

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.

Petitioner,

v.

INTELLECTUAL VENTURES II LLC

Patent Owner.

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

Patent Owner Demonstratives

Independent Claims of the '158 Patent

1. An image capture device comprising:
a plurality of sensors;
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
a processing component configured to **control an integration time of each sensor.**

9. A system comprising:
a plurality of channels, wherein each channel of the plurality of channels includes a sensor; and
a processing component coupled to the plurality of channels, wherein the processing component is configured to **determine an integration time of each channel of the plurality of channels,**
wherein the processing component is configured to combine data from the plurality of channels received to provide an image..

15. A method comprising:
identifying an integration time for each of a plurality of channels of an image capture device, wherein the plurality of channels includes a plurality of sensors;
capturing data with each of the plurality of sensors, wherein the data captured by each sensor is based at least in part on the integration time of the sensor; and
generating an image by combining the data captured by each of the plurality of sensors.

Dependent Claims of the '158 Patent in Dispute

2. The device of claim 1, wherein the processing component is further configured to control the integration time of each sensor during a frame.

11. The system of claim 9, wherein the integration time of at least one channel is relatively shorter than the integration time of at least one other channel.

16. The method of claim 15, wherein a first integration time of a first sensor is less than a second integration time of a second sensor.

How Does the '158 Invention Work?

As noted in the Background, the '158 Patent is directed to expanding the dynamic range of a camera for capturing "scenes with highly varying illumination." *Id.*, 1:52-53 (emphasis added). In contrast to prior techniques, which suffered from temporal aliasing when attempting to capture motion in such a scene, the techniques disclosed in the '158 Patent minimized such temporal aliasing. From the '158 Patent:

... Image capture by the camera is performed using the multiple camera channels, and each camera channel is controlled during a frame under an independent integration time. The integration time for each channel can be automatically controlled and/or controlled in response to a user input. A wide range of integration times are available for use in an embodiment. The images obtained in each channel under the different integration times are obtained simultaneously or nearly simultaneously, so undesirable temporal aliasing from moving scenes or camera motion is minimized. *Id.*, 3:47-57 (emphasis added).

POR, 5

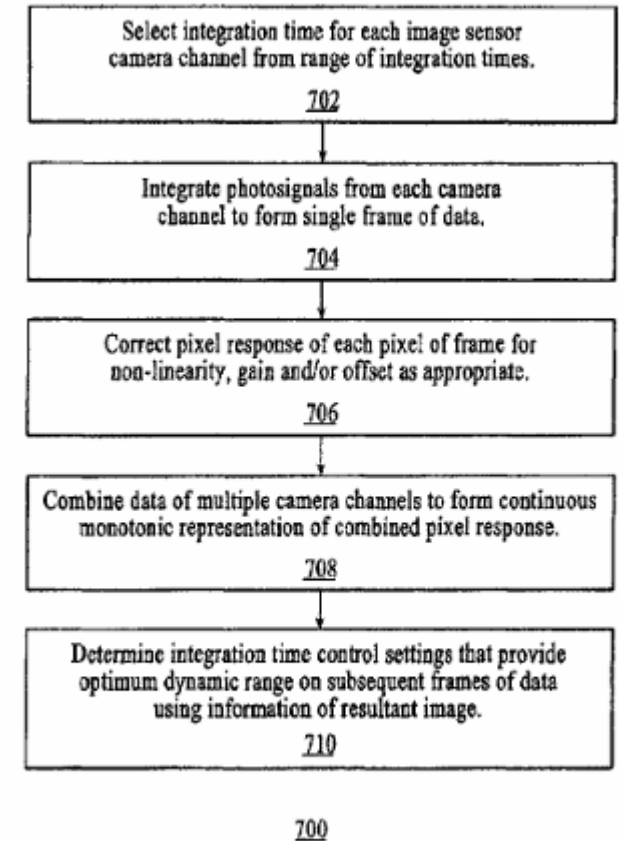


FIG.7

EX1001

What is integration time?

The '158 Patent expressly defines "integration time" as follows:

... The amount of integrated photo-charge is directly related to the time the image sensor collects and integrates signal from the scene. **This is known as integration time.** EX1001, 4:3-7 (emphasis added).

Given this express definition, the term "integration time" as used in claims 1, 9 and 15 of the '158 Patent means "the time interval during which the image sensor collects and integrates signal from the scene."

