

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CANON, INC. and CANON U.S.A., INC.,
Petitioner,

v.

WSOU INVESTMENTS, LLC
d/b/a BRAZOS LICENSING AND DEVELOPMENT,
Patent Owner.

IPR2022-01532
Patent 7,493,030 B2

Before THU A. DANG, JO-ANNE M. KOKOSKI, and
JOHN A. HUDALLA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

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

Canon Inc. and Canon U.S.A., Inc. (collectively, “Petitioner”) filed a
Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1–25
 (“the challenged claims”) of U.S. Patent No. 7,493,030 B2 (Ex. 1001, “the

'030 patent"). Petitioner filed a Declaration of Dr. Michael Lebby (Ex. 1002) with its Petition. WSOU Investments, LLC d/b/a Brazos Licensing and Development ("Patent Owner") filed a Preliminary Response (Paper 12, "Prelim. Resp.").

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2022). Under 35 U.S.C. § 314(a), we may not authorize an *inter partes* review unless the information in the petition and the preliminary response "shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." For the reasons that follow, we do not institute an *inter partes* review.

I. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies Canon Inc. and Canon U.S.A., Inc., as the real parties-in-interest. Pet. 2. Patent Owner identifies WSOU Investments, LLC d/b/a Brazos Licensing and Development as the real party-in-interest. Paper 3, 1.

B. *Related Matter*

As required by 37 C.F.R. § 42.8(b)(2), the parties identify the following related matter (Pet. 2; Paper 3, 2):

WSOU Invs., LLC v. Canon, Inc., No. 6:22-cv-00166 (W.D. Tex. filed Feb. 16, 2022).

C. The '030 Patent

The '030 patent is directed to “methods and optical devices that provide an increased depth of field.” Ex. 1001, 1:6–7. Figure 7 of the '030 patent is reproduced below.

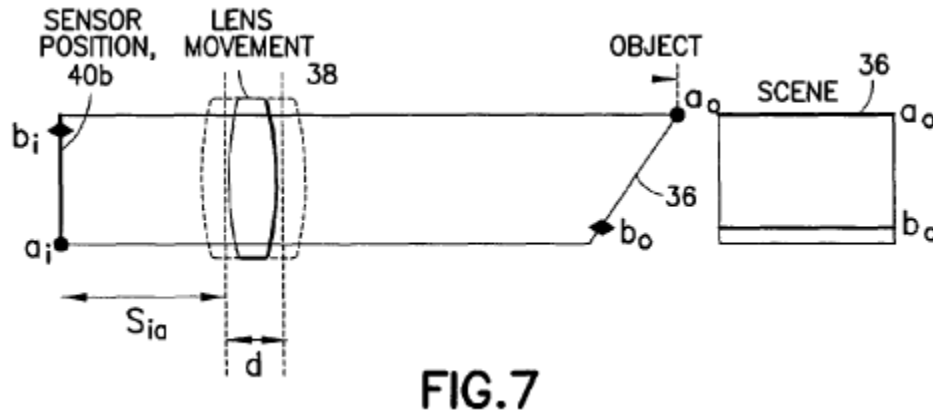


Figure 7 is a schematic diagram showing a moveable lens and image sensing surface. *Id.* at 5:65–67. Sensor surface 40b is planar and oriented perpendicular to an optical axis. *Id.* at 8:10–11. Lens 38 is moved in span d in order to provide precise focus for a variety of image distances between s_{ia} and $s_{ia}+d$. *Id.* at 8:11–13. Though sensor surface 40b is flat, the movement of lens 38 creates the effect of a curved sensor surface. *Id.* at 8:13–15. The '030 patent acknowledges that, in this arrangement, exposing all of sensor surface 40b while lens 38 is in motion would result in portions of surface 40b being out-of-focus during periods where lens 38 and surface 40b are aligned to focus a different swath of scene 36. *Id.* at 8:25–31. The '030 patent purports to solve this problem with a rolling shutter. *Id.* at 8:25–31.

Figure 9 of the '030 patent is reproduced below.

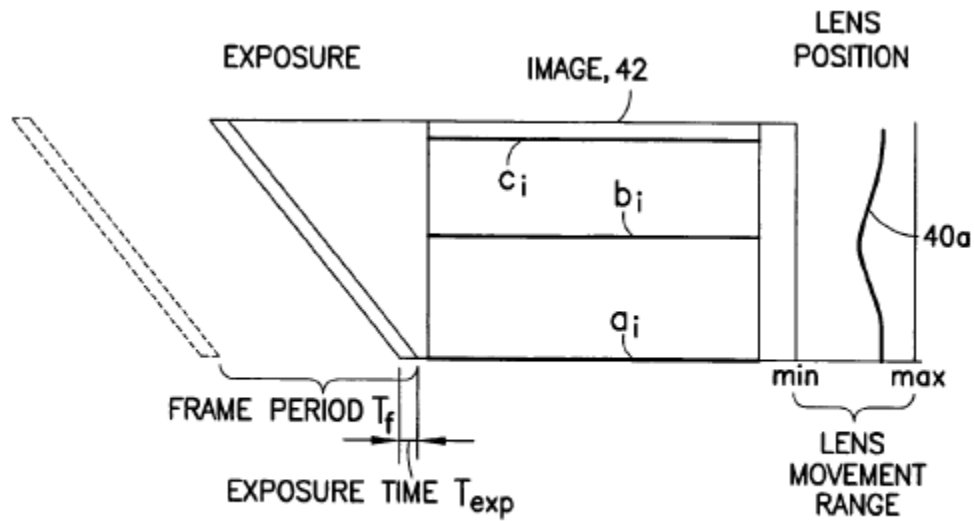


FIG.9

Figure 9 is a schematic diagram showing the concept of a rolling shutter for exposing different rows of a sensor according to a particular lens movement. Ex. 1001, 6:1–4. Image 42 exhibits different swaths, each of which correspond to an object in scene 36 at a nearer object distance, a further object distance, or somewhere in between. *Id.* at 8:58–61. Scene 36 includes horizontal swath b_i for a near object and horizontal swaths a_i and c_i for far objects. *Id.* at 9:28–37. Because swath b_i lies spatially between swaths a_i and c_i in image 42, the lens must reverse its direction of relative movement in order to properly focus each swath. *Id.* at 9:37–41. Reversal of the lens direction can be avoided in digital photography, however, by rolling the shutter along different discontinuous sections of pixels to mirror the scene being imaged, such as by reading out different lines or even individual pixels of a pixel array at different times. *Id.* at 10:18–37.

The '030 patent also describes how exposure times for pixels or groups of pixels can be adapted based on (1) image brightness (Ex. 1001,

11:26–58) and (2) object motion, with shorter exposure times for moving objects at the cost of brightness (*id.* at 11:59–12:7).

D. Illustrative Claim

Of the challenged claims, claims 1, 3, 4, 9–11, and 15 are independent. Claim 2 depends from claim 1; claims 5–8 depend from claim 4; claims 12–14 depend from claim 11; and claims 16–25 depend from claim 15. Claim 1 is illustrative of the challenged claims and recites:

1. A method comprising:
 - manipulating an optical relationship between an optical lens and an image sensing surface so that the image sensing surface is spaced at different effective image distances from the lens; and
 - exposing different portions of the image sensing surface synchronous with manipulating the optical relationship by adaptively exposing said portions for different exposure periods based on detected movement of at least two objects.

Ex. 1001, 14:2–11.

