**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| In re Patent of: | Takahiro Nakano, et al. | Attorney Docket No.:18768-0217IP5 |
| U.S. Patent No.: | 8,736,729 | |
| Issue Date: | May 27, 2014 | |
| Appl. Serial No.: | 13/681,495 | |
| Filing Date: | November 20, 2012 | |
| Title: | ELECTRIC CAMERA | |

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# PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT NO. 8,736,729 PURSUANT TO 35 U.S.C. §§311–319, 37 C.F.R. §42

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**EXHIBITS**

| | |
|---|---|
| LG-1001 | U.S. Patent No. 8,736,729 to Takahiro Nakano, et al. (“the ’729 Patent”) |
| LG-1002 | Excerpts from the Prosecution History of the ’729 Patent (“the Prosecution History”) |
| LG-1003 | Declaration and Curriculum Vitae of W. Leo Hoarty |
| LG-1004 | Complaint, *Maxell, Ltd. v. LG Electronics Inc. et al*, 5-23-cv-00152, E.D. Tex., filed December 29, 2023 |
| LG-1005 | U.S. Patent No. 5,444,482 (Misawa) |
| LG-1006 | U.S. Patent No. 6,292,218 (Parulski) |
| LG-1007 | U.S. Patent No. 6,963,361 (Kawahara) |
| LG-1008 | U.S. Patent No. 6,690,881 (Tomita) |
| LG-1009 | RESERVED |
| LG-1010 | Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) (“Director’s Guidance”) |
| LG-1011 | Federal Court Management Statistics - Profiles (June 30, 2024) |
| LG-1012 | Prosecution History of Reexamination Control No. 90/014,628 |

## LISTING OF CLAIMS

| **Claim 1** | |
|---|---|
| [1.pre] | A camera comprising: |
| [1.1] | an image sensing device having an array of pixels arranged vertically and horizontally in a grid pattern; |
| [1.2] | an image-instability detector, configured to detect an amount of image-instability of the camera; |
| [1.3] | a signal processing unit configured to form image signals with a predetermined view angle by using effective pixels of the image sensing device, and: |
| [1.4] | during monitoring in a static image mode, to form image signals with a first view angle by using a first effective set of pixels of the image sensing device, |
| [1.5] | during recording in the static image mode, to form image signals by using all effective pixels of the image sensing device, and |
| [1.6a] | during recording in a moving video mode, to form image signals with a second view angle, different from the first view angle, by using a second effective set of pixels which is a portion of the array of pixels of the image sensing device, and |
| [1.6b] | to change a position of the second effective set of pixels according to the amount of image-instability detected by the image-instability detector, in order to correct the image-instability; and |
| [1.7] | a display unit configured to display an image corresponding to the image signals formed by the signal processing unit. |
| **Claim 2** | |
| [2] | A camera according to the claim 1, wherein the first view angle is larger than the second view angle. |
| **Claim 3** | |

| | |
|---|---|
| [3.pre] | A method for operating a camera, the camera including an image sensing device having an array of pixels arranged vertically and horizontally in a grid pattern, a signal processing unit configured to form image signals at a predetermined view angle by using effective pixels of the image sensing device, a display unit configured to display an image corresponding to the image signals formed by the signal processing unit, and an image-instability detector configured to detect an amount of image-instability of the camera, the method for operating the camera comprising the steps of: |
| [3.1] | selecting between a static image mode and a moving video mode; and |
| [3.2] | selecting an operation from a list of operations, as follows: |
| [3.3] | when in the static image mode, selecting an operation from a list of operations including: a monitoring of an image in the static image mode, and a recording of an image in the static image mode, and |
| [3.4] | when in the moving video mode, selecting an operation from a list of operations including: a recording of an image in the moving video mode; |
| [3.5] | wherein when the selected operation is the monitoring of an image in the static image mode, the signal processing unit forms image signals with a first view angle, by using a first effective set of pixels of the image sensing device; |
| [3.6] | wherein when the selected operation is the recording of an image in the static image mode, the signal processing unit forms image signals by using all effective pixels of the image sensing device; and |
| [3.7a] | wherein when the selected operation is the recording of an image in the moving video mode, the signal processing unit forms image signals with a second view angle, different from the first view angle, by using a second effective set of pixels which is a portion of the array of pixels of the image sensing device, |
| [3.7b] | a position of the second effective set of pixels being changed according to the amount of image-instability detected by the image-instability detector, in order to correct the image-instability. |

| **Claim 4** | |
|---|---|
| [4] | A method for operating a camera of claim 3, wherein the first view angle is larger than the second view angle. |

# I. INTRODUCTION

LG Electronics, Inc. and LG Electronics USA, Inc. ("Petitioner" or collectively "LG") petitions for IPR of claims 1-4 ("the Challenged Claims") of U.S. Patent No. 8,736,729 ("the '729 Patent").

# II. REQUIREMENTS FOR IPR

## A. Grounds for Standing

Petitioner certifies the '729 Patent is available for IPR. This Petition is being filed within one year of service of a complaint against LG. Petitioner is not barred or estopped from requesting review of the Challenged Claims on the below-identified grounds.

## B. Challenge and Relief Requested

Petitioner requests IPR of the Challenged Claims on Grounds 1-3 below. Mr. W. Leo Hoarty provides supporting testimony in his Declaration. LG-1003.

| Ground | Claim(s) | Pre-AIA 35 U.S.C. §103 |
|---|---|---|
| 1 | 1-4 | Misawa in view of Parulski |
| 2 | 1-4 | Kawahara in view of Misawa and further in view of Parulski |
| 3 | 1-4 | Tomita in view of Kawahara and further in view of Parulski |

Applied references are prior art on the bases below:

| Reference | Filing Date | Publication Date | Basis |
|---|---|---|---|
| Misawa | 4/28/1994 | 8/22/1995 | §102(b) |
| Parulski | 7/16/1997 | 9/18/2001 | §102(e) |
| Kawahara | 2/22/1999 | 11/8/2005 | §102(e) |
| Tomita | 8/20/1999 | 2/10/2004 | §102(e) |

The ’729 Patent claims priority to U.S. application (09/520,836) filed 3/8/2000, and claims priority to JP Patent Application No. 2000-006064 filed 1/11/2000. LG-1001 code (30). Misawa published more than one year before the earliest claimed U.S. filing date of the ’729 Patent, and therefore qualifies as prior art under §102(b). Parulski, Kawahara, and Tomita have effective filing dates under §102(e) before 3/8/2000—presumed to be the date of the alleged invention[1]—

[1] In Reexamination Control No. 90/014,628, Patent Owner asserted a parent application, US Patent No. 8,339,493, was conceived 10/27/1999. LG-1012, 7-9, 33-37. Petitioner does not concede that Patent Owner properly established conception and diligence and reserves the right to challenge the date of invention determined in the reexamination proceeding. Nor does Petitioner concede that Patent Owner’s arguments in the reexamination apply to the ’729 Patent. Furthermore,

and therefore are prior art.

### C. Claim Construction

Petitioner submits the Challenged Claims do not require formal construction for the obviousness grounds in this Petition. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011). Petitioner may respond to any constructions Patent Owner raises or the Board adopts. *Parkervision, Inc. v. Vidal*, 88 F.4th 969, 980 (Fed. Cir. 2023); *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1383 (Fed. Cir. 2023).