POR, 12

What is Integration Time Control?

Having expressly defined “integration time,” the ‘158 Patent expressly defines “integration time control.” From the ‘158 Patent:

In contrast to exposure control, which is used by conventional digital cameras to manage dynamic range, the digital camera systems of an embodiment use integration time control to control the time the electrical signal is integrated on a charge storage device (capacitance) within a sensor (pixel), as described herein. Integration time control, also referred to as “focal plane shutter” control, controls the time the electrical signal is integrated or accumulated by controlling a switch (e.g., charge integration switch) coupled or connected to the sensor or a photo-detection mechanism of a sensor. For example, the charge integration switch is placed in a state to allow charge to accumulate within the sensor for a period of time approximately equal to the integration time corresponding to that sensor; upon completion of the integration period, the switch is placed in a state to transfer the accumulated charge as a photo-signal to a processing component. *Id.*, 4:41-63 (emphasis added).

... integration time control” as used in the ‘158 Patent is in contrast to off-sensor timing signals (e.g. frame, line, transfer, correlated-double-sampling, or A/D clocks) as those signals can coordinate operation or retrieval, but they do not define when the pixel is integrating photocharge and they do not open or close the charge-integration path at the sensor. Instead, “integration time control” in the ‘158 Patent begins when an integration switch permits charge to accumulate and ends when that switch closes. That is why the specification ties “integration time control” to focal-plane shutter control at the pixel and treats it as distinct from upstream exposure heuristics or downstream readout sequencing.

EX2017, ¶96

POR, 14

POR, 14

What does “each” mean?

In IPR2022-00710 (the Toyota IPR), the Board interpreted the “processing component” of Claim 1 as follows:

... Consistent with this interpretation, claim 1 also recites “a processing component configured to control an integration time of *each* sensor,” which similarly distinguishes the processing component’s configuration as being able to control the integration time of an individual sensor distinct from the other sensor(s) in the group.

The specification is in accord with this interpretation. For example, the specification states,

The digital cameras described herein overcome this dynamic range limitation through the use of multiple camera channels, including multiple optics and image sensors on a single integrated circuit (IC) or semiconductor Substrate. The multiple camera channels are configured to image the same field of view simultaneously, and each operates independently under a different integration time.

And the specification states,

Each channel includes an optics component and an image sensor having an active area including multiple picture elements (pixels). Each sensor is controlled under or with an independent signal integration time. . . .

Toyota Motor Corp. v. Intellectual Ventures II LLC, IPR2022-00710, Paper 13, at 12-13 (October 26, 2022) (emphasis added; citations omitted).

Tesla Tries to Relitigate the PTAB's Construction

Petitioner tries to re-label Patent Owner's position as a demand that claim 1 include a particular adverb such as "independent," "separately," or "simultaneously," and then argues that because claim 1 uses only "control," Patent Owner is impermissibly importing extra words into the claim. (Reply, 11–14.) That argument ignores the Board's finding in the Toyota IPR that the claims require controlling "the integration time of an individual sensor distinct from the other sensor(s)," which is the same thing as independently controlling the integration time of each sensor. IPR2022-00710, Paper #13, 11-13. As the Board found in the Toyota IPR, the disclosure in the specification that "[e]ach sensor is controlled under or with an independent signal integration time" is "in accord with" the Board's finding that the claims require controlling "the integration time of an individual sensor distinct from the other sensor(s)." *Id.*

Sur-Reply, 3

claim phrase means controlling "the integration time of an individual sensor distinct from the other sensor(s)." As Dr. Saber explains, the specification of the '158 Patent is in accord with this interpretation because it discloses a pipeline in which the processor selects an integration time for each camera channel, image captures under those respective settings, and then combines that data. (EX2017, ¶71). Petitioner's attempt to treat "control ... of each sensor" as satisfied by a common-value regime is not a neutral "plain meaning" application; it is a construction that is at odds with both the Board's decision in the Toyota IPR and the patent specification as a whole. (EX2017, ¶71). Moreover, it is an improper, late attempt to rewrite the argument in the Petition.

The Reply also argues that because claims in a continuation patent filed years after the '158 Patent issued recite "independently control simultaneous data acquisition" or "separately and simultaneously controlling," the claims of the '158 Patent must mean something other than what the Board said in the Toyota IPR. (Reply, 12–14). The claims in the continuation patent do not alter the meaning of the claims of the '158 Patent. Nor does the Reply cite any authority for the proposition that claims in a later continuation patent can be used to nullify or undercut the Board's earlier construction of the parent patent.

