ground 1: Alleged Obviousness Over Matsushima*

Petitioner challenges claims 1, 2, 5, 8, 9, 11, 13–16, and 19 as obvious over Matsushima. Pet. 19. The Petition provides a detailed, limitation-by-limitation analysis of each challenged claim, supported by the testimony of Mr. Guidash. *See id.* at 12–42. Patent Owner, in contrast, raises only three arguments addressed to the entirety of Ground 1, directed to independent claims 1, 9, and 15 and to dependent claims 2, 11, and 16. *See* PO Resp. 18–43. Because Patent Owner’s arguments identify a deficiency in Petitioner’s

contentions for the independent claims that is dispositive of Ground 1, we focus our analysis on that dispositive issue, and we additionally address the issues Patent Owner raises as to dependent claims 2, 11, and 16. We have studied the entire record developed during this proceeding, and for the reasons below we determine that Petitioner has not shown by a preponderance of the evidence that any challenged claim is unpatentable over Matsushima.

1. Independent Claims 1, 9, and 15

The independent claims each require that an integration time be controlled, determined, or identified for each sensor or channel. Claim 1 recites “control[ing] an integration time of each sensor.” Ex. 1001, 25:38–39. Claim 9 recites that the processing component is “configured to determine an integration time of each channel.” *Id.* at 26:9–11. Claim 15 recites “identifying an integration time for each of a plurality of channels.” *Id.* at 26:31–33. As construed above (*see supra* § II.C), each of these limitations requires a per-channel determination of integration time, and is not satisfied by a single global value that is merely applied uniformly to every channel.

Patent Owner argues the independent claims together, treating claim 1 and its “Limitation 1.3” as representative of claims 9 and 15. PO Resp. 14 (asserting that “claim 1, as well as claims 9 and 15 (which include substantially similar limitations), require independent control of the integration time of each sensor”). (emphasis omitted). We address them together as well, while noting that the analysis applies equally to the verbs “control” (claim 1), “determine” (claim 9), and “identify” (claim 15).

a) Petitioner's Contentions

Petitioner contends that Matsushima discloses controlling an integration time of each sensor through its electronic-shutter charge-accumulation control. Pet. 19–21. Petitioner relies on Matsushima's disclosure that "CPU 30, together with integration circuits 60A and 60B", the "[t]iming [g]enerator (TG) 28, and CCD drive circuits 20A and 20B", controls the charge-accumulation time of each CCD. *Id.*; Ex. 1003 ¶¶ 90–96. Petitioner points to Matsushima's statement that the CCDs "have a so-called electronic shutter function that controls the accumulation time (shutter speed) of the charge accumulated by each sensor." Pet. 19 (citing Ex. 1007 ¶ 24). Mr. Guidash testifies that the integration time of each sensor is "respectively" controlled by the corresponding integration circuit. Ex. 1003 ¶ 96.

In its Reply, Petitioner advances a structural argument: because Matsushima provides duplicated, per-sensor hardware (separate integration circuits 60A and 60B, separate CCD drive circuits 20A and 20B, and separate shutter gates), that hardware "[would] only serve a purpose if each imaging system uses its own integration time." Pet. Reply 18–22. Petitioner argues that a skilled artisan would have understood Matsushima to control the integration time of each sensor, and that it would in any event have been obvious to do so. *Id.*

b) Patent Owner's Contentions

Patent Owner responds that Matsushima determines a single, common exposure value and applies it uniformly to both sensors, rather than determining a per-sensor integration time. PO Resp. 18–22. Patent Owner relies on Matsushima's disclosure that the camera computes a single

“imaging EV value,” from which it derives a single “shutter speed,” and then drives both CCD 18A and CCD 18B “to reach the determined shutter speed.” *Id.* at 20–21; Ex. 1007 ¶¶ 34–35; Ex. 2017 ¶¶ 100–104.

Patent Owner acknowledges that Matsushima includes separate hardware for each imaging system, but argues that the existence of duplicated hardware does not establish that Matsushima determines a distinct integration time for each sensor. PO Resp. 21–22; Ex. 2017 ¶ 105.

In its Sur-reply, Patent Owner argues that the single timing generator (TG 28) drives the CCD drive circuits “synchronously,” producing a common-mode integration window across both sensors rather than independent per-sensor control. PO Sur-reply 12, 20; Ex. 2017 ¶¶ 106–108. Patent Owner further argues that claim 9’s verb “determine” and claim 1’s verb “control” capture different stages of the exposure-control process, but that Matsushima satisfies neither because it determines and applies a single value. PO Sur-reply 20–22.

c) Analysis

We are persuaded by Patent Owner that Petitioner has not shown Matsushima discloses or renders obvious a per-channel determination of integration time, as the independent claims require.