### D. Level of Ordinary Skill in the Art

A person of ordinary skill in the art ("POSITA") relating to the '729 Patent as of the time of the alleged invention would have had at least a combination of (1) a Bachelor's Degree (or a similar Master's Degree, or higher degree) in computer science, electrical engineering, computer engineering, or a related field or equivalent work experience, and (2) one to two years of practical experience in the field of digital image processing, digital cameras, electronic imaging, or a related field. LG-1003, ¶24. Additional education or industry experience may compensate for a deficit in one of the other aspects of the requirements stated above. *Id.*

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Petitioner does not understand Patent Owner to have asserted an invention date prior to the effective filing dates of Parulski, Kawahara, and Tomita.

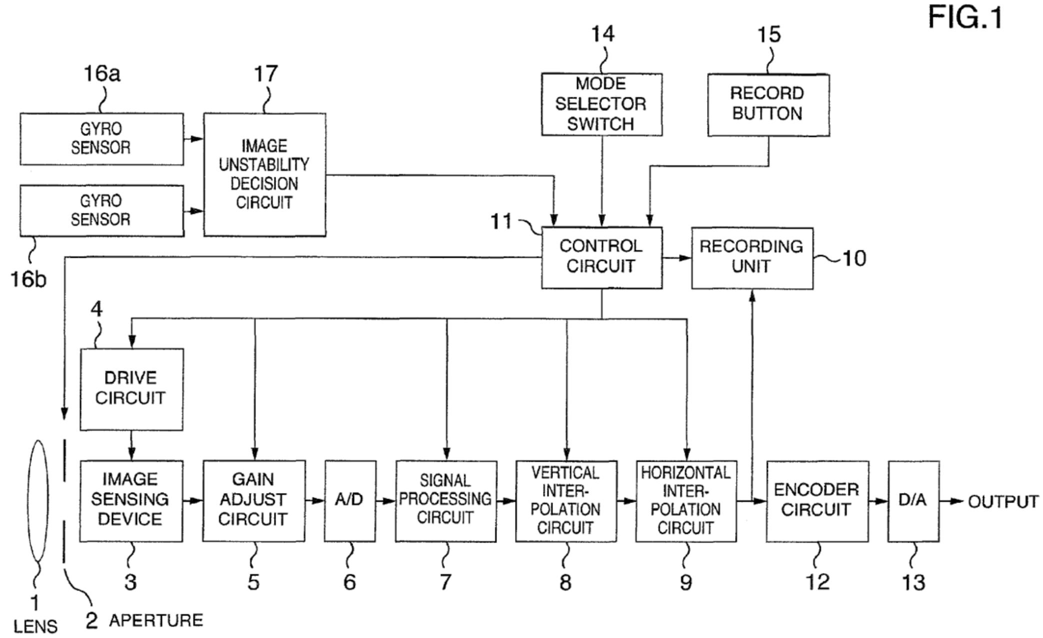
## III. THE '729 PATENT

### A. Technology Background and Admitted Prior Art

According to the '729 Patent, at the time of the alleged invention, electric cameras that use solid-state image sensors were available. *See* LG-1001, 1:25-31; LG-1003, ¶¶37-40. Such cameras included both (1) video cameras for taking moving images that also had still image taking functions and (2) digital still cameras for taking still images that also had moving image taking functions. LG-1001, 1:25-31. When photographing a still image, camera users would need to monitor the image, and thus the camera would have to generate signals that conform to a display. *Id.*, 2:7-11; *see also id.*, 2:28-34; LG-1003, ¶¶41-53. Moreover, the display used for monitoring the image would oftentimes have fewer effective scanning lines than the number of pixel rows of the image sensing device, and in some cases, video signals for the display could only be generated from a portion of the pixel area of the image sensing device. LG-1001, 1:32-62; LG-1003, ¶53.

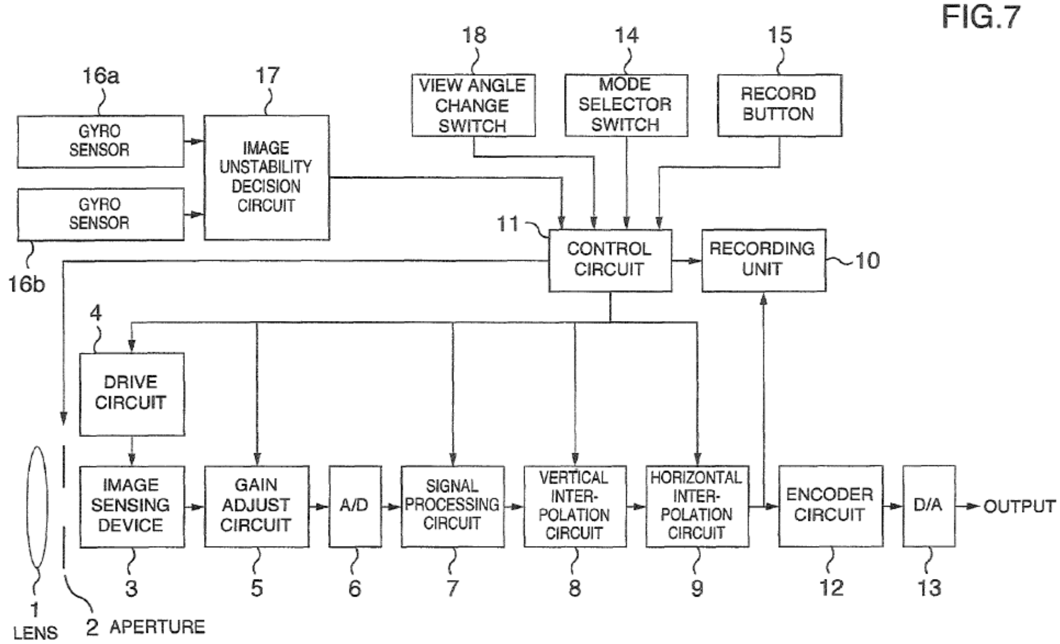
### B. Brief Description

The '729 Patent is directed to "[a]n electric camera includ[ing] an image sensing device." LG-1001, Abstract; LG-1003, ¶¶56-60. As shown in Figure 1 below, to capture a moving video or a static image, image sensing device 3 (e.g., a charged-coupled device) converts received light into an electric signal. LG-1001, 3:43-45, 4:36-39, 7:62-8:6. The electric camera also includes a signal processing circuit 7 to "generate image signals by using the output signals of the image sensing device." *Id.*, 3:32-33.




LG-1001, FIG. 1.

The electric camera also includes gyro sensors 16a, 16b to "detect vertical image-unstability and lateral image-unstability." *Id.*, 4:31-33. And as shown in FIG. 7 below, the electric camera includes a view angle change switch 18, which provides a "zooming function." *Id.*, 10:56-58.