E. Prior Art

Petitioner relies on the following prior art:

Japanese Patent Application Publication No. 2002-318342, published Oct. 31, 2002 (Ex. 1003, “Sugitani”);¹

¹ Sugitani is a Japanese-language publication (Ex. 1003, 9–15) that was filed with an English-language translation (*id.* at 2–8) and a declaration attesting to the accuracy of the translation (*id.* at 1). Our citations to Sugitani herein refer to the translation.

Japanese Patent Application Publication No. 2001-103366, published Apr. 13, 2001 (Ex. 1004, “Kubo”);²

Japanese Patent Application Publication No. 2003-121913, published Apr. 23, 2003 (Ex. 1005, “Misawa”);³

U.S. Patent No. 6,369,954 B1, PCT filed Oct. 7, 1998, issued April 9, 2002 (Ex. 1006, “Berge”);

Japanese Patent Application Publication No. 2003-319239, published Nov. 7, 2003 (Ex. 1007, “Shibata”);⁴ and

U.S. Patent Application Publication No. 2003/0174234 A1, filed Apr. 13, 2001, published Sept. 18, 2003 (Ex. 1008, “Kondo”).

F. The Asserted Grounds

Petitioner challenges claims 1–25 of the ’030 patent based on the following grounds (Pet. 6–7):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–9, 11–21, 23, 24	103(a) ⁵	Sugitani, Kubo

² Kubo is a Japanese-language publication (Ex. 1004, 20–37) that was filed with an English-language translation (*id.* at 2–19) and a declaration attesting to the accuracy of the translation (*id.* at 1). Our citations to Kubo herein refer to the translation.

³ Misawa is a Japanese-language publication (Ex. 1005, 18–32) that was filed with an English-language translation (*id.* at 2–17) and a declaration attesting to the accuracy of the translation (*id.* at 1). Our citations to Misawa herein refer to the translation.

⁴ Shibata is a Japanese-language publication (Ex. 1007, 10–17) that was filed with an English-language translation (*id.* at 2–9) and a declaration attesting to the accuracy of the translation (*id.* at 1). Our citations to Shibata herein refer to the translation.

⁵ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the ’030 patent claims priority to an application filed before March 16, 2013 (the

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
9, 23	103(a)	Sugitani, Kubo, Misawa
10, 25	103(a)	Sugitani, Kubo, Berge
1–5, 7–9, 15, 16, 18–24	103(a)	Shibata, Kondo
10, 25	103(a)	Shibata, Kondo, Berge
6, 11–14, 17	103(a)	Shibata, Kondo, Kubo

II. ANALYSIS

We now consider Petitioner’s asserted grounds and Patent Owner’s arguments to determine whether Petitioner has met the “reasonable likelihood” standard for institution under 35 U.S.C. § 314(a).

A. *Legal Standards*

A claim is unpatentable under 35 U.S.C. § 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. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007).

The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary

effective date of the relevant amendments), the pre-AIA versions of §§ 102 and 103 apply.

considerations.⁶ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be “considered together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Dr. Lebby, Petitioner contends a person of ordinary skill in the art “would have had a bachelor’s degree in electrical engineering, physics, or computer science, or an equivalent degree, and two to three years of experience in the field of optical engineering.” Pet. 7 (citing Ex. 1002 ¶ 40). Patent Owner does not dispute Petitioner’s proposed level of ordinary skill in the art at this time. Prelim. Resp. 1.

For purposes of this Decision, we adopt Petitioner’s definition of the level of ordinary skill in the art. On the present record, we are satisfied that this definition comports with the level of skill necessary to understand and implement the teachings of the ’030 patent and the asserted prior art.

C. Claim Interpretation

In an *inter partes* review, 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), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

⁶ The present record does not include any evidence of secondary considerations of nonobviousness.

37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary 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, 1313 (Fed. Cir. 2005) (en banc). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Petitioner (*see* Pet. 19–21) and Patent Owner (*see* Prelim. Resp. 6–11) put forth arguments regarding the construction of certain terms of the challenged claims. For purposes of this Decision, we determine that no aspects of the challenged claims require explicit construction. *See, e.g., Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Obviousness Ground Based on Sugitani and Kubo

Petitioner contends the subject matter of claims 1–9, 11–21, 23, and 24 would have been obvious over the combination of Sugitani and Kubo. Pet. 26–28, 39–58. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 13–20, 24–28, 32, 34–37, 46–49.

1. *Sugitani*

Sugitani is a Japanese patent application publication directed to “a camera capable of focusing on obliquely arranged objects such that all the objects are in focus, without a need of tilting.” Ex. 1003 ¶ 1. Figure 2 of Sugitani is reproduced below.

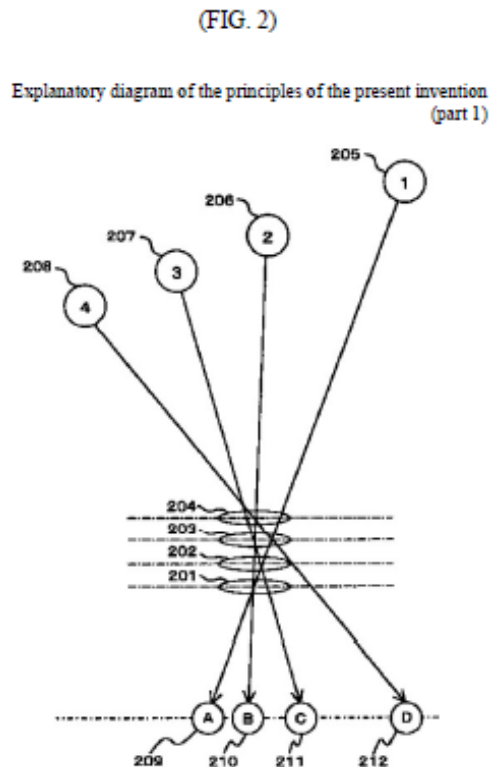


Figure 2 illustrates a camera where the distance between the lens and the exposure surface is changed to bring obliquely arranged objects into focus. Ex. 1003 ¶¶ 13–14. When exposing object 205, the lens is placed at position 201, and the image is formed at position 209. *Id.* ¶ 14. When exposing the object 206, the lens is advanced to position 202, and the image is formed at position 210. *Id.* For objects 207, 208, the lens position is then similarly moved to positions 203, 204, and an image is formed at positions 211, 212, respectively. *Id.* By moving the lens in this manner,

obliquely arranged objects 205–208 all come into focus while the lens and exposure surface remain parallel. *Id.* ¶¶ 14–15.

Figure 3 of Sugitani is reproduced below.

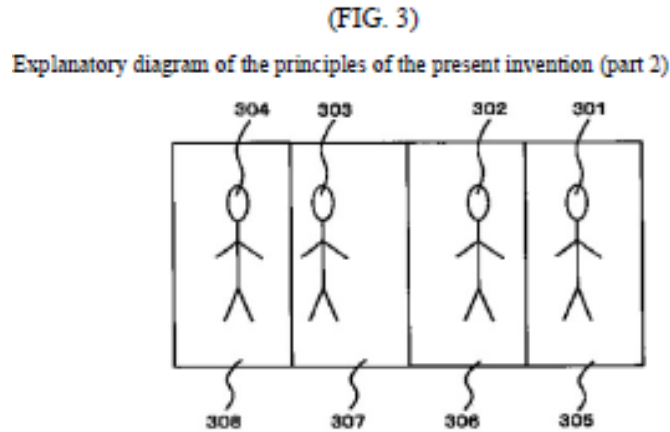


Figure 3 illustrates focusing for obliquely arranged people from the standpoint of the exposure surface. Ex. 1003 ¶ 16. When capturing an image of person 301, distance measurement is performed on area 305 within the exposure surface and the lens is moved accordingly. *Id.* Subsequently, when capturing images of persons 302–304, distance measurement is performed on areas 306–308, respectively, and the lens is moved accordingly. *Id.* In this scenario, the exposure area needs to be limited every time when moving the lens, and the lens needs to be moved continuously. *Id.*

Figure 4 of Sugitani is reproduced below.