Sur-Reply, 5

Ground 1

Claims 1-2, 5, 8-9, 11, 13-16, and 19
§ 103 over Matsushima

Matsushima Doesn't Teach "respectively"

D. There is no disclosure of independent per-sensor control; Matsushima's AE sets and applies a single common value

Matsushima describes a pre-capture AE loop in which the camera meters to determine "the subject luminance (imaging EV value)," then determines "the aperture value and shutter speed," and then exposes by controlling "the CCD 18A and CCD 18B charge accumulation time ... to reach the determined shutter speed." (EX1007, ¶¶0034–0035.) Nothing in that sequence discloses that one CCD is assigned a different integration-time value than the other, or that the controller sets per-sensor timing independently. The consistent use of singular terms— "the imaging EV," "the aperture value and [the] shutter speed," "the determined shutter speed," and "the charge accumulation time"—paired with the conjunctive reference to both CCDs, conveys a single AE result applied in common to CCD 18A and CCD 18B. (EX1007, ¶¶0034–0035).

Petitioner's quotation of ¶0034 as if the integration circuits "determine the subject luminance ... for sensors 18A and 18B respectively" is not supported by the text; the word "respectively" does not appear in ¶0034. (EX1007, ¶0034.) As shown below, inserting "respectively" alters the reference from a common-value AE regime to a per-sensor regime the document does not describe.

<u>Petition, at 20</u>	<u>Actual Text Of [0034] Matsushima</u>
Ex.1007, [0034] (for automatic exposure (AE) adjustment, the integration circuits 60A and 60B determine the subject luminance (imaging EV value) for sensors (CCD) 18A and 18B <u>respectively</u> , and CPU 30 determines "aperture value and shutter speed...based on this imaging EV value.") (emphasis added)	For AE control, <u>the</u> 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. The apertures 17A and 17B are driven via the drive circuits 52A and 52B, and <u>the</u> CCD 18A and CCD 18B <u>charge accumulation time</u> is controlled using an electronic shutter to reach the determined shutter speed.

What does Matsushima Show?

[0024] CCD 18A and CCD 18B each have a shutter drain via a shutter gate, and the accumulated signal charges can be swept to the shutter drain by driving the shutter gates with shutter gate pulses. In other words, 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.

[0034] For AE control, 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. The apertures 17A and 17B are driven via the drive circuits 52A and 52B, and the CCD 18A and CCD 18B charge accumulation time is controlled using an electronic shutter to reach the determined shutter speed. As a result, optimal exposure adjustment and focusing are performed simply by pointing the imaging lenses 15A and 15B of the digital camera 10 at the subject.

[0035] During imaging and recording, the AF operation is performed when the release button is "half-pressed," and the metering operation is repeated several times to obtain the exact imaging EV. The final aperture value and shutter speed for imaging is then determined based on the imaging EV. The apertures 17A and 17B are then driven to the final aperture value when the release button is "fully press", and the charge accumulation time is controlled by the electronic shutters at the determined shutter speed. Instead of AE control based on image signals acquired from CCD 18A and CCD 18B, other well-known photometric sensors may be used.

EX1007

EX1007

EX1007

control of integration time. Petitioner must show that Matsushima teaches the processing component actually controlling integration time on a per-sensor basis, not merely that electronic shutter structures exist on the sensors. EX2017, ¶121. As Dr. Saber explains, in Matsushima's disclosed configuration, the electronic shutter capability is operated under common timing from the single TG, yielding a common integration window—the very opposite of the distinct per-sensor control required to meet the claim language. EX2017, ¶¶110, 111.

Sur Reply, 15-16

How does Matsushima work?

The only evidence of what Matsushima teaches is Matsushima's own AE description, which repeatedly uses singular exposure-control variables applied across both channels. Dr. Saber explains that Matsushima describes a single AE solution in which the CPU determines "the final aperture value and shutter speed" (singular), and then the "CCD 18A and CCD 18B charge accumulation time" is controlled using an electronic shutter "to reach the determined shutter speed," again in the singular. EX2017, ¶109. That disclosure aligns with Matsushima's system architecture: a single CPU drives a single timing generator (TG) that provides timing to both CCD drive circuits, and "each circuit is driven synchronously" by the TG. EX2017, ¶108. In a synchronous TG architecture, the natural—and disclosed—operation is common-mode shutter gating, not two distinct in-frame integration windows. (EX2017, ¶110). Dr. Saber further explains that independent per-sensor integration-time control would require de-synchronized per-channel timing (e.g., distinct shutter-gate pulse trains or distinct timing domains) so CCD 18A and CCD 18B integrate for distinct intervals, and Matsushima does not disclose that; it discloses the opposite: one CPU, one TG, synchronous drive. EX2017, ¶111.