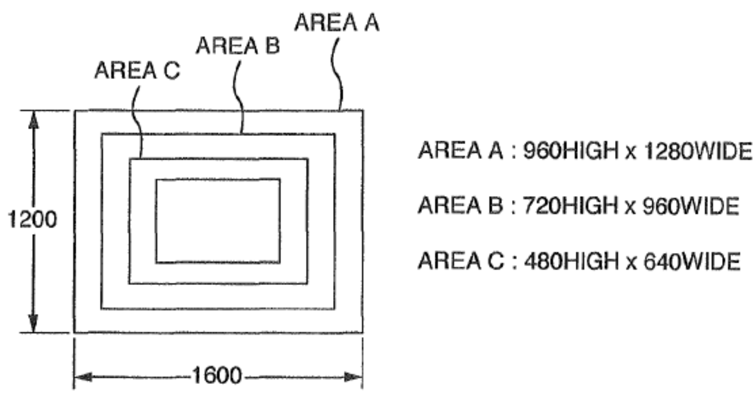

*Id.*, FIG. 7.

As shown in FIGS. 1 and 7, the electric camera includes a mode selector switch 14 that selects between a static image mode and a moving video mode. *Id.*, 4:66-5:1, 7:30-32.

In the static image mode, a static image is monitored or recorded. *Id.*, 8:53-60. The '729 patent describes that when recording a static image, "***all*** of the effective pixels on the image sensing device are used." *Id.*, 5:36-39 (emphasis added). Meanwhile, during monitoring in a static image mode, the '729 patent describes that image signals are formed with a "first view angle by using a first effective set of pixels of the image sensing device." *Id.*, 16:4-6. In some embodiments, the first effective set of pixels used to generate television signals is described as corresponding to "the entire pixel area" of the image sensing device. *Id.*, 7:39-41.

However, the ’729 patent also describes embodiments in which the view angle is changed during monitoring the static image to extract only a portion of the total pixel area of the image sensing device (e.g., to perform a zooming function). *Id.*, 11:60-65, 12:12-15, FIG. 9 (reproduced below).

FIG.9




In the moving video mode, the ’729 patent describes that when recording moving videos, image signals are formed with “a second view angle … by using a second effective set of pixels which is a portion of the array of pixels of the image sensing device.” *Id.*, 16:10-14. In this way, recording the moving video mode is unlike the recording of static images because only a ***portion*** of the pixels of the image sensing device are used for image forming. *Id.*, 7:36-39; *see also id.*, 5:9-17 (describing an embodiment where only 960 pixels out of 1200 vertically arranged pixels are used for image forming). As the ’729 patent explains, the purpose of this is "to realize [an] image stabilizing function," in which "the position of an extracted area (effective pixel area) on the light receiving surface [i.e., the image sensing device] is shifted in a direction that cancels the image-unstability" detected by the gyro sensors 16a, 16b. *Id.*, 5:9-10, 7:11-28. As Mr. Hoarty explains, this shifting of effective pixel area to perform image instability correction is possible because the effective pixel area is smaller than the entire pixel area of the image sensing device. LG-1003, ¶59.

The '729 patent also describes that changing the angle of view (e.g., zooming in/out) in the moving video mode (*see* LG-1001, 10:46-12:12) involves a "similar operation" as during monitoring in the static image mode (*id.*, 12:12-15). However, as explained above, monitoring in the static image mode allows for generating television signals based on "signals coming from the entire pixel area" (*id.*, 7:39-41) while recording in the moving video is described as using only a ***portion*** of the pixels of the image sensing device for image forming. Therefore, in at least some implementations, the "first view angle" associated with monitoring in the static image mode is different—and larger than—the "second view angle" associated with recording in the moving video mode. *Id.*, 16:11-12, 20-21, 52-53, 60-61.

### C. Prosecution History

The initial application included claim 1, which in its original form, did not correspond to any of the issued claims. LG-1002, 289-298, 302-339. In response to claim rejections and objections in an office action (2/26/2013), applicant amended claim 1 extensively and added claims 2-4. *Id.*, 115-22. Then, in response to further rejections and objections in a final office action (8/28/2013), applicant amended claims 1 and 3. *Id.*, 85-93. On 1/9/2014, applicant submitted a terminal disclaimer. *Id.*, 76-77. The Office subsequently allowed the claims via examiner's amendment. *Id.*, 53-62; LG-1003, ¶¶61-64.

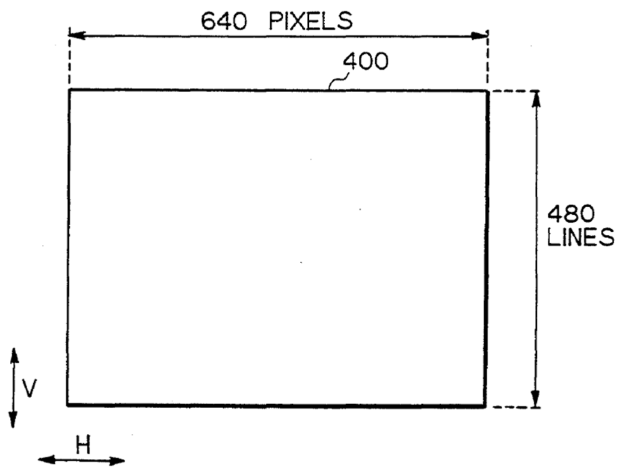
# IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

## A. [GROUND 1] – Misawa in view of Parulski Renders Obvious Claims 1-4

### 1. Misawa Overview

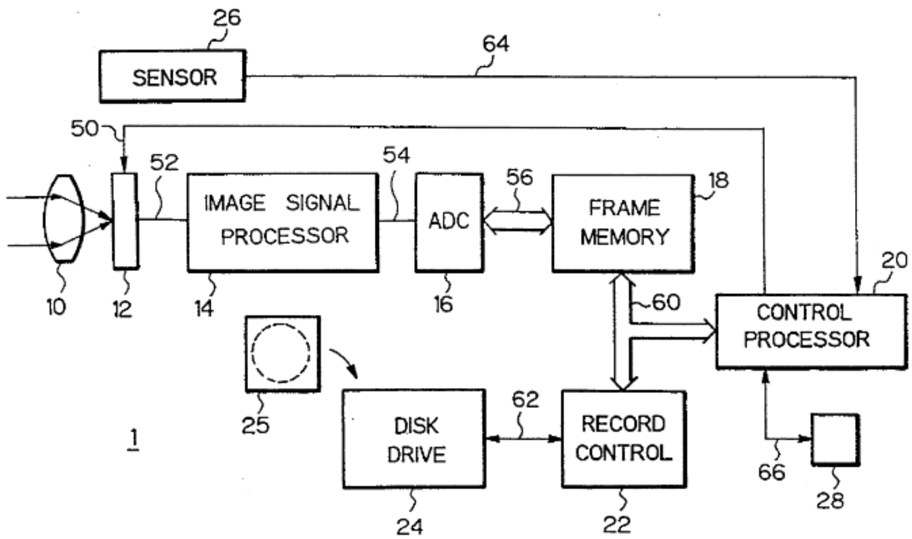
Misawa discloses a digital electronic camera including (1) an optical lens for forming the optical image of an object to be captured and (2) an image sensor for producing pixel signals associated with the optical image. LG-1005, 2:36-44, 2:55-61; LG-1003, ¶¶65-69. As Figure 4A below shows, the image sensor includes a photosensitive array with 640 pixels extending in a horizontal direction and 480 horizontal lines extending in a vertical direction. LG-1005, 3:30-34; LG-1003, ¶65.