(FIG. 4)
Explanatory diagram of the principles of the present invention (part 3)

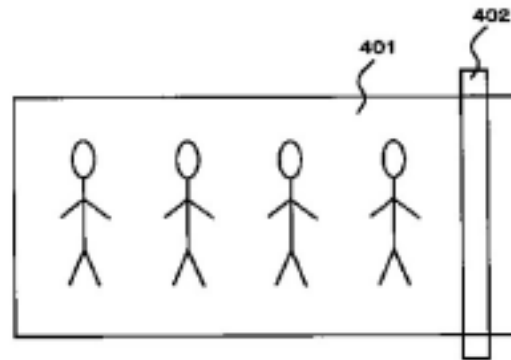


Figure 4 illustrates an embodiment where a distance measurement is taken for each area to be exposed, and the lens is moved based on the result of the distance measurement. Ex. 1003 ¶ 17. Slit 402 is moved across exposure surface 401 in a left-right direction. *Id.* A distance measurement is performed on the object field corresponding to the area of slit 402, and the lens is moved based on the result of the distance measurement to achieve focus while slit 402 is exposed. *Id.* Continuously moving slit 402 makes it possible to take a photograph such that the entire surface of exposure surface 401 is in focus. *Id.*

2. *Kubo*

Kubo is a Japanese patent application publication directed to “reduc[ing] image blur of photographic images during movement of photographic objects.” Ex. 1004, Abstr. Kubo describes a camera that evaluates the degree of correlation pertaining to the movement of a photographic object in two photographic images. *Id.* ¶ 6. Based on the evaluation, “an appropriate exposure time (shutter speed) is automatically set for the main exposure according to the magnitude (speed) of movement

of the photographic object, thereby maximally reducing blur of the photographic image due to movement of the photographic object.” *Id.*

Kubo describes several “programs” for setting exposure time based on the degree of correlation and object brightness: (1) “a standard program line for setting an exposure time and aperture value on the basis of photographic object brightness”; (2) for a low degree of correlation/large movement, “a speed priority program line for setting a shorter exposure time compared to the standard program line”; and (3) for a high degree of correlation/little to no movement, a “depth priority program line . . . for setting a larger aperture value than the standard program line, thus enabling a greater depth of field and allowing focusing on multiple photographic objects within the angle of view.” *Id.* ¶¶ 11–12.

Figure 3 of Kubo is reproduced below.

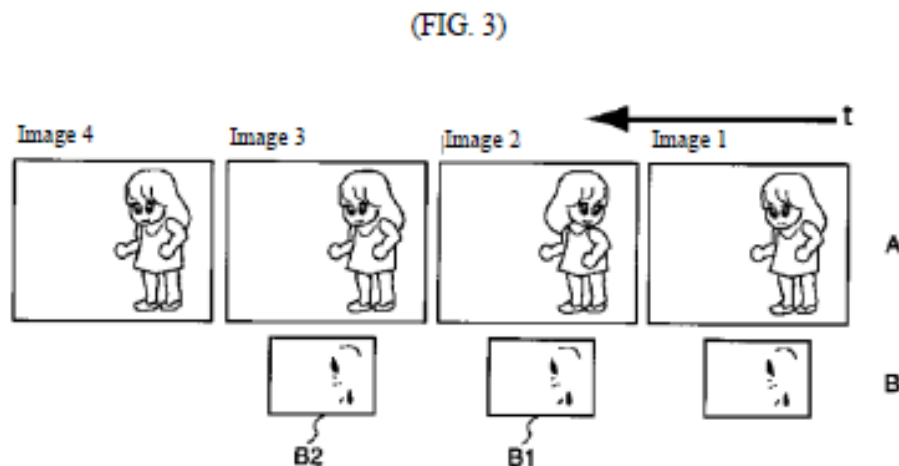


Figure 3 depicts photographic images of a photographic object and non-correlating portion data where there is relatively small movement of the photographic object. Ex. 1004 ¶ 38. In Figure 3A, frame images are photographed at a predetermined frequency. *Id.* The differences between two images are taken to obtain the non-correlating portion data, as shown in Figure 3B. *Id.* Thus, for example, the difference between images 2 and 1 is

taken to obtain non-correlating portion data B1, which is shown in black. *Id.* In light of the relatively low area ratio of the non-correlating portion, the standard program or the depth priority program is used depending on the brightness of the photographic object. *Id.* ¶ 38, Table 1.

Figure 4 of Kubo is reproduced below.

(FIG. 4)

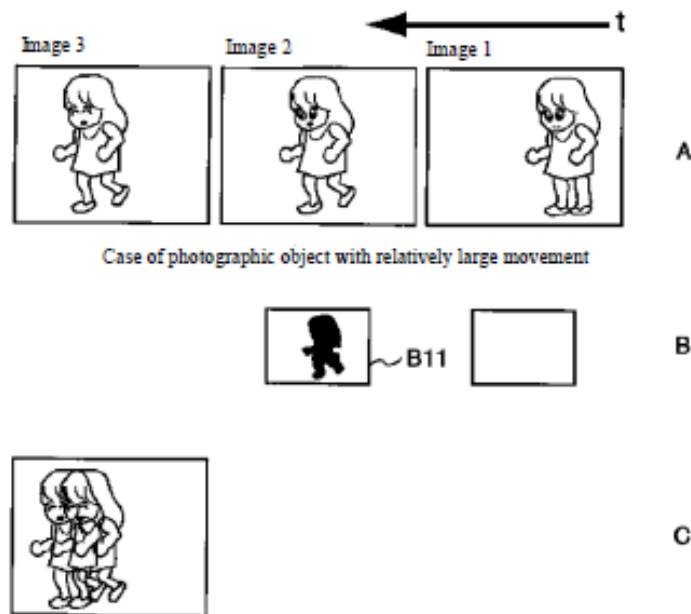


Figure 4 depicts photographic images of a photographic object and non-correlating portion data where there is relatively large movement. Ex. 1004 ¶ 39. The difference between images 2 and 1 is taken to obtain non-correlating portion data B11. *Id.* In light of the relatively high area ratio of the non-correlating portion, the standard program or the speed priority program is used depending on the percentage of non-correlating area and the brightness of the photographic object. *Id.* ¶¶ 39–42, Table 1.

3. *Claim 1*

Claim 1 recites “[a] method.” Ex. 1001, 14:2. Petitioner contends the preamble should not be limiting but nonetheless cites Sugitani for teaching a method. Pet. 39 (citing Ex. 1003 ¶¶ 4–5, 11–12, 23–26); *see also id.* at 21–23 (description of Sugitani).

Claim 1 further recites “manipulating an optical relationship between an optical lens and an image sensing surface so that the image sensing surface is spaced at different effective image distances from the lens.” Ex. 1001, 14:3–6. Petitioner cites Sugitani’s teaching of changing the distance between the lens and the exposure surface in a camera in order to focus on obliquely-arranged objects (e.g., people). Pet. 39 (citing Ex. 1003 ¶¶ 14–15, 30–32, Fig. 2).