The disclosed embodiment in Matsushima performs a single, common-mode determination. Matsushima computes one “imaging EV value,” derives a single “shutter speed” from it, and controls “the CCD 18A and CCD 18B charge accumulation time . . . to reach the determined shutter speed.” Ex. 1007 ¶¶ 34–35. The operative terms are singular: one EV value and one shutter speed, applied to both CCDs. That is the application of a single global value, not the per-channel determination the claims require.

Petitioner’s structural argument does not fill this gap. The presence of duplicated, per-sensor hardware establishes that Matsushima has the capability to apply integration timing to each sensor; it does not establish that Matsushima determines a distinct integration time for each sensor. The claim requires a per-channel determination, not merely the hardware capacity to effectuate one. Matsushima discloses the latter but not the former: its disclosed control logic yields a single determined shutter speed that both CCDs are driven to reach. Ex. 1007 ¶¶ 34–35. Consistent with this disclosure, the single timing generator drives the CCD drive circuits, and Petitioner identifies no disclosure in which Matsushima computes or assigns different integration times to the two sensors.

We have considered Mr. Guidash’s testimony that the integration time of each sensor is “respectively” controlled. Ex. 1003 ¶ 96. That testimony, however, is not supported by the underlying disclosure on which it relies, which describes a single determined shutter speed applied to both CCDs. Ex. 1007 ¶ 34. We therefore afford it little weight.

To the extent Petitioner contends it would have been obvious to determine different integration times for the two sensors, that contention is not supported by Matsushima and rests on impermissible hindsight. Matsushima’s stated object is to combine a telephoto image into the center of a wide-angle image while preventing unnatural boundary regions and maintaining continuity. Ex. 1007 ¶¶ 7, 11–12. Nothing in that objective calls for assigning different integration times to the two imaging systems; the disclosure points the opposite way, toward a single determined value applied to both.

Accordingly, Petitioner has not shown that Matsushima discloses or renders obvious the “each” limitation recited in independent claims 1, 9, and 15.

We address one further limitation specific to claim 9. Independent claim 9 additionally requires that the processing component “combine data from the plurality of channels received to provide an image.” Ex. 1001, 26:13–17. Matsushima discloses synthesizing the images captured by its two imaging systems—scaling the telephoto image and combining it into the center of the wide-angle image to produce a single output image. Ex. 1007 ¶¶ 48–51. Patent Owner argues that this is “different-FOV spatial pasting,” not the “same-scene” fusion the patent describes. PO Resp. 38–39; PO Sur-reply 14. But claim 9 requires only that data from the channels be combined “to provide an image”; it does not require that the channels image the same field of view. That further requirement appears in separate claims. *See* Ex. 1001, claims 4, 10 (reciting sensors configured to image the same field of view). We therefore decline to import a “same field of view” requirement into claim 9, and we determine that Matsushima’s synthesis of its two images satisfies the “combine” limitation. Claim 9 nonetheless fails because Petitioner has not shown the per-channel-determination limitation is met, as explained above.

2. *Claim 2*

Claim 2 depends from claim 1 and additionally requires that the integration time of each sensor be controlled “during a frame.” Ex. 1001, 25:40–42.

Petitioner contends that “during a frame” means during the period in which data for a single frame is captured, and that Matsushima's electronic

shutter controls each sensor's charge-accumulation time during that period. Pet. 22–24; Ex. 1003 ¶¶ 100–105. In its Reply, Petitioner argues that Matsushima's shutter-gate operation “spans the entire integration period” and is therefore in-frame control. Pet. Reply 23–25; Ex. 1044 ¶¶ 70–75. Patent Owner responds that “during a frame” requires in-frame actuation of the focal-plane charge-integration gate while that frame's data are being collected, and that Matsushima instead sets a single value before capture through its automatic-exposure loop. PO Resp. 40–41; Ex. 2017 ¶ 148. In its Sur-reply, Patent Owner argues that, unless “during a frame” requires such in-frame actuation, the limitation would add nothing to claim 1. PO Sur-reply 10–11.

As construed above (*see supra* § II.C), “during a frame” denotes the period during which data for a single frame is captured, and is satisfied where the per-channel integration time is effectuated within a frame; it does not require mid-frame re-determination or the actuation of a charge-integration “switch.” Matsushima’s electronic shutter controls the duration of charge accumulation during capture through shutter-gate pulses. Ex. 1007 ¶¶ 24, 34. We therefore determine that Matsushima satisfies the “during a frame” element. Patent Owner’s surplusage concern is unfounded: “during a frame” is not redundant of claim 1 under our construction, because it adds the requirement that the per-channel control occur within a single frame (intrascene), as distinct from frame-to-frame (interscene) adjustment.