Fig. 4A



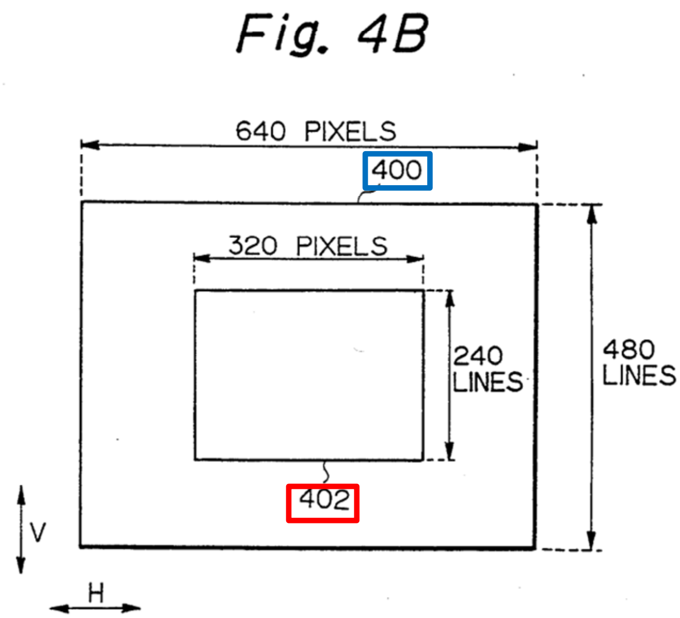

LG-1005, FIG.4A.

Misawa discloses that the camera includes an image signal processor 14 "adapted for processing the pixel signals produced [by the image sensor 12] to develop image signals representative of the optical image captured." *Id.*, 2:55-61; FIG. 1 (reproduced below). Misawa explains it was known to reproduce image data or signals using a playback device "to be visualized on an image monitor such as a TV monitor device in the form of pictures." *Id.*, 1:33-39.




*Id.*, FIG. 1.

Misawa's camera operates in still picture and movie picture modes. *Id.*, 5:54-6:5, 6:15-38. In still picture mode, a read-out processor reads out image data corresponding to an entire area of the imaging field of the image sensor. *Id.*, 7:1-7, 8:60-9:8; LG-1003, ¶67. In movie picture mode, the read-out processor reads out part of the image data corresponding to part of an imaging field of the image sensor corresponding to a smaller **area 402** in an **image frame 400** shown in Figure 4B below. LG-1005, 7:8-13; LG-1003, ¶67. The image frame 400 (640-pixel by 480-pixel) and the area 402 (320-pixel by 240-pixel) have a 4:3 aspect ratio. LG-1005, 7:13-15; LG-1003, ¶67.




LG-1005, FIG. 4B (annotated).

To provide image instability correction, Misawa discloses the camera includes a sensor 26 such as a gyroscopic transducer that senses "unintentional movement or vibration of the camera body proper which would cause blur in a picture" and provides the sensed signals to control processor 20. *Id.*, 4:60-5:8. As Misawa explains, control processor 20 includes movement detector 314 and a correction processor for forming "correction data used for compensating for blur due to the movement of camera 1 in movie pictures taken by camera 1." *Id.*, 6:7-14, 8:17-21.

### 2. Parulski Overview

Parulski discloses a camera including (1) a liquid crystal display (LCD) that can have a pixel resolution of 312 pixels by 240 pixels and (2) an image sensor (e.g., having 512 lines with 768 pixels per line) for producing images processed by a preview mode processing circuit that generates "relatively low resolution, spatially subsampled digital image data" for directly driving the "relatively low resolution" LCD. LG-1006, 3:23-26, 4:37-46, 5:49-52, 8:11-12; LG-1003, ¶¶70-74.

Parulski discloses "still image mode" for capturing a still image from the image sensor and "motion preview mode" for producing a preview image prior to capturing the still image. LG-1006, 1:9-13, 2:25-31, 3:45-47, 6:27-31; LG-1003, ¶71. In motion preview mode, Parulski implements a line-skipping process in which a fast dump structure eliminates some vertically arranged lines of image charge from the image sensor prior to readout. LG-1006, 6:32-34; LG-1003, ¶72.

Parulski describes that after reading out lines from the image sensor using a line-skipping process, those lines are displayed on the LCD. LG-1006, 7:41-61. For example, after 512 lines are read out from the image sensor using a line-skipping process in which two or four lines are alternately skipped, the read-out lines are displayed using only 204 of the LCD's approximately 240 lines of pixels, with approximately 36 lines being either masked behind a bezel or behind displayed status information. *Id.*, 7:41-48. Specifically, as shown in Parulski's Figure 11 below, the line-skipping process maps pixels from an image sensor having a 3:2 aspect ratio to **area 90** on **LCD 92** having a 4:3 aspect ratio, with this mapping process leaving **status area 94** available for other purposes. *Id.*, 7:48-54.

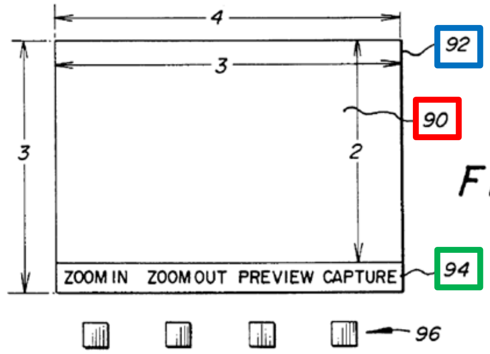



FIG. 11

*Id.*, FIG. 11 (annotated).

As Parulski's FIG. 11 shows, the status area 94 includes a list of functions users can select including a "zoom in" function, "zoom out" function, "preview" function, and "capture" function. *Id.*, 7:51-54. For example, to make this selection, Parulski describes the camera includes corresponding user control buttons for zooming in and out of the displayed image, monitoring the displayed image in preview mode, and recording a still image once the user is satisfied with the composition shown on the LCD. *Id.*, 3:23-38.

### 3. Misawa-Parulski Combination

Generally, a POSITA would have found it predictable to combine the teachings of Misawa and Parulski because both pertain to digital cameras for recording imagery such as still images and moving videos. LG-1005, 1:54-58; LG-1006, 1:9-13; LG-1003, ¶84. A POSITA would have, in particular, been motivated to (1) add an LCD, as Parulski teaches, to Misawa's camera and use a motion preview mode, as Parulski teaches, for monitoring on the LCD an image to be captured in Misawa's still picture mode; (2) add user control buttons, as Parulski teaches, to Misawa's camera for selecting between a monitoring operation and an image recording operation in the static image mode from a list displayed on the LCD; and (3) add a zoom functionality, as Parulski teaches, to Misawa's camera for changing a view angle of images prior to recording. LG-1003, ¶¶84-85.