Claim 1 further recites “exposing different portions of the image sensing surface synchronous with manipulating the optical relationship by adaptively exposing said portions for different exposure periods based on detected movement of at least two objects.” Ex. 1001, 14:7–11. Petitioner cites Sugitani’s Figures 2–4 and the related teaching of moving slit 402 in a left-right direction to separately expose the sensor area corresponding to different sub-regions 305–308, while the lens is moved to acquire proper focus for the person in each sub-region. Pet. 40 (citing Ex. 1003 ¶¶ 14–17, Figs. 2–4). Petitioner acknowledges that Sugitani does not provide detail regarding how the exposure for each sub-region is determined, but Petitioner contends an ordinarily skilled artisan would have been “motivated to apply existing image exposure techniques to each sub-region, as it was well-known in the art to consider the movement of an object when selecting exposure characteristics.” *Id.* at 41 (citing Ex. 1002 ¶¶ 158–159).

Thus, Petitioner cites Kubo's teaching of setting exposure time based on detected movement such that a small degree of movement results in a longer exposure, whereas a large degree of movement results in a shorter exposure. Pet. 42 (citing Ex. 1004 ¶¶ 38–40). Petitioner states that “*Sugitani* teaches exposing each of the objects in its image field in sub-exposure regions with separate focus to achieve a superior overall image,” so Petitioner contends that an ordinarily skilled artisan would have “similarly appl[ied] *Kubo*’s exposure time calculation technique to each object’s sub-exposure.” *Id.* (citing Ex. 1002 ¶¶ 162–164). Referring to the four people depicted in *Sugitani*’s Figures 2–4, Petitioner contends that it would have been obvious to “calculate exposure based on the movement of each person independently, such that the motion and brightness of at least two objects (*i.e.*, each person) are considered as claimed.” *Id.* (citing Ex. 1004 ¶ 165).

Further addressing its rationale for the combination, Petitioner notes that “*Sugitani* does not describe how to choose exposure settings for an image to account for object motion or different lighting conditions.” Pet. 26. As such, Petitioner contends that an ordinarily skilled artisan “building a complete camera system would have been motivated to add the enhanced exposure setting teachings of references like *Kubo* to *Sugitani*’s depth of field expansion to build a more fully-featured camera.” *Id.* (citing Ex. 1002 ¶ 115). According to Petitioner, this advantageously would have resulted in “a digital camera that adjusts exposure settings for both object motion and objects arranged at different distances (including shutter speed) to create an image where the focus distance is correctly determined for objects and motion blur is avoided, while limiting the tradeoffs otherwise required in

seeking wide depth of field.” *Id.* at 27 (citing Ex. 1002 ¶ 118); *see also id.* at 27–28 (citing Ex. 1002 ¶ 120) (further addressing alleged motivation). Petitioner contends that an ordinarily skilled artisan would have “readily and predictably made” the combination “because *Kubo* discloses the technology for distance measuring to determine focus, focusing processing, and exposure control, which the ’030 patent recites without detail.” *Id.* at 27 (citing Ex. 1002 ¶ 119; Ex. 1004 ¶¶ 43–46).

Patent Owner argues that “the Petition lacks evidentiary support and rational underpinning establishing precisely how Sugitani and Kubo could be *operatively* combined as proposed in view of their respective *incompatible* teachings.” Prelim. Resp. 14. In particular, Patent Owner notes Petitioner’s reliance on Sugitani’s slit 402 moving left to right over exposure surface 401 as depicted in Figure 4 of Sugitani. *Id.* (citing Pet. 23; Ex. 1003 ¶ 17, Fig. 4). Patent Owner further notes Petitioner’s reliance on Kubo’s automated exposure programming in conjunction with slit 402. *Id.* at 15 (citing Pet. 27–28). Patent Owner contends that the combination is flawed because the combined system could not detect a relatively large movement of an object from right to left (i.e., the same direction of movement as Sugitani’s slit 402) in exposure surface 401. *Id.* at 15–16 (showing Patent Owner’s conception of how Sugitani’s slit 402 would capture the “photographic object with relatively large movement” in Kubo’s Figure 4). Patent Owner explains that “the gradual movement of Sugitani’s slit 402 (e.g., from left to right), independent of any object movement, may result in slit 402 never aligning with the present position of a moving object.” *Id.* at 16.

Patent Owner also notes that, in Kubo, full-frame images are compared in order to evaluate the movement of objects in the image frame. Prelim. Resp. 18 (citing Ex. 1004 ¶¶ 7, 30, 36). In light of this, Patent Owner argues that “the Petition lacks any explanation of how Kubo’s full-frame scheme, upon which its software programming is based, can possibly be combined with Sugitani’s slit-based scheme, which continually relies on an ever-present mechanical slit 402 to selectively expose one small sliver of the surface area 401 at a time.” *Id.* Patent Owner also notes that Sugitani’s system cannot capture a full-frame image until slit 402 is sequentially driven across exposure surface 401. *Id.* As such, Patent Owner argues that “once surface area 401 has already been fully exposed—*without the claimed adaptation*—it would be too late to adapt different exposure periods for different portions based on the detected movement of two objects.” *Id.*

We agree with Patent Owner that Petitioner has not provided sufficient details about how its proposed combination would work. Petitioner’s combination relies specifically on Sugitani’s slit 402 moving “in a left-right direction to expose the sensor area corresponding to the different sub-regions, while the lens is moved to acquire proper focus for the person in each sub-region.” Pet. 40 (citing Ex. 1003 ¶¶ 15–17). Petitioner contends this results in “adaptively exposing different portions” of the image sensor “for different exposure periods.” *Id.* To this moving slit arrangement, Petitioner purports to add “*Kubo’s* automated exposure systems to program the camera to expose each object while accounting for its movement.” *Id.* at 41 (citing Ex. 1002 ¶¶ 162–165).

Yet, as noted by Patent Owner (Prelim. Resp. 18), Kubo’s motion detection scheme compares two successive full-frame images in order to

detect motion. Ex. 1004 ¶¶ 7 (“[E]valuation of the degree of correlation becomes possible on the basis of the entire photographic object image (i.e. the frame image”), 30 (“The threshold value comparison unit 973 compares the level value of the non-correlating portion (differing portion) between the frame images [T]he level data of the previous frame image is subtracted from the level data of the current frame image.”). Petitioner fails to explain how full-frame data for Kubo’s image comparison would be obtained where only portions of Sugitani’s image sensor 401 are exposed by slit 402.

In addition, even if we were to assume that a full frame of data ultimately obtained with Sugitani’s moving slit 402 and image sensor 401 is used in Kubo’s motion comparison, the process of moving slit 402 over image sensor 401 occurs over a time period. This means that different portions within a single image frame in Sugitani are captured across a range of time. Petitioner admits as much when it states that “different portions” of Sugitani’s image sensor are exposed “for different exposure periods.” Pet. 40. Yet Petitioner does not explain how this complication might be overcome in the combined Sugitani–Kubo system for purposes of correlating images and detecting motion, because Kubo’s system correlates full-frame images that each represent an instant in time. *See* Ex. 1004 ¶ 5 (stating that images for motion correlation are captured “at least two times prior to the main exposure instruction”). Moreover, we agree with Patent Owner that once the entirety of Sugitani’s image sensor 401 has been exposed by slit 402, “it would be too late to adapt different exposure periods for different portions based on the detected movement of two objects,” as claimed. Prelim. Resp. 18. Petitioner makes no effort to explain the timing

interplay between Sugitani’s slit-based image capture and Kubo’s motion detection scheme in a way that sufficiently shows the “adaptively exposing” limitation.⁷

For these reasons, we find Petitioner’s rationale for combining Kubo with Sugitani to be insufficiently developed to support its obviousness contentions for claim 1. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claim 1 would have been obvious over the combination of Sugitani and Kubo.