113. As a result, Matsushima does not disclose independent control of integration time for each CCD, as required by the Challenged Claims. Instead, it applies a single charge accumulation time uniformly across both imaging sensors, as evidenced by its consistent references to the charge accumulation time, the determined shutter speed, and the final aperture value -- each in the singular. The Petition's reliance on Matsushima's timing signals is misplaced, as these signals merely coordinate data retrieval rather than independently adjusting integration times. Even if they influenced electronic shutters, Matsushima provides no disclosure of separate integration time control for each CCD.

EX2017, 113

Matsushima Doesn't show “during a frame”

As Dr. Saber explains:

Petitioner's fallback to the timing generator (TG-28) misreads the reference. Matsushima states that TG-28 “provides appropriate timing signals” to the CCD drive circuits and describes the two image paths as being driven synchronously—i.e., frame/line/transfer clocks used to coordinate operation and readout—not distinct per-sensor shutter-gate waveforms that define different integration windows within the same frame. (EX1007, ¶¶0023–0024.) Nothing in ¶¶0023–0024 or ¶¶0034–0035 identifies any actuation “during a frame” that sets per-sensor integration time, much less sets different in-frame windows across the two CCDs. A POSITA would understand that TG-28's “timing signals” coordinate drive/readout, not per-sensor, in-frame shutter gating. EX2017, ¶149.

2. The device of claim 1, wherein the processing component is further configured to control the integration time of each sensor during a frame.

POR, 41

image). Accordingly, Matsushima discloses that controlling an integration time of sensor 18A during a period of time in which data for a single frame of image 62A is captured by that sensor 18A, and controlling an integration time of sensor 18B during a period of time in which data for a single frame of image 62B is captured by that sensor 18B. Ex.1003, ¶104.

Petition, 24

Matsushima's shutter time is the same

This is also why Petitioner's "broadcast one value" theory is inconsistent with the claim set's structure. A broadcast one value regime is not a determination of "an integration time of each channel," as claim 9 requires, because it is the determination of one integration time for the system. Even if Petitioner relabels a single broadcast value as "an integration time" for each channel by asserting that each channel "has" that same value, that approach renders claim 11's relative shorter limitation largely meaningless. A single common value cannot satisfy a relative shorter relationship without additional per channel degrees of freedom that Petitioner's theory denies.

Dr. Saber confirms the Prior PTAB interpretation that the claim set is coherent when "control an integration time of each sensor" is given operative effect as per sensor control authority over the sensor local integration interval, rather than reduced to a global exposure label applied across channels. (EX2017, ¶70).

Properly read, the claim set uses "determine" in claim 9 to require per-channel integration time values, uses claim 11 to constrain those values, and uses "control" in claim 1 to require that the processing component be configured to effectuate integration time control at the sensors. Petitioner's "broadcast one value" theory collapses those distinctions and renders multiple claim phrases superfluous.

11. The system of claim 9, wherein the integration time of at least one channel is relatively shorter than the integration time of at least one other channel.

16. The method of claim 15, wherein a first integration time of a first sensor is less than a second integration time of a second sensor.

Sur-Reply, 18

Ground 2

Claims 1-2, 4-5, 8-11, 13-14

§ 103 over Yu in view of Miyazaki

Yu Does not teach “integration control”

Yu’s digital image-processing circuitry generates four independent feedback signals (332), each derived from the corresponding histogram and used respectively to control a corresponding image sensor, including shortening that sensor’s exposure time where indicated. (EX1005, 6:59–65; 11:39–42; 12:10–14; 12:16–19). Those passages do not expressly or inherently disclose “integration time control” applied at “*focal plane* shutter control “by controlling a switch (e.g., charge integration switch) coupled or connected to the sensor or a photo-detection mechanism of a sensor, which regulates the time the image sensor collects and integrates light. In fact, the Petition concedes “Yu does not describe the implementation details.” Petition, 59-60.