First, a POSITA would have been motivated to add an LCD, as Parulski teaches, into Misawa's digital camera so that the LCD could (1) present a user a preview of an image to be captured in Misawa's still picture mode without using complex circuitry, (2) play back previously recorded images without an external monitor, and (3) provide status information or a reconfigurable push-button menu to the user. LG-1003, ¶¶86-92; *see* LG-1006, 1:27-34, 2:24-53, 3:33-38, 7:41-48; LG-1005, 1:9-58. Misawa acknowledges the known functionality of monitoring captured images on an external device such as a "TV monitor device," while Parulski's LCD eliminates the need for an external device by including the LCD as part of the camera. LG-1005, 1:33-39; LG-1006, 1:27-34; LG-1003, ¶¶86-92. In addition, Parulski describes how the LCD can be used, in a motion preview mode, to allow users to compose an image to their liking before capturing the image. LG-1006, 3:33-38. A POSITA would have found it predictable to incorporate Parulski's LCD and motion preview mode into Misawa's camera to achieve similar advantages, and the combination would have had a reasonable expectation of success since both Parulski's and Misawa's cameras are similarly configured to capture still images. LG-1003, ¶¶86-92.

Second, a POSITA would have been motivated to add user control buttons, as Parulski teaches, to Misawa's digital camera so that, in static image mode, users could select a monitoring operation and/or a recording operation from a list displayed on the camera's LCD. LG-1003, ¶93. Upon modifying Misawa's still image mode with Parulski's motion preview mode to include a monitoring operation in addition to Misawa's recording operation (as described above), a POSITA would have recognized the need for a user interface to select between these multiple operations. *Id.* Parulski provides a simple solution to this problem by displaying a list of functions such as "Preview" and "Capture" on status area 94 of LCD display screen 92 as well as including control buttons 96 for selecting between the functions. LG-1006, 3:23-37, 7:51-54, FIG. 11. It would have been predictable for a POSITA to further modify Misawa to include Parulski's user interface to obtain the same effect with a reasonable expectation of success. LG-1003, ¶93.

Third, a POSITA would have been motivated to add a zooming function, as Parulski teaches, to Misawa's camera. LG-1003, ¶94; *see* LG-1006, 1:27-34. Parulski describes that users can compose a picture by depressing "zoom in" or "zoom out" buttons "while observing the display image" and can then depress the capture button "[w]hen the user is satisfied with the composition on the color LCD display." LG-1006, 3:33-38. Therefore, a POSITA would have found it desirable to add the zooming function Parulski teaches into Misawa's camera to allow users to compose an image to their liking before capturing the image. Indeed, this would be consistent with the above-mentioned motivation to add a monitoring operation to Misawa's camera in the first place. As such, a POSITA would have found it predictable to modify Misawa's camera in this way and would have had a reasonable expectation of success since the zooming function would operate in the same way as in Parulski's camera to achieve similar advantages of improved image composition. LG-1003, ¶94.

#### 4. Claim 1

***[1.pre]***

To the extent the preamble is limiting, Misawa-Parulski renders it obvious. LG-1003, ¶95. Misawa discloses a "digital electronic camera 1." LG-1005, 1:9-14. Parulski discloses an electronic camera. LG-1006, 1:9-13.

***[1.1]***

Misawa-Parulski renders obvious this element. LG-1003, ¶¶96-97. Misawa discloses this feature. *Id.* Misawa describes image sensor 12 as having "an array of photosensitive cells … adapted to transduce the optical image from on the photosensitive array into corresponding pixel signals." LG-1005, 2:35-44, 3:14-29. In one example, Misawa describes "the photosensitive array of image sensor 12 has an imaging field 400 including 640 photosensitive cells or pixels in its horizontal direction H to form a horizontal line and 480 lines in its vertical direction (V)" to create a 640x480 grid pattern of pixels. *Id.*, 3:30-38. Therefore, Misawa's image sensor 12 corresponds to *an image sensing device having an array of pixels arranged vertically and horizontally in a grid pattern*.

Parulski similarly discloses this feature. For example, Parulski discloses an image sensor including a two-dimensional array of pixels arranged in rows and columns of image pixels and specifically identifies the Kodak model CCD KAI-0400CM image sensor—having approximately 512 active lines with approximately 768 active pixels per line and an image aspect ratio of 3:2—as a preferred sensor. LG-1006, 5:39-41, 5:49-52.

***[1.2]***

Misawa-Parulski renders obvious this element. LG-1003, ¶98. Misawa discloses this feature. *Id.* Misawa's camera includes sensor 26 such as a piezoelectric gyroscopic transducer that senses "unintentional movement or vibration of the camera body proper which would cause blur in a picture." LG-1005, 4:60-5:8. These sensed signals are provided to control processor 20 that includes movement detector 314. *Id.*, 6:7-14. Misawa further describes that movement detector 314 "receives a movement signal from sensor 26 … and generates movement data" that includes "moving amount data." *Id.*, 8:7-16. Therefore, a POSITA would have understood that Misawa's sensor 26 and movement detector 314—either alone or in combination—correspond to *an image-instability detector, configured to detect an amount of image-instability of the camera*. LG-1003, ¶98.

***[1.3]***

Misawa-Parulski renders obvious this element. LG-1003, ¶¶99-100. Misawa's digital electronic camera includes:

> an image signal processor 14 adapted for processing the pixel signals produced [by the image sensor 12] to develop image signals representative of the optical image captured … [,] an analog-to-digital [converter] (ADC) 16 for [c]onverting the output from [the] image signal processor 14 into image data containing corresponding digital values, a frame memory 18 for temporarily storing therein the image data, and [a] control processor 20 adapted to compress the image data stored in frame memory 18 for the purpose of recording in [an] optical disk 25 and also to control the overall operations of digital camera 1.

LG-1005, 2:55-3:2; *see also id.* 3:39-4:15. The control processor includes a read-out processor that reads image data from the frame memory, a data compressing processor that compresses image data transferred from the read-out processor, and a write-in processor that converts image data processed by the data compressing processor to a format appropriate to an optical disk. *Id.*, 6:7-14, 66-67, 7:49-55, 7:66-8:1, 9:4-5. A POSITA would have understood that Misawa has *a signal processing unit*—including the image signal processor, ADC, frame memory, and control processor—*configured to form image signals*. LG-1003, ¶99.

Misawa discloses that image signals can be formed with various predetermined view angles by using effective pixels of the image sensing device. For example, Misawa discloses that when recording image data in still picture mode, "a full frame of image data is read out from frame memory 18 and processed." LG-1005, 10:39-41. However, when recording image data in movie picture mode, only "part of image data corresponding to area 402 within imaging field 400 is read out from frame memory 18 to be processed." LG-1005, 10:42-45. For example, Misawa describes that the entire frame of imaging field 400 can be a 640x480 pixel array, while area 402 can be a smaller 320x240 array. *Id.*, 3:30-35, 7:13-15, FIG. 4B. A POSITA would have recognized these different areas correspond to different predetermined view angles, and the image signals formed with these view angles are formed by using effective pixels of the image sensing device. LG-1003, ¶100.

***[1.4]***

Misawa-Parulski renders obvious this element. LG-1003, ¶¶101-103. Misawa's camera includes "still picture mode" for recording still images, and a POSITA would have recognized that this "still picture mode" corresponds to *a static image mode*. LG-1005, 2:7-9; LG-1003, ¶101. To the extent Misawa does not explicitly disclose a "monitoring" operation in the static image mode, Parulski discloses this feature.