4. *Other Claims*

Petitioner’s obviousness contentions for independent claims 3, 4, 9, 11, and 15 rely on the same deficient rationale for combining Kubo with Sugitani as discussed with respect to claim 1.⁸ *See, e.g.*, Pet. 26–27. Thus,

⁷ We acknowledge that Petitioner’s obviousness contentions are supported at this stage by Dr. Lebby’s uncontested testimony, but we find Petitioner’s rationale for combining Sugitani and Kubo deficient even in light of his testimony.

⁸ We acknowledge that Petitioner’s obviousness contentions for certain of these claims rely on Kubo sparingly, if at all. *See* Prelim. Resp. 32, 34, 48 (arguing for claims 4, 9, and 15 that “the Petition fails to articulate what alleged teaching of Kubo, if any, is relied upon in combination with Sugitani”). Notwithstanding, “the petitioner’s petition . . . guide[s] the life of the litigation.” *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1351 (2018). We cannot deviate from the grounds in the petition and raise our own obviousness theory, e.g., obviousness based on Sugitani alone. *See Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018). Thus, even where Kubo might not be necessary for teaching the limitations of certain claims, we evaluate Petitioner’s obviousness ground as it has been presented in the Petition, which necessarily includes Petitioner’s rationale for combining Kubo with Sugitani.

we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claims 3, 4, 9, 11, and 15 would have been obvious over the combination of Sugitani and Kubo.

Petitioner's analysis for dependent claims 2, 5–8, 12–14, 16–21, 23, and 24 likewise relies on the same deficient rationale for combining Kubo with Sugitani as discussed with respect to claim 1. Moreover, Petitioner's analysis for these dependent claims does not cure the deficiency in Petitioner's rationale for the combination. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claims 2, 5–8, 12–14, 16–21, 23, and 24 would have been obvious over the combination of Sugitani and Kubo.

E. Obviousness Ground Based on Sugitani, Kubo, and Misawa

Petitioner contends the subject matter of claims 9 and 23 would have been obvious over the combination of Sugitani, Kubo, and Misawa. Pet. 26–29, 58–60. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 37–38

1. Misawa

Misawa is a Japanese patent application publication directed to “a lens barrel, a lens-interchangeable camera, and a program capable of correcting the curvature of field aberration of an imaging lens provided on a lens barrel.” Ex. 1005 ¶ 1.

2. *Claims 9 and 23*

Petitioner's analysis for claims 9 and 23 relies on the same deficient rationale for combining Kubo with Sugitani as discussed with respect to claim 1 in the Sugitani–Kubo ground. *See* Pet. 26–29. Moreover, Petitioner's analysis for claims 9 and 23 does not cure the deficiency in Petitioner's rationale for the combination. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claims 9 and 23 would have been obvious over the combination of Sugitani, Kubo, and Misawa.

F. *Obviousness Ground Based on Sugitani, Kubo, and Berge*

Petitioner contends the subject matter of claims 10 and 25 would have been obvious over the combination of Sugitani, Kubo, and Berge. Pet. 26–28, 30, 61–62. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 42–43.

1. *Berge*

Berge is a U.S. patent directed to “liquid lenses having a variable electrically controlled focus.” Ex. 1006, 1:6–8.

2. *Claims 10 and 25*

Petitioner's analysis for claims 10 and 25 relies on the same deficient rationale for combining Kubo with Sugitani as discussed with respect to claim 1 in the Sugitani–Kubo ground. *See* Pet. 26–28, 30. Moreover, Petitioner's analysis for claims 10 and 25 does not cure the deficiency in Petitioner's rationale for the combination. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in

showing that the subject matter of claims 10 and 25 would have been obvious over the combination of Sugitani, Kubo, and Berge.

G. Obviousness Ground Based on Shibata and Kondo

Petitioner contends the subject matter of claims 1–5, 7–9, 15, 16, and 18–24 would have been obvious over the combination of Shibata and Kondo. Pet. 36–37, 63–67. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 23–25.

1. Shibata

Shibata is a Japanese patent application publication directed to “an imaging device that is able to yield an image in which the entirety of the subject is in focus, without requiring multiple photographs or high-capacity image memory.” Ex. 1007, Abstr. Figure 1 of Shibata is reproduced below.

(FIG. 1)

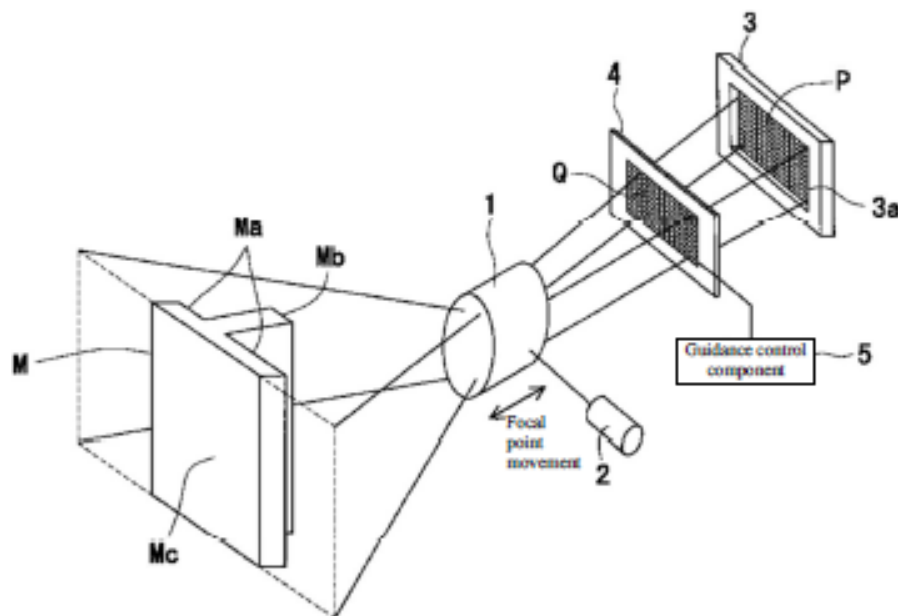


Figure 1 is a perspective view of the main components of an imaging device.

Id. ¶ 15. The imaging device includes photographic lens 1, focal point control component 2, imaging element 3 provided along the optical path of photographic lens 1, liquid crystal shutter 4 comprising an optical image guide interposed between photographic lens 1 and imaging element 3, and guidance control component 5. *Id.* ¶ 16. Photographic lens 1 captures and forms an optical image of subject M on imaging element 3, which can be a charge-coupled device (CCD). *Id.* ¶¶ 17, 19. Focal point control component 2 variably controls the focal point position of photographic lens 1 within a moveable range. *Id.* ¶ 18. Liquid crystal shutter 4 guides or obstructs an optical image from photographic lens 1 to each pixel of CCD 3. *Id.* ¶ 19. Shutter 4 has $m \times n$ shutter elements Q arrayed in a matrix of m rows and n columns corresponding to the matrix of pixels P on light-receiving plane 3a of CCD 3. *Id.* ¶¶ 19–20.

Figure 5 of Shibata is reproduced below.