POR, 45

The claim term at issue is not “exposure control.” The challenged claims require “control[ing] an integration time of each sensor” by “controlling a switch (e.g., charge integration switch) coupled or connected to the sensor or a photo-detection mechanism of a sensor controlling a switch coupled to the sensor.” EX1001, 4:46-50. The ‘158 Patent equates the required integration time control with “focal plane shutter control,” which is not merely an exposure “setting.” EX2017, ¶¶90–96. For example, as Dr. Saber explains, there is a critical divide between (i) focal-plane, pixel-domain gating that opens and closes the charge-collection path (the integration gate), and (ii) off-sensor driver and sequencer timing (frame/line/transfer clocks) that schedules transfer, sampling, and readout. EX2017, ¶¶90–96. A system can adjust the latter and even reduce effective exposure opportunity, but unless it actuates the sensor-local gate that defines when charge accumulation starts and stops, it has not performed integration-time control as defined in the ‘158 Patent. *Id.*

Tesla's "fix"

Petitioner implicitly treats “control[ling] an integration time” as defined and claimed in the ‘158 Patent as interchangeable with any system-level exposure setting or with downstream clocking/readout decisions. Dr. Saber explains why that is technically wrong in the context of the CCD/CMOS imaging techniques disclosed in the relied-on references. In CCD/CMOS imagers, there are two distinct layers of timing: a pixel-domain, focal-plane layer that opens and closes the charge-collection path (the integration gate), and a separate sequencer/readout layer that controls transfer, sampling, and conversion after charge has been collected. (EX2017, ¶90). A system can manipulate the sequencer/readout layer (for example, initiating transfer earlier or advancing row cadence) and thereby affect when the charge is moved or read, without ever performing focal-plane shutter control that defines the start/stop of charge accumulation at the pixel. (EX2017, ¶¶91–93).

Sur-Reply, 7-8

Petitioner cannot carry its burden of demonstrating that the relied on references disclose the requirements of integration time control as defined in the ‘158 Patent by pointing to generalized statements that a controller produces “exposure control signals” or that a timing block drives sensor circuitry, because those statements do not identify focal-plane gating that controls the time the electrical signal is integrated or accumulated by controlling a switch (e.g., charge integration switch) coupled or connected to the sensor or a photo-detection mechanism of a sensor, as required by the ‘158 Patent. (EX2017, ¶94). Dr. Saber explains this in the specific context of Yu: Yu describes system-level exposure-time control signals and “necessary control signals” driven by histogram feedback, but does not identify the focal-plane actuator (reset/clear/transfer gating) or specify per-sensor gate/clear waveforms that define the time the electrical signal is integrated or accumulated by controlling a switch (e.g., charge integration switch) coupled or connected to the sensor or a photo-detection mechanism of a sensor, as required by the ‘158 Patent. (EX2017, ¶94). In contrast to the ‘158 Patent’s definition of “integration time control,” Yu controls the system’s exposure layer rather than a switch (e.g., a charge integration switch) that controls integration time at the focal plane.

Sur-Reply, 9

What does Miyazaki add?

Miyazaki sets “shutter speed ... by controlling the mechanical shutter and an electronic shutter available with the CCD image sensor.” It then details an electronic-shutter control signal for a single CCD. EX1006, 4:16–19 (“In the illustrated embodiment, the camera 10 controls a shutter speed, i.e., an exposure time at the time of the shot by controlling the mechanical shutter and an electronic shutter available for the CCD image sensor 14); 9:8–14 (“Specifically, the controller 38 delivers to the optics driver 34 a control signal for controlling the focal position of the lens and a control signal for controlling the duration of opening of the mechanical shutter. Also, 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). Miyazaki nowhere suggests dispensing with the mechanical shutter or running electronic-only. Instead, as Dr. Saber explains, “in Miyazaki the mechanical shutter defines a coarse/open interval, while the electronic shutter (on-sensor charge gating) can shorten or fine-tune.” EX2017, ¶176. Accordingly, Miyazaki presents the combination as the way the camera realizes the effective exposure duration for that one sensor.