Parulski discloses an electronic camera for capturing still images that includes "motion preview mode" for producing a preview image of "acceptable quality" prior to capturing the still image from the image sensor. LG-1006, 1:9-13, 2:25-31, 6:27-34; LG-1003, ¶102. A POSITA would have understood this motion preview mode corresponds to performing a *monitoring in a static image mode*. LG-1003, ¶102. Parulski describes that in motion preview mode, a digital image processing technique maps an array of color image pixels from an image sensor into an array of color display pixels on an LCD display that has fewer pixels than the image sensor. LG-1006, 2:24-39. For example, Parulski describes that after 512 lines of pixels are read out from an image sensor using a line-skipping process, the read-out lines are displayed using only 204 of the LCD's approximately 240 lines of pixels, with approximately 36 lines being either masked behind a bezel or behind displayed status information. *Id.*, 7:41-48. Specifically, as shown in Figure 11, the line-skipping process maps pixels from an image sensor having a **3:2 aspect ratio** to an area 90 on LCD 92 having a **4:3 aspect ratio**, with this mapping process leaving status area 94 available for other purposes. *Id.*, 7:48-54. A POSITA would have understood this formation of an image with a 4:3 aspect ratio in motion preview mode to correspond to *forming image signals with a first view angle by using a first effective set of pixels of the image sensing device*. LG-1003, ¶102. Furthermore, since Parulski discloses "zoom in" and "zoom out" functionality in motion preview mode, a POSITA would have further understood Parulski as disclosing **multiple** alternative view angles using **different** effective sets of pixels of the image sensing device. LG-1006, 3:29-36; LG-1003, ¶102.

A POSITA would have been motivated to modify Misawa's still picture mode to include the monitoring operation of Parulski's motion preview mode since both references disclose electronic cameras used for capturing static images. LG-1005, 1:54-58; LG-1006, 1:9-13; LG-1003, ¶103. A POSITA also would have been motivated to make this combination at least because it would predictably allow users to improve the quality of captured images since Parulski's motion preview mode allows users to compose an image to their liking before recording the image. LG-1006, 3:33-38; LG-1003, ¶103. Parulski's motion preview mode would operate in a very similar manner to achieve the same effect in Misawa's camera, and a POSITA would therefore have recognized that the combination would have a reasonable expectation of success. LG-1003, ¶103.

***[1.5]***

Misawa-Parulski renders obvious this element. LG-1003, ¶¶104-105. As described above, Misawa's camera includes "still picture mode" for recording still images, and a POSITA would have recognized that this "still picture mode" corresponds to *a static image mode*. LG-1005, 2:7-9; LG-1003, ¶104. Misawa also discloses that, "[i]n order to record image data in the still mode, a full frame of image data is read out from frame memory 18 and processed" (LG-1005, 10:39-41) and that "the entire pixel data included in imaging field 400 [of the image sensor 12] is sequentially read out from frame memory 18" (LG-1005, 8:60-66). *See also id.*, 3:30-38; 7:1-7, FIG. 4A. Therefore, a POSITA would have understood Misawa's description of recording images in static image mode to correspond to *during recording in the static image mode, to form signals by using all effective pixels of the image sensing device*. LG-1003, ¶104.

Parulski also discloses this feature by disclosing that in still imaging mode, "all rows of image pixel charge corresponding to each line are progressively read out through the horizontal register 70 during a single scan" to form an image. LG-1006, 6:27-38.

***[1.6a]***

Misawa-Parulski renders obvious this element. LG-1003, ¶¶106-107. Misawa describes "movie picture mode" for "movie picture recording" that corresponds directly to *recording in a moving video mode*. LG-1005, 1:63-68. Furthermore, Misawa discloses that, in movie picture mode, image data is recorded such that only "part of image data corresponding to area 402 within imaging field 400 is read out from frame memory 18 to be processed." *Id.*, 10:42-45. Particularly, Misawa describes an example in which imaging field 400 can be a 640x480 pixel array, while area 402 can be a smaller 320x240 array. *Id.*, 3:30-35, 7:13-15, FIG. 4B. A POSITA would have understood that forming an image based on the pixels in smaller area 402 corresponds to *form[ing] image signals with a second view angle … by using a second effective set of pixels which is a portion of the array of pixels of the image sensing device*. LG-1003, ¶¶106.

Misawa-Parulski also renders obvious that the second view angle (associated with recording in the moving video mode) is *different from the first view angle* (associated with monitoring in the static image mode). As described above, it would have been obvious to modify Misawa's still picture mode to include the monitoring operation of Parulski's motion preview mode. *See supra* Sections IV.A.3 and IV.A.4.[1.4]. And since Parulski discloses a "zoom in" and "zoom out" functionality in motion preview mode (i.e., during monitoring in static image mode), the combination of Misawa and Parulski would enable **multiple** alternative view angles during monitoring in static image mode. LG-1006, 3:29-36; LG-1003, ¶107. Therefore, a POSITA would have understood that the combination of Misawa and Parulski necessarily yields, in at least some instances, a second view angle that is different from the first view angle. LG-1006, 3:29-36; LG-1003, ¶107.

***[1.6b]***

Misawa-Parulski renders obvious this element. LG-1003, ¶108. Misawa discloses that one of the major advantages of using area 402 smaller than the entire frame of imaging field 400 to record moving videos is that "portions of the image data associated with a peripheral portion adjacent to and surrounding area 402 [can be utilized] for the purpose of compensating for blur which would [otherwise] be caused in a reproduced picture by unintentional movements of digital camera 1 proper." LG-1005, 10:45-51. More specifically, Misawa describes that, in movie picture recording mode, instability correction can be achieved by shifting the position of area 402 based on a "moving amount" and "directional data" included in the movement data provided by movement detector 314. *Id.*, 8:17-27. A POSITA would have understood Misawa's disclosure as corresponding to *during recording in a moving video mode … to change a position of the second effective set of pixels according to the amount of image-instability detected by the image-instability detector, in order to correct the image-instability*. LG-1003, ¶108.

***[1.7]***

Misawa-Parulski renders obvious this element. LG-1003, ¶109. Misawa discloses capturing an object and recording data representative of still and movie images in a data recording medium and that such recorded data can be adapted to be visualized on an image monitor (e.g., TV monitor device). LG-1005, 1:9-39. To the extent Misawa does not explicitly disclose a display unit as part of its camera, Parulski discloses that its image sensor produces images processed by the preview mode processing circuit to generate image data that can directly drive an LCD on Parulski's electronic camera. LG-1006, 3:23-26, 4:37-46. Based on Parulski's teachings, a POSITA would have been motivated to modify Misawa to include an LCD and to include preview mode processing circuit that generates image data to drive the LCD ("*a display unit configured to display an image corresponding to the image signals formed by the signal processing unit*"). LG-1003, ¶109; *see* LG-1006, 2:24-53, 3:33-38; *supra* §IV.A.3.

### 5. Claim 2

***[2]***

Misawa-Parulski renders obvious this element. LG-1003, ¶¶110-112. As described above, it would have been obvious to combine Misawa and Parulski to obtain a camera in which the first view angle (monitoring in the static image mode) is *different* than the second view angle (recording in the moving video mode). *See* *supra* §IV.A.4.[1.6a]; LG-1003, ¶110. It also would have been obvious for the first view angle to be *larger* than the second view angle.