Claim 2 nonetheless fails. Because claim 2 incorporates claim 1’s requirement of controlling an integration time of each sensor, and Petitioner has not shown Matsushima discloses or renders obvious that per-channel

determination, Petitioner has not shown claim 2 unpatentable over Matsushima.

3. *Claims 11 and 16*

The parties address dependent claims 11 and 16 together, and we do the same. *See* Pet. 40 (addressing claim 16 “for the same reasons presented above” for claim 11); PO Resp. 42–43. Claim 11 depends from claim 9 and requires that “the integration time of at least one channel is relatively shorter than the integration time of at least one other channel.” Ex. 1001, 26:18–20. Claim 16 depends from claim 15 and requires that “a first integration time of a first sensor is less than a second integration time of a second sensor.” *Id.* at 26:40–42.

As a threshold matter, claims 11 and 16 depend from independent claims 9 and 15, respectively, and fail for the same reason those claims fail. They also fail independently. Petitioner contends that the different fields of view of Matsushima’s two imaging systems (wide-angle and telephoto) would result in different subject luminance, and therefore different integration times, determined independently by integration circuits 60A and 60B. Pet. 33–35; Ex. 1003 ¶¶ 132–135. Patent Owner responds that Matsushima meters a single exposure value, determines a single shutter speed, and drives both CCDs to that single value, so that no channel’s integration time is “relatively shorter” than another’s. PO Resp. 43; Ex. 2017 ¶¶ 104, 109.

We agree with Patent Owner. Matsushima determines a single shutter speed and applies it to both CCDs. Ex. 1007 ¶¶ 34–35. It does not disclose that one sensor's integration time is set shorter than another's; to the contrary, both are driven “to reach the determined shutter speed.” *Id.* ¶ 34.

Petitioner's field-of-view-luminance theory describes a condition under which different integration times might be desirable, but it does not overcome Matsushima's express disclosure of a single determined value, and the inference that Matsushima would assign different integration times to the two sensors is unsupported attorney and expert argument that we afford little weight. *See* 37 C.F.R. § 42.65(a). Accordingly, Petitioner has not shown claims 11 and 16 unpatentable over Matsushima.

4. *Conclusion as to Ground 1*

For the reasons above, Petitioner has not shown that Matsushima discloses or renders obvious the per-channel-determination limitation recited in independent claims 1, 9, and 15. Because each challenged dependent claim incorporates the limitation of the independent claim from which it depends, the deficiency in Petitioner's showing as to claims 1, 9, and 15 extends to their respective dependent claims—claims 2, 5, and 8 (depending from claim 1); claims 11, 13, and 14 (depending from claim 9); and claims 16 and 19 (depending from claim 15). Accordingly, Petitioner has not shown by a preponderance of the evidence that claims 1, 2, 5, 8, 9, 11, 13–16, and 19 are unpatentable as obvious over Matsushima.

F. *Ground 2: Alleged Obviousness over Yu in View of Miyazaki*

Petitioner challenges claims 1, 2, 4, 5, 8–11, 13, and 14 as obvious over Yu in view of Miyazaki. Pet. 46–78. We have studied the entire record, and for the reasons below we determine that Petitioner has shown by a preponderance of the evidence that these claims are unpatentable. Unlike Matsushima, Yu determines and controls an exposure time for each of its image sensors independently, and the principal disputes are whether Yu's control of “exposure time” satisfies the recited “integration time” under the

construction we adopt, and whether the proposed combination with Miyazaki is supported.

1. Independent Claims 1 and 9

Independent claim 1 requires controlling “an integration time of each sensor,” and independent claim 9 requires determining “an integration time of each channel.” Ex. 1001, 25:38–39, 26:9–11. Claim 15 is not challenged in this ground. We address claims 1 and 9 together because they present the same dispositive question, and we separately address claim 9’s “combine” limitation below. Regarding the remaining limitations of claims 1 and 9, Petitioner

a) Petitioner’s Contentions

Petitioner contends that Yu discloses controlling an exposure time of each sensor independently, and that, for the on-sensor electronic-shutter sensors at issue, exposure-time control is integration-time control. Pet. 50–54. Petitioner relies on Yu’s disclosure of “[f]our independent feedback signals,” each derived from a histogram of its own sensor’s output and used to “independently and respectively control” the corresponding image sensor. Ex. 1005, 6:31–38, 6:54–60. Petitioner contends that controlling a solid-state sensor’s exposure time is accomplished by controlling the duration of charge integration, such that Yu’s per-sensor exposure-time control discloses the recited per-sensor integration-time control. Pet. 51–54; Ex. 1003 ¶¶ 177–182; *see also* Ex. 1028 (technical dictionary). To the extent any implementation detail is needed, Petitioner relies on Miyazaki’s electronic shutter, which controls “the duration of charge storage in the CCD image sensor.” Pet. 58–60; Ex. 1006, 9:11–14.