As a result, Miyazaki teaches a two-part mechanical and electronic shutter stack for a single sensor. A person of ordinary skill, if they were even to combine these references, would import both into Yu. That would inject camera-level mechanics that Yu neither discloses nor needs and would defeat per-sensor independence. If Petitioner discards the mechanical part to avoid those consequences, the combination still fails. Yu lacks the on-sensor focal-plane control that the ‘158 Patent requires. Miyazaki does not scale that control to multiple sensors. Either path leaves Ground 2 without the claimed per-sensor integration-time control in a multi-sensor architecture.

POR, 49

No Motivation to combine

The Petition also claims that the combination would “eliminate any mechanical shutter” from Yu. But Yu does not disclose a mechanical shutter in the first place; the mechanical-plus-electronic shutter regime is Miyazaki’s single-sensor design. (EX1005, 6:59–65; 12:16–19; 13:23–37; EX1006, 4:16–19; 9:8–14). Petitioner never explains why a POSITA would import Miyazaki’s single-sensor shutter scheme into Yu’s multi-sensor architecture merely to “eliminate” hardware not present in Yu, nor how that importation yields the per-sensor, in-frame focal-plane timing the claims require. Therefore, Petitioner’s motivation is internally inconsistent.

Equally absent is any closure of Yu’s histogram-based exposure-time feedback loop onto a focal-plane switch at each sensor. To convert Yu’s “exposure time” signals (332 to control circuits 342/344/346/348) into integration time as defined in the ‘158 Patent, Petitioner needed a disclosure that those control circuits actually drive an electronic shutter/charge-integration switch at the sensor. Yu never supplies that linkage; it does not mention electronic shutters, charge-integration switches, or reset/clear gating. (EX1005, 6:59–65; 12:16–19; 13:23–37). Miyazaki links an electronic-shutter control signal to a single CCD array only and does not provide any details of synchronization, independent data processing, and proper data integration into a single frame period (EX1006, 9:8–14). The Petition’s annotated figures simply label lines as “controlling an electronic shutter on each sensor,” which is an attorney/expert conclusion rather than a prior-art disclosure and should be discounted under 37 C.F.R. § 42.65(a).

POR, 52

Car- Automobile Analogy Doesn't Help

B. The Reply's "car vs automobile" analogy underscores that Petitioner is litigating semantics rather than disclosure.

The Reply purports to reframe Petitioner's position as merely "recognizing" that Yu's disclosed "on-sensor exposure time control" is understood by a POSITA to be the same as "controlling an integration time," likening it to "a car" disclosing "an automobile." Reply, 27. The analogy fails because the dispute is not about synonymous nouns; it is about whether the prior art discloses the explicitly defined control modality needed to meet the claim limitation as used in the '158 Patent.

The terms "car" and "automobile" refer to the same object, and therefore are not an apt analogy. A better analogy would involve the terms "vehicle" and "bicycle." Just as the term "vehicle" is generic and can cover everything from automobiles to trains, ships, airplanes, helicopters and bicycles, the term "exposure time" is a functional objective that can be realized in multiple non-equivalent ways such as control of the optical aperture, mechanical shuttering, on-sensor charge-integration switch, among others. Just as the generic disclosure of a vehicle does not equate to a disclosure of a bicycle, Yu's generic disclosure of "exposure control" does not equate to "control[ing] an integration time of each sensor" by "controlling a switch (e.g., charge integration switch) coupled or connected to the sensor or a photo-detection mechanism of a sensor controlling a switch coupled to the sensor," as required by the claims of the '158 Patent. EX1001, 4:46-50; EX2017, ¶¶164–165. Where, as here, the reference is silent on implementation, calling the function by another name is not "recognition"; it is impermissible gap-filling. EX2017, ¶166.

Sur-Reply, 20

The Combination Doesn't Teach Control “during a frame”

Claim 2 requires that “the processing component is further configured to control the integration time of each sensor during a frame.” Read with the specification, “integration time” is not a high-level exposure label; it is sensor-level, focal-plane control of a charge-integration switch— “the time the image sensor collects and integrates signal from the scene,” implemented by “controlling a switch (e.g., charge integration switch) ... also referred to as ‘focal plane shutter control.’” (EX1001, 3:65–4:6; 4:46–56.) The patent further teaches channels imaging the same field of view simultaneously, each operating independently under a different integration time, with the processor separately and simultaneously controlling the integration time of each channel and combining the resulting single-frame data. (EX1001, 4:38–45; 5:3–18; 7:36–39). Against that intrinsic backdrop, Yu never identifies per-sensor, on-sensor actuation during the frame. Yu states only that the “Four independent feedback signals 332 are generated in [the] circuitry 330 and ... are used respectively to control each of image sensors 302–308” and that it “generates all necessary controls signals” delivered to per-sensor control circuits. (EX1005, 6:59–65; 11:39–42; 12:10–19; 12:16–19; 13:23–37). Those passages are agnostic to how “exposure time” is realized and do not disclose an electronic shutter, a charge-integration switch, or gate/clear timing at the sensor. Petitioner’s mapping of “during a frame” points to Yu’s per-sensor image streams (Fig. 5) rather than to a disclosure of focal-plane gating at each sensor while the frame is being captured. (EX1005, 7:50–53).