First, Parulski describes its line-skipping process in motion preview mode as displaying "the ***entire*** 3:2 aspect ratio sensor image on the 4:3 aspect ratio LCD, without introducing geometric distortion." LG-1006, 6:45-40 (emphasis added); *see also id.*, 7:33-40 (describing a 'line skipping' readout mode as allowing the sensor 3:2 aspect ratio image to be fully displayed on a 4:3 aspect ratio LCD without 'geometric distortion'). In contrast, Misawa's movie picture mode uses only a 320x240 pixel area of a wider 640x480 pixel imaging field to form images. Therefore, a POSITA would have recognized that adding Parulski's motion preview mode to Misawa's camera would result in a first view angle (during monitoring in static image mode, as Parulski teaches) that is larger than a second view angle (during recording in moving video mode, as Misawa teaches). LG-1003, ¶111. A POSITA would have recognized (e.g., using common sense) that the view angle used during monitoring in static image mode would match the view angle during recording in static image mode (which Misawa describes as using the "full frame" of image data) so that users could more accurately preview images before capturing them. *Id.*

Second, Parulski describes both "zoom in" and "zoom out" functionality in motion preview mode (i.e., during monitoring in static image mode). Therefore, as

Mr. Hoarty explains, a POSITA would have had reason to configure the zooming out function in the motion preview mode to provide a first view angle larger than the second view angle of Misawa's movie picture mode. LG-1003, ¶112. A POSITA would have been motivated to do this to provide a wider view angle for composing and recording still images. *Id.* Additionally, since the image instability correction Misawa discloses (which requires using a smaller view angle) is not implemented in still picture mode, there would be even more reason to allow users to zoom out when previewing and recording still images to take advantage of the maximum view angle possible with the image sensor. *Id.*

### 6. Claim 3

***[3.pre]***

To the extent the preamble is limiting, Misawa-Parulski renders it obvious. LG-1003, ¶¶113-117. Both Misawa and Parulski disclose electronic cameras and methods for operating them. *See* LG-1005, 54-58; LG-1006, 2:24-31; *supra* §IV.A.4.[1.pre]; LG-1003, ¶113.

Misawa-Parulski also renders obvious that the camera includes the claimed "image sensing device." *See supra* §IV.A.4.[1.1]; LG-1003, ¶114.

Misawa-Parulski also renders obvious that the camera includes the claimed "signal processing unit." *See supra* §IV.A.4.[1.3]; LG-1003, ¶115.

Misawa-Parulski also renders obvious that the camera includes the claimed "display unit." *See supra* §IV.A.4.[1.7]; LG-1003, ¶116.

Misawa-Parulski also renders obvious that the camera includes the claimed "image-instability detector." *See supra* §IV.A.4.[1.2]; LG-1003, ¶117.

***[3.1]***

Misawa-Parulski renders obvious this element. LG-1003, ¶118. Misawa discloses shutter release button mechanism 28 that can be depressed by users to send signals to control processor 20. LG-1005, 5:9-6:6. Misawa further describes that the control processor includes mode selector 302 that selects between still picture mode and movie picture mode based on input from the shutter release mechanism. *Id.*, 6:15-36. Therefore, Misawa discloses a method for operating a camera that includes *selecting between a static image mode and a moving video mode*.

***[3.2]***

Misawa-Parulski renders obvious this element. LG-1003, ¶119. Parulski describes a camera with LCD 92 that includes status area 94 for displaying a list of operations including "zoom in" function, "zoom out" function, "preview" function, and "capture" function. LG-1006., 7:51-54, FIG. 11. Parulski also describes that the camera includes corresponding user control buttons for selecting these operations to zoom in and out of a displayed image, monitor a displayed image in the preview mode, and record a still image once the user is satisfied with the composition shown on the LCD. *Id.*, 3:23-38. Parulski, therefore, discloses *selecting an* *operation from a list of operations*. As described above, a POSITA would have been motivated to add Parulski's LCD and user control buttons to Misawa to assist users with composing an image to their liking before capturing the image, and would have had a reasonable expectation of success in doing so. *See supra* §IV.A.3; LG-1003, ¶119.

***[3.3]***

Misawa-Parulski renders obvious this element. LG-1003, ¶120. As described above, Parulski discloses LCD 92 that includes status area 94 for displaying a list of operations including "zoom in" function, "zoom out" function, "preview" function, and "capture" function as well as corresponding user control buttons for selecting these operations. *See supra* §IV.A.6.[3.2]; LG-1003, ¶120. Parulski's "preview" function corresponds to operating the camera in "motion preview mode" for producing a preview image prior to capturing a still image from the image sensor, and Parulski's "capture" function corresponds to operating the camera in "still image mode" for capturing and storing the still image from the image sensor. LG-1006, 1:9-13, 2:25-31, 3:45-47, 6:27-31; LG-1003, ¶120. Therefore, Parulski's user-selectable "preview" function corresponds to *selecting an operation from a list of operations including a monitoring of an image in the static image mode*, and Parulski's user-selectable "capture" function corresponds to *selecting an operation from a list of operations including … a recording of an image* *in the static image mode*. As described above, a POSITA would have been motivated to add Parulski's LCD and user control buttons to Misawa to assist users with composing an image to their liking before capturing the image, and would have had a reasonable expectation of success in doing so. *See supra* §IV.A.3; LG-1003, ¶120.

***[3.4]***

Misawa-Parulski renders obvious this element. LG-1003, ¶¶121-122. Misawa discloses a camera with movie picture mode, and further discloses that a "manipulation of the release button mechanism [of the camera] … will in turn select the movie picture mode effecting movie picture recording." LG-1005, 1:63-68. This disclosure corresponds to *when in the moving video mode, selecting an operation from a list of operations including: recording of an image in the moving video mode*.

To the extent element [3.4] requires a list of operations to be displayed, Misawa-Parulski render this element obvious, at least because Parulski discloses LCD 92 that includes status area 94 for displaying a list of operations including a "capture" function. *See supra* §IV.A.6.[3.2]. Although Parulski describes capturing still images, it would have been obvious to provide a similar display and user control button for capturing moving pictures in Misawa's moving video mode.

LG-1003, ¶122. As Mr. Hoarty explains, a POSITA would have been motivated to do so in order to achieve a similar user experience across camera modes. *Id.*

***[3.5]***

*See supra* §IV.A.4.[1.4]; LG-1003, ¶123.

***[3.6]***

*See supra* §IV.A.4.[1.5]; LG-1003, ¶124.

***[3.7a]***

*See supra* §IV.A.4.[1.6a]; LG-1003, ¶125.

***[3.7b]***

*See supra* §IV.A.4.[1.6b]; LG-1003, ¶126.

#### 7. Claim 4

***[4]***

*See supra* §IV.A.5.[2]; LG-1003, ¶127.