b) Patent Owner's Contentions

Patent Owner responds that “exposure time” is not “integration time.” PO Resp. 45–54. Patent Owner argues that exposure and integration are distinct concepts—exposure being the total light incident on the sensor, and integration being the time charge is collected on the sensor’s storage device—and that the claims require control of the latter through a focal-plane charge-integration switch. *Id.*; Ex. 2017 ¶¶ 90–96. Patent Owner contends that Yu is silent as to how its exposure-time control is implemented and does not disclose controlling integration time, and that Petitioner improperly fills that gap. PO Resp. 46–48.

c) Petitioner's Reply and Patent Owner's Sur-reply

In Reply, Petitioner argues that no claim requires controlling a charge-integration switch, and that for the electronic-shutter sensors disclosed in the references, controlling exposure time is controlling integration time. Pet. Reply 26–27; Ex. 1044 ¶¶ 34–37, 87–88. In Sur-reply, Patent Owner reiterates that the claims require “two layers of timing”—exposure and integration—and that controlling a shutter does not establish control of integration time. PO Sur-reply 8, 19–21; Ex. 2017 ¶¶ 182–184.

d) Analysis

We determine that Petitioner has shown the per-channel-determination limitation met, and that Yu’s control of exposure time satisfies the recited ‘integration time’ under the construction we adopt.

First, Yu makes a per-channel determination. Yu generates “[f]our independent feedback signals,” each derived from a histogram of the output of its own sensor, and uses those signals to “independently and respectively control” each image sensor—for example, to “shorten the exposure time” of

a given sensor. Ex. 1005, 6:30–44, 6:53–61. This per-sensor determination is materially different from Matsushima’s single combined value, and Patent Owner does not dispute that Yu’s feedback signals are independent. PO Resp. 44. The “each” limitation is therefore met.

Second, on the integration-time question, we weigh the competing expert testimony. Mr. Guidash testifies that, for a solid-state image sensor employing an electronic shutter, controlling the sensor’s exposure time is accomplished by controlling the time during which charge is integrated—i.e., the integration time—and he supports that testimony with reference to the technical literature. Ex. 1003 ¶¶ 177–182; Ex. 1028. Dr. Saber offers the contrary view that exposure-time control and integration-time control are separate “layers of timing.” Ex. 2017 ¶¶ 182–184. We find Mr. Guidash’s testimony better supported. It is corroborated with evidence and is consistent with Miyazaki’s disclosure of electronic shutters that operate by controlling charge-storage duration. Ex. 1006, 9:11–14. Dr. Saber’s contrary opinion is not supported by comparable evidence, and it depends on reading the “charge integration switch” structure into the claims—a structure we have declined to require. We therefore afford Dr. Saber’s “two layers of timing” opinion little weight, and we credit Mr. Guidash’s testimony that, for the electronic-shutter sensors at issue, exposure-time control is integration-time control. Yu’s per-sensor exposure-time control therefore satisfies the recited per-sensor integration-time control.

Third, the proposed combination with Miyazaki is supported by a preponderance of the evidence. Yu discloses the multi-sensor architecture and the four independent control loops; Miyazaki supplies the electronic-shutter mechanism, which controls “the duration of charge storage in the

CCD image sensor.” Ex. 1006, 9:11–14. Petitioner articulates a concrete reason to combine—using a known electronic shutter to implement Yu’s already-disclosed per-sensor exposure control yields a fast, reliable, and compact camera, consistent with the prevalence of electronic shutters in image sensors. Pet. 58–60; Ex. 1003 ¶¶ 191–195. Patent Owner argues that scaling Miyazaki’s single-sensor electronic shutter to Yu’s four sensors would require synchronization and timing mechanisms that the references do not disclose, and that Petitioner’s selective use of Miyazaki’s electronic shutter is hindsight. PO Resp. 47–55; Ex. 2017 ¶¶ 182–184. We do not agree. Yu already provides the four independent per-sensor control loops; the combination requires only that a known per-sensor electronic shutter implement the exposure control Yu already performs. The cross-sensor synchronization and artifact-free fusion Patent Owner invokes are engineering details that the challenged claims do not require, which recite only a per-channel determination of integration time. The combination is a predictable use of known elements according to their established functions.