(FIG. 5)

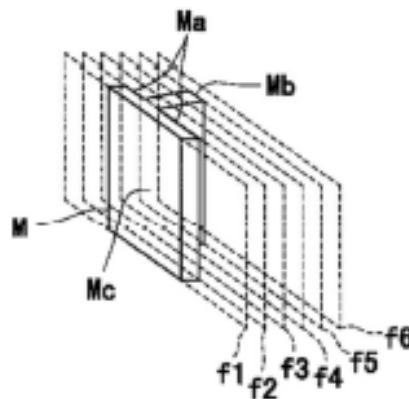


Figure 5 illustrates the movement of the focal point position of lens 1 with respect to subject M. Ex. 1007 ¶ 39. At focal point position f1–f2, lens 1 is

focused on rear face Mc of the basal part of subject M; at focal point position f_2 – f_3 , lens 1 is focused on front face Ma of the basal part of subject M; at focal point position f_3 – f_5 , lens 1 is focused on neither of the faces of subject M; and at focal point position f_5 – f_6 , lens 1 is focused on front face Mb of the projecting part of subject M. *Id.*

Figure 6 of Shibata is reproduced below.

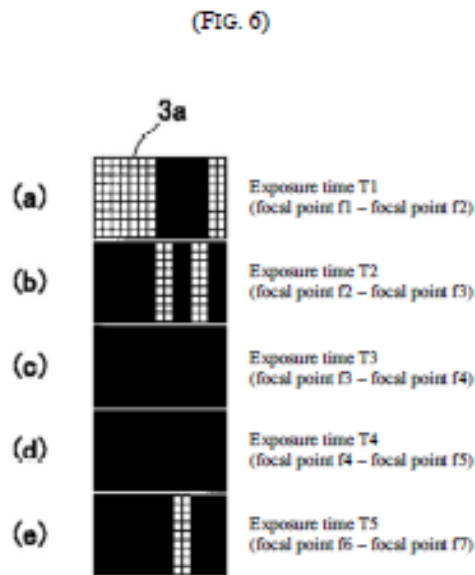


Figure 6 illustrates light receiving face 3a of CCD 3 at a number of different exposure times and focal point positions, with white areas indicating pixels that are being exposed because they are in focus and black areas indicating pixels that are not being exposed because they are out-of-focus. Ex. 1007 ¶ 48. For example, when the focal point position is at f_1 – f_2 , the focus is on rear face Mc. *Id.* When the focal point position reaches f_1 , shutter elements Q expose only those pixels corresponding to the left and right sides of subject M (as shown in Figure 6(a)), and this exposure is continued for time T1. *Id.* When the focal point position is at f_2 – f_3 , the focus is on front face Ma. *Id.* ¶ 49. When the movement of the focal point position

progresses and reaches focal point position f_2 , shutter elements Q expose only those pixels corresponding to front face Ma (as shown in Figure 6(b)), and this exposure is continued for time T2. *Id.*

2. *Kondo*

Kondo is a U.S. patent application directed to obtaining images of an “object of high contrast without losing its detail, e.g., in [a] digital video camera, etc.” Ex. 1008 ¶ 1. Figure 4 of Kondo is reproduced below.

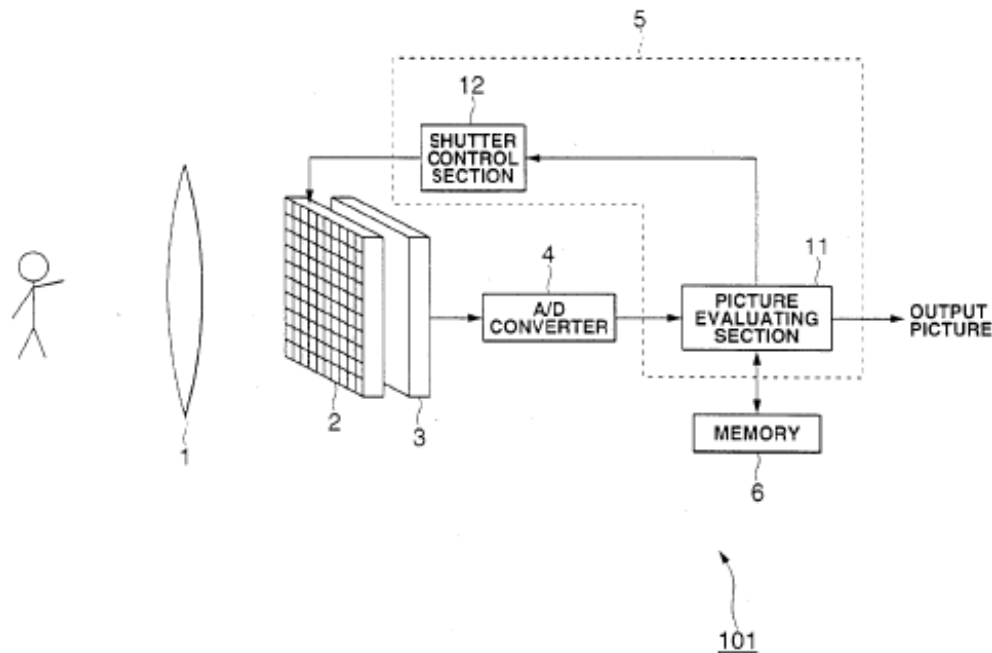


FIG.4

Figure 4 is a block diagram of controller 5 within digital video camera 101. *Id.* ¶¶ 26, 54. Controller 5 includes shutter control section 12 and picture evaluating section 11. *Id.* ¶ 54. Controller 5 controls shutter 2 such that it controls the extent to which light from lens 1 exposes particular pixels of CCD (Charge Coupled Device) 3. *Id.* ¶ 44. Specifically, picture evaluating section 11 evaluates pixel values from CCD 3 (via A/D converter 4) and sets per-pixel exposure times for shutter 2 based on that evaluation. *Id.* ¶¶ 55–

56. Shutter control section 12 then controls shutter 2 in accordance with the per-pixel exposure times set at picture evaluating section 11. *Id.* ¶ 56.

Memory 6 temporarily stores data necessary for processing in controller 5.

Id. ¶ 49.

Figure 5 of Kondo is reproduced below.

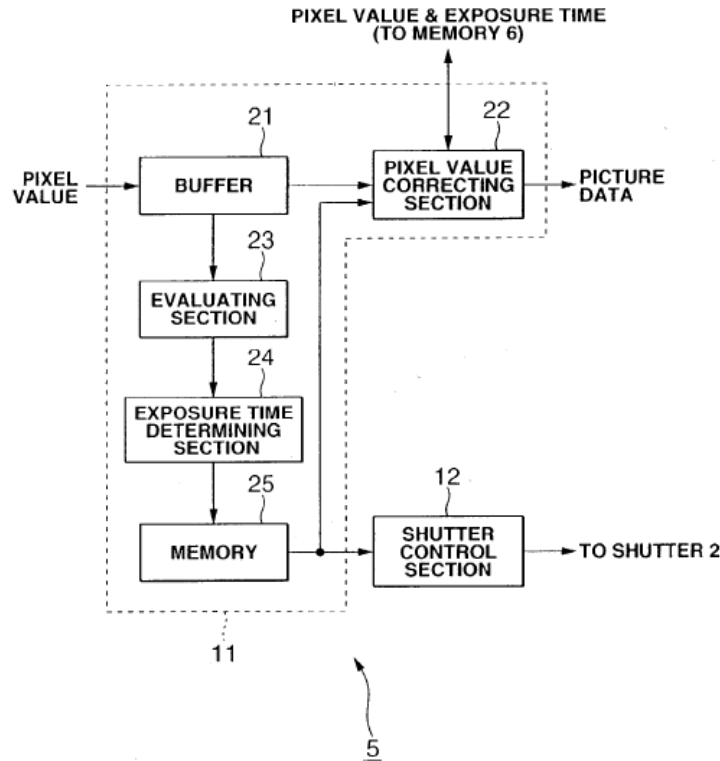


FIG.5

Figure 5 is a block diagram of picture evaluating section 11. *Id.* ¶¶ 27, 57.