306, 308) *during a frame* (i.e., during a period of time in which data for a single frame of an image) is captured by that sensor. Ex.1003, ¶205; see VII.C (“*during a frame*” means “during a period of time in which data for a single frame of an image is captured” by a sensor); Ex.1006, FIG. 3, 8:4-20 (intervals between successive shots are determined such that exposure time ST (charge accumulation time) for each shot is completed within a frame); Ex.1003, ¶205.

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POR, 20

The Combination Doesn't Teach the Control of Different Integration Times

Claims 11 and 16 explicitly require an actual relative difference— “the integration time of at least one channel is relatively shorter than the integration time of at least one other channel.” Read with the intrinsic record, “integration time” is sensor-level, focal-plane charge-accumulation time, not a high-level exposure label. The specification teaches channels imaging the same field of view simultaneously, “each operates independently under a different integration time,” and a processor “separately and simultaneously” controlling the integration time of each channel to enable single-frame fusion. (EX1001, 4:38–45; 5:3–18; 7:36–39). Against that backdrop, Yu never discloses that one sensor’s integration time is set shorter than another’s. Yu states only that “Four independent feedback signals 332 are generated in [the] circuitry 330 and ... are used respectively to control each of image sensors 302–308” and that it “generates all necessary controls signals” to per-sensor control circuits. (EX1005, 6:59–65; 11:39–42; 12:10–19; 12:16–19; 13:23–37). Those passages are agnostic as to whether the commanded “exposure time” values are equal or different, and they do not identify focal-plane control of a charge-integration switch as the ‘158 Patent requires.

Miyazaki does not cure the deficiency because it is a single-sensor still-camera reference that controls “shutter speed ... by controlling the mechanical shutter and an electronic shutter available with the CCD image sensor,” and later describes an electronic-shutter control signal for that one CCD. (EX1006, 4:16–19; 9:8–14). A single-sensor teaching cannot establish a relative relationship between two channels’ integration times in a multi-sensor system. The combination therefore lacks any cited disclosure that, in Yu’s multi-sensor camera, at least one channel operates under a shorter integration time than another channel as claims 11 and 16 requires. Petitioner’s annotated figures that label lines as “electronic shutter” for each sensor are attorney conclusions, not prior-art disclosures showing different per-sensor integration-time values, and should be discounted under § 42.65(a). On this record, Ground 2 fails to meet the “relatively shorter” limitation of claims 11 and 16.

Conclusion

Ground I Fails for the following reasons:

- Matsushima doesn't teach "control an integration time of each sensor" (claim 1)
- Matsushima doesn't teach "determine an integration time of each channel of the plurality of channels" (claim 9)
- Matsushima doesn't teach "identifying an integration time for each of a plurality of channels" (claim 15)
- Matsushima doesn't teach "control the integration time of each sensor during a frame" (claim 2)
- Matsushima doesn't teach "the integration time of at least one channel is relatively shorter than the integration time of at least one other channel" (claim 11)
- Matsushima doesn't teach "a first integration time of a first sensor is less than a second integration time of a second sensor." (claim 16)

Ground II Fails for the following reasons:

- No motivation to combine Yu+ Miyazaki
- Combination doesn't teach "control an integration time of each sensor" (claim 1)
- Combination doesn't teach "determine an integration time of each channel of the plurality of channels" (claim 9)
- Combination doesn't teach "identifying an integration time for each of a plurality of channels" (claim 15)
- Combination doesn't teach "control the integration time of each sensor during a frame" (claim 2)
- Combination doesn't teach "the integration time of at least one channel is relatively shorter than the integration time of at least one other channel" (claim 11)
- Combination doesn't teach a first integration time of a first sensor is less than a second integration time of a second sensor." (claim 16)