Regarding the remaining limitations of claims 1 and 9, Petitioner provides a detailed, limitation-by-limitation analysis, supported by the testimony of Mr. Guidash. *See* Pet. 46–50, 69–72; Ex. 1003 ¶¶ 163–174, 219–232. Patent Owner does not separately address these claim limitations in its Response or Sur-reply. Having considered all of Petitioner’s contentions and the supporting evidence as to these claims, we find that evidence persuasive to show that the combination of Yu and Miyazaki discloses or suggests the additional limitations these claims recite.

We therefore determine that Petitioner has shown by a preponderance of the evidence that the per-channel integration-time limitation of independent claims 1 and 9 is met by Yu in view of Miyazaki.

2. *Claim 11*

Claim 11 depends from claim 9 and requires that “the integration time of at least one channel is relatively shorter than the integration time of at least one other channel.” Ex. 1001, 26:18–20. Petitioner relies on Yu’s express disclosure that the multiple sensors may be “separately controlled with different exposure time.” Ex. 1005, 9:40–46; Ex. 1003 ¶ 236. Petitioner additionally relies on Mr. Guidash’s testimony that, because the channels have different spectral sensitivities, the channel receiving more light (e.g., the clear or “W” channel) would be assigned a shorter integration time than the others. Ex. 1003 ¶¶ 237–240. Patent Owner responds that Yu is “agnostic” as to whether the exposure times are actually equal or different. PO Resp. 58; Ex. 2017 ¶ 208.

We determine that the limitation is met. Yu expressly contemplates that its sensors may be “separately controlled with different exposure time.” Ex. 1005, 9:40–46. That disclosure of different exposure times across sensors, combined with our determination that exposure-time control is integration-time control for the sensors at issue, establishes that at least one channel’s integration time may be controlled to be relatively shorter than another’s. Patent Owner’s “agnostic” argument does not overcome Yu’s express language. Accordingly, Petitioner has shown claim 11 unpatentable over Yu in view of Miyazaki.

3. *Remaining Claims 2, 4, 5, 8, 10, 13, and 14*

Petitioner provides a detailed, limitation-by-limitation analysis of dependent claims 2, 4, 5, and 8 (depending from claim 1) and claims 10, 13, and 14 (depending from claim 9), supported by the testimony of Mr. Guidash. *See* Pet. 63–67 (claims 2, 4, 5, 8), 73, 76–77 (claims 10, 13, 14); Ex. 1003 ¶¶ 202–218 (claims 2, 4, 5, and 8), ¶ 233 (claim 10), and ¶¶ 242–250 (claims 13 and 14). Patent Owner does not separately address these claims in the context of Ground 2 in its Response or Sur-reply. Having considered all of Petitioner’s contentions and the supporting evidence as to these claims, we find that evidence persuasive to show that the combination of Yu and Miyazaki discloses or suggests the additional limitations these claims recite. Petitioner has therefore also shown, by a preponderance of the evidence, that claims 2, 4, 5, 8, 10, 13, and 14 are unpatentable over Yu in view of Miyazaki.

4. *Conclusion as to Ground 2*

For the reasons above, Petitioner has shown by a preponderance of the evidence that claims 1, 2, 4, 5, 8–11, 13, and 14 are unpatentable as obvious over Yu in view of Miyazaki.

III. CONCLUSION

For all of the foregoing reasons and based on the entire record developed during trial, Petitioner has demonstrated by a preponderance of the evidence that that claims 1, 2, 4, 5, 8–11, 13, and 14 are unpatentable under 35 U.S.C. § 103, but has not carried its burden to show claims 15, 16, and 19 are unpatentable. Our conclusion is summarized in the following table.

Claim(s)	35 U.S.C. §	Reference(s) /Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 5, 8, 9, 11, 13–16, 19	103(a)	Matsushima		1, 2, 5, 8, 9, 11, 13–16, 19
1, 2, 4, 5, 8–11, 13, 14	103(a)	Yu, Miyazaki	1, 2, 4, 5, 8– 11, 13, 14	
Overall Outcome⁵			1, 2, 4, 5, 8– 11, 13, 14	15, 16, 19

VII. ORDER

For the foregoing reasons, it is:

ORDERED that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 2, 4, 5, 8–11, 13, and 14 of the '158 patent are unpatentable, but has not demonstrated by a preponderance of the evidence that claims 15, 16, and 19 of the '158 patent are unpatentable; and

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.

⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

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