Pixel values from CCD 3 are received at buffer 21, which temporarily stores the pixel values. *Id.* ¶ 57. Evaluating section 23 evaluates each pixel value stored in buffer 21 by, for example, determining whether the pixel value is above an upper limit or below a lower limit, or determining whether the pixel corresponds to a moving object. *Id.* ¶ 59. Evaluating section 23 then delivers its evaluation result to exposure time determining section 24. *Id.*

Exposure time determining section 24 adjusts the exposure time for a particular pixel to fix under- or over-exposure. *Id.* Exposure time determining section 24 also shortens exposure time for pixels associated with blurring and large movement. *Id.*

Figure 6 of Kondo is reproduced below.

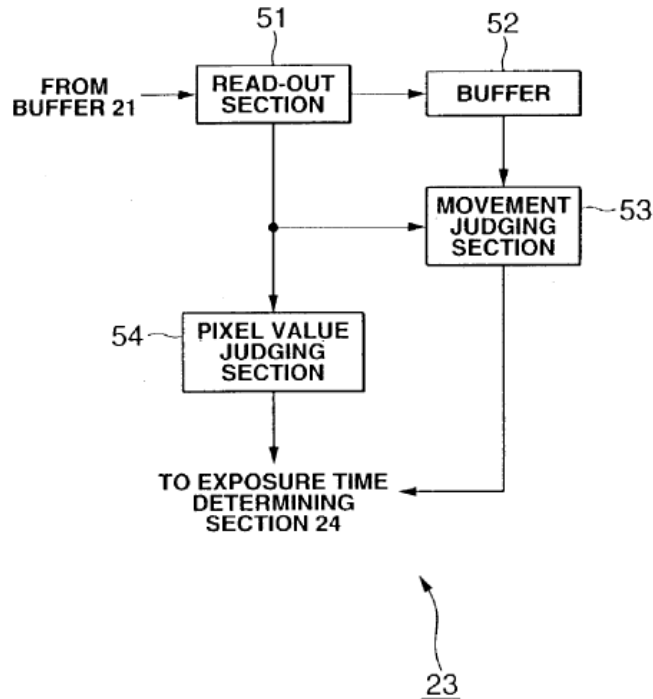


FIG.6

Figure 6 is a block diagram of evaluating section 23. *Id.* ¶¶ 28, 62. Read-out section 51 reads out values of each pixel stored in buffer 21 and delivers the pixel values to buffer 52, which can store multiple image frames. *Id.* ¶¶ 62–63. Movement judging section 53 receives groups of pixels (e.g., 3×3 pixels) for a preceding frame from buffer 52 and corresponding groups of pixels for a current frame from read-out section 51. *Id.* ¶ 64. Movement judging section 53 then determines the magnitude of movement based on a

difference calculation between the corresponding groups of pixels and outputs the result to exposure time determining section 24. *Id.*

3. *Claim 1*

Claim 1 recites “[a] method.” Ex. 1001, 14:2. Petitioner contends the preamble should not be limiting but nonetheless cites Shibata for teaching a method. Pet. 63 (citing Ex. 1007 ¶ 25); *see also id.* at 31–34 (description of Shibata).

Claim 1 further recites “manipulating an optical relationship between an optical lens and an image sensing surface so that the image sensing surface is spaced at different effective image distances from the lens.” Ex. 1001, 14:3–6. Petitioner cites Shibata’s focal point control component 2 adjusting the position of lens 1 in Shibata’s digital camera such that “the focal point is serially repositioned to obtain focus on the entire scene during image capture.” Pet. 63 (citing Ex. 1007 ¶¶ 17–18, 46, Fig. 1.).

Claim 1 further recites “exposing different portions of the image sensing surface synchronous with manipulating the optical relationship by adaptively exposing said portions for different exposure periods based on detected movement of at least two objects.” Ex. 1001, 14:7–11. Petitioner cites Shibata’s shutter element Q, including liquid crystal shutter 4, that obstructs exposure to pixels on Shibata’s CCD such that “[s]hutter element Q only exposes those pixels that are in focus based on the current position of lens 1.” Pet. 64 (citing Ex. 1007 ¶¶ 48–51, Fig. 6). Petitioner further cites Shibata’s teaching of calibrating the duration of each sub-exposure “based on the illuminance distribution of the object detected during a preliminary analysis.” *Id.* (citing Ex. 1007 ¶¶ 13, 32, 42, 55).

Notwithstanding, Petitioner acknowledges that “*Shibata* does not expressly disclose calibrating the exposure period based on the detected movement of two objects.” *Id.* As such, Petitioner contends an ordinarily skilled artisan would have been “motivated to apply existing image exposure calculation techniques to each sub-image as it was well-known to consider the movement of an object selecting exposure characteristics.” *Id.* (citing Ex. 1002 ¶ 287).

Accordingly, Petitioner cites Kondo’s teaching of analyzing objects across frames “to detect movement and calibrate the exposure duration to, *e.g.*, reduce duration in situations where large amounts of movement are detected.” Pet. 65 (citing Ex. 1008 ¶¶ 59, 64). Petitioner contends that an ordinarily skilled artisan “seeking to implement *Shibata* in a camera would [have] be[en] motivated to incorporate exposure systems like *Kondo*’s that automatically account for object movement.” *Id.*; *see also* Ex. 1002 ¶ 291 (same statement from Dr. Lebby). Petitioner also contends that the combination of *Shibata* and *Kondo* would have been “readily implemented” because both references “disclose liquid crystal shutters that can be controlled at the pixel level to selectively expose only discrete portions of the sensor.” Pet. 66 (citing Ex. 1007 ¶¶ 44–47, Fig. 6; Ex. 1008 ¶¶ 51–53, Fig. 3); *see also* Ex. 1002 ¶ 296 (same statement from Dr. Lebby); Pet. 37 (similar argument). According to Petitioner, an ordinarily skilled artisan would have understood “that the use of the same hardware for a similar purpose is predictable and confirms that *Kondo* can be successfully combined with *Shibata* without requiring undue experimentation.” Pet. 37 (citing Ex. 1002 ¶¶ 136–138).

Further addressing its rationale for the combination, Petitioner contends that Shibata and Kondo describe complimentary systems insofar as “*Shibata* describes how to change focus during a single exposure frame to make sure all areas of the image are in focus and enhance depth of field, and *Kondo* describes how to change exposure settings across the frame within a single exposure to enhance dynamic range.” Pet. 36 (citing Ex. 1002 ¶¶ 133–135). Petitioner contends that an ordinarily skilled artisan would have looked to both references “because each addresses similar problems: maximizing the use of memory to avoid creating composite images from a series of planar images.” *Id.* (citing Ex. 1007 ¶¶ 4, 6; Ex. 1008 ¶ 49); *see also* Ex. 1002 ¶ 138 (same statement from Dr. Lebby).

Patent Owner disputes Petitioner’s rationale for combining Kondo with Shibata. On one hand, Patent Owner highlights Petitioner’s acknowledgement that, in Kondo, “objects are analyzed across frames to detect movement and calibrate the exposure duration.” Prelim. Resp. 21 (quoting Pet. 65); *see also id.* at 23 (partially quoting same). Accordingly, Patent Owner contends that Petitioner’s cited portions of Kondo “require[] buffering *multiple full-frame* images in memory and performing analysis thereon when generating a single photograph.” *Id.* at 23. In support of this contention, Patent Owner cites Kondo’s teaching of comparing “a current *frame* buffered in memory and a preceding *frame* also buffered in memory.” *Id.* (citing Ex. 1008 ¶ 64).

On the other hand, Patent Owner notes that “a primary purpose” of the disclosure in Shibata is “‘to eliminate the need’ to store multiple full-frame images in memory and perform processing thereon when generating a single photograph.” *Id.* at 22 (quoting Ex. 1007 ¶ 12) (citing Ex. 1007 ¶¶ 4–6).

According to Patent Owner, “Shibata disparages the multi-frame approach, in part, as requiring additional processing and very high-capacity image memory.” *Id.* at 22–23 (internal quotations omitted) (citing Ex. 1007 ¶¶ 4–6, 12). As such, Patent Owner argues that Petitioner’s proposed modification based on Kondo is at odds with the purpose of Shibata’s disclosed system. *Id.* at 23. Patent Owner also argues that an ordinarily skilled artisan would have been “led away from the proposed modification.” *Id.*; *see also id.* at 22 (citing *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1069 (Fed. Cir. 2018)).

We agree with Patent Owner that Shibata’s stated purpose undermines Petitioner’s asserted rationale for combining Kondo with Shibata. In particular, Shibata states that a problem with the prior art is the need “to take a plurality of photographs in order to synthesize an image,” including the time spent taking and processing photographs to produce a final synthesized image. Ex. 1007 ¶ 4. Accordingly, Shibata states that its objective is “to provide an imaging device that is able to yield an image in which the entirety of the subject is in focus, *without requiring multiple photographs or high-capacity image memory.*” *Id.* ¶ 6 (emphasis added). Against this backdrop, Petitioner contends an ordinarily skilled artisan would have been motivated to incorporate Kondo’s motion analysis *across frames* to calibrate Shibata’s exposure duration. Pet. 65 (citing Ex. 1008 ¶¶ 59, 64); *see also* Ex. 1002 ¶¶ 291–292 (similar testimony from Dr. Lebby). In particular, Kondo’s movement judging section compares pixels from a current frame and a previous frame that are read out from buffers. Ex. 1008 ¶¶ 59, 63–64. Yet Petitioner fails to resolve the tension between Shibata’s objective to avoid storing images and Kondo’s motion

analysis that requires buffered image data from at least two frames. In the absence of any attempt by Petitioner to reconcile these divergent teachings in Shibata and Kondo, we find Petitioner's stated rationale for the combination to be flawed.

We also disagree with Petitioner's contention that an ordinarily skilled artisan would have looked at both Shibata and Kondo "because each addresses similar problems: maximizing the use of memory to avoid creating composite images from a series of planar images." Pet. 37 (citing Ex. 1007 ¶¶ 4, 6; Ex. 1008 ¶ 49); *see also* Ex. 1002 ¶ 138 (Dr. Lebby stating the same). This contention is misstated at best and incorrect at worst. First, Shibata seeks to eliminate—i.e., *minimize*—memory use insofar as its disclosed imaging device does not send multiple images to memory for later synthesis into a final image. *See* Ex. 1007 ¶¶ 4, 6. Second, Kondo may not call for creating composite images from a series of planar images, but it certainly teaches motion detection using a series of at least two planar images. *See* Ex. 1008 ¶ 64. In addition, the portion of Kondo that Petitioner cites says nothing about maximizing memory usage or creating composite images; rather, it only mentions how "memory 6 temporarily stores data necessary for processing," which reinforces that Kondo's system requires storage of planar images in order to detect motion. *Id.* ¶ 49. Thus, Petitioner's "similar problems" rationale does not square with the teachings Petitioner cites.

For these reasons, we find Petitioner's rationale for combining Kondo with Shibata to be fatally flawed. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the

subject matter of claim 1 would have been obvious over the combination of Shibata and Kondo.

4. *Other Claims*

Petitioner's obviousness contentions for independent claims 3, 4, 9, and 15 rely on the same deficient rationale for combining Kondo with Shibata as discussed with respect to claim 1.⁹ *See, e.g.*, Pet. 36–37. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claims 3, 4, 9, 11, and 15 would have been obvious over the combination of Shibata and Kondo.

Petitioner's analysis for dependent claims 2, 5, 7, 8, 16, and 18–24 likewise relies on the same deficient rationale for combining Kondo with Shibata as discussed with respect to claim 1. Moreover, Petitioner's analysis for these dependent claims does not cure the deficiency in Petitioner's rationale for the combination. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claims 2, 5, 7, 8, 16, and 18–24 would have been obvious over the combination of Shibata and Kondo.

⁹ We acknowledge that Petitioner's obviousness contentions for these claims rely on Kondo sparingly, if at all. *See* Prelim. Resp. 28, 33, 39, 47 (arguing for claims 3, 4, 9, and 15 that “the Petition fails to articulate what alleged teaching of Kondo, if any, is relied upon in combination” with Shibata). Notwithstanding, we evaluate Petitioner's obviousness ground as it has been presented in the Petition, which necessarily includes Petitioner's rationale for combining Kondo with Shibata. *See supra* note 8.

H. Obviousness Ground Based on Shibata, Kondo, and Berge

Petitioner contends the subject matter of claims 10 and 25 would have been obvious over the combination of Shibata, Kondo, and Berge. Pet. 36–38, 77–78. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 43–44.

Petitioner’s analysis for claims 10 and 25 relies on the same deficient rationale for combining Kondo with Shibata as discussed with respect to claim 1 in the Shibata–Kondo ground. *See* Pet. 36–38. Moreover, Petitioner’s analysis for claims 10 and 25 does not cure the deficiency in Petitioner’s rationale for the combination. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in showing that the subject matter of claims 10 and 25 would have been obvious over the combination of Shibata, Kondo, and Berge.

I. Obviousness Ground Based on Shibata, Kondo, and Kubo

Petitioner contends the subject matter of claims 6, 11–14, and 17 would have been obvious over the combination of Shibata, Kondo, and Kubo. Pet. 36–38, 79–84. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 44–46.

Petitioner’s analysis for claims 6, 11–14, and 17 relies on the same deficient rationale for combining Kondo with Shibata as discussed with respect to claim 1 in the Shibata–Kondo ground. *See* Pet. 36–38. Moreover, Petitioner’s analysis for claims 6, 11–14, and 17 does not cure the deficiency in Petitioner’s rationale for the combination. Thus, we determine that Petitioner has not established a reasonable likelihood that it would prevail in

showing that the subject matter of claims 6, 11–14, and 17 would have been obvious over the combination of Shibata, Kondo, and Kubo.

III. CONCLUSION

After considering the evidence and arguments presented in the current record, we determine that Petitioner has not demonstrated a reasonable likelihood that it would prevail with respect to at least one of the claims challenged in the Petition. Therefore, we do not institute an *inter partes* review on the asserted grounds as to any of the challenged claims.

IV. ORDER

Accordingly, it is

ORDERED that the Petition is denied as to all challenged claims, and no *inter partes* review is instituted.

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