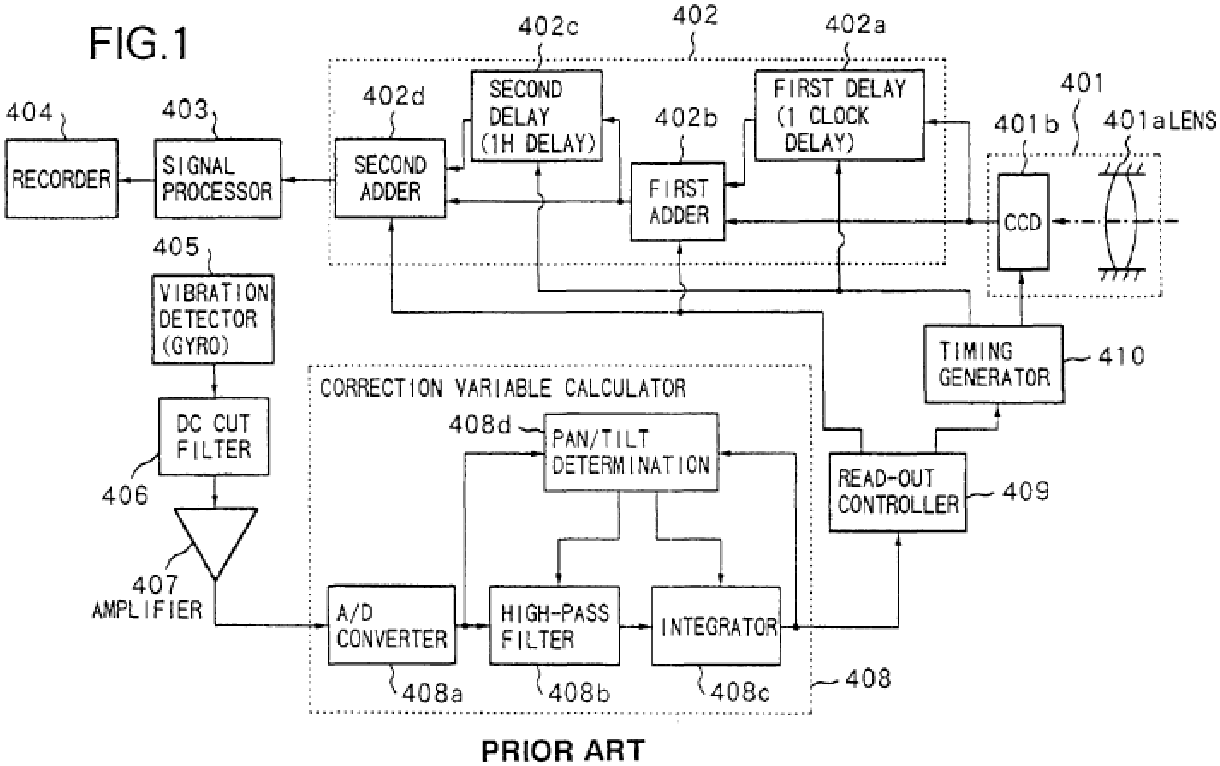
### B. [GROUND 2] – Kawahara in view of Misawa and further in view of Parulski Renders Obvious Claims 1-4

#### 1. Kawahara Overview

Kawahara discloses conventional and improved image sensing apparatuses such as video cameras capable of sensing "both a moving image and a still image." LG-1007, 1:17-21, 7:58-59; LG-1003, ¶¶75-78. Kawahara discloses a conventional image sensing apparatus that includes "an imaging sensor 410b such as a

CCD [charge-coupled device] or the like" and shows, in FIG. 4, image sensing device 701 constructed with pixels arranged vertically and horizontally in a grid pattern. LG-1007, 1:40-41, 4:29-34, 6:22-26, 13:5-10, FIG. 4.

Kawahara also discloses that the image sensing apparatus includes (1) vibration correction section 402 "to correct image signals … to reduce vibration components of a moving image influenced by unsteady hands or the like" (*id.*, 1:42-45), (2) signal processor 403 to "convert electric signals … to standard video signals" (*id.*, 1:51-54), (3) recording section 404 to "record[] the standard video signals … as image signals" (*id.*, 1:54-56), (4) vibration detector 405 such as a "vibration gyro sensor or the like" (*id.*, 1:56-58), (5) DC cut filter 406 to "cut off the DC components of the angular velocity signal, outputted by the vibration detector" (*id.*, 1:60-63), (6) amplifier 407 to amplify the angular velocity signal outputted by the DC cut filter (*id.*, 1:66-67), (7) correction variable calculator 408 to obtain an angle displacement signal that serves as a correction target value (*id.*, 2:1-26), (8) read-out controller 409 to "shift[] a read-out start position of the image sensing device 401b in accordance with the vibration correction target value signal" (*id.*, 2:27-32), and (9) [timing] generator 410 to "generate[] driving pulses … based on the control data of the read-out controller" (*id.*, 2:33-36). Kawahara explains that captured images could be reproduced on a monitor such as video monitor or a finder or the like. *Id.*, 4:1-5, 13:53-55.




*Id.*, FIG. 1.

To provide vibration correction, Kawahara discloses shifting a position of an extraction frame (comprising only a portion of the pixels of the entire image sensing device) in order to remove "displacement caused by vibration on the image sensing apparatus." *Id.*, 4:11-5:27, FIGS. 3-4 (reproduced below). Using this technique, "a partial image from the entire image sensing area 601 of the image sensing device 401b" is selectively extracted. *Id.*, 5:6-9. Kawahara explains that since this image extraction technique "can only be performed in each unit pixel 702 of the image sensing device 401b," an additional "fine pixel shifting" operation can be performed to achieve sub-pixel correction amounts. *Id.*, 5:43-50.

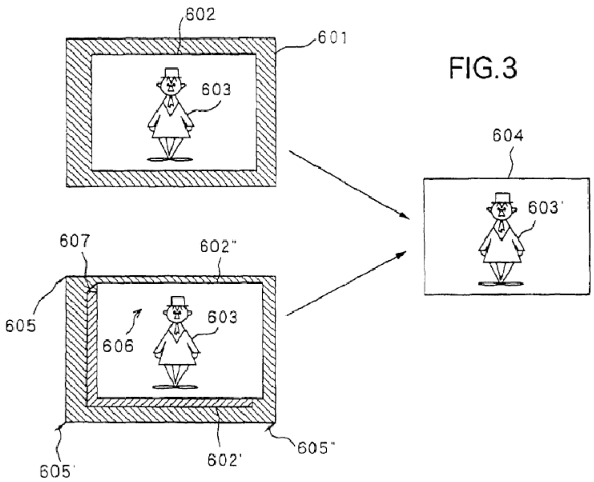
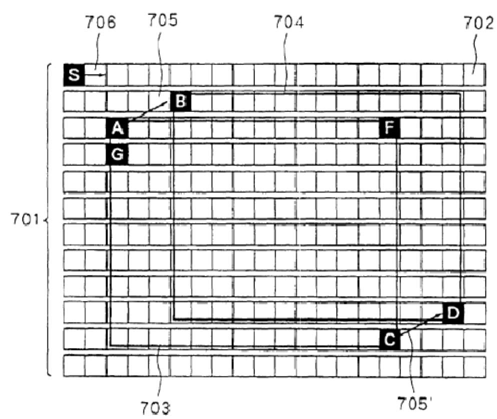



FIG.3

PRIOR ART

FIG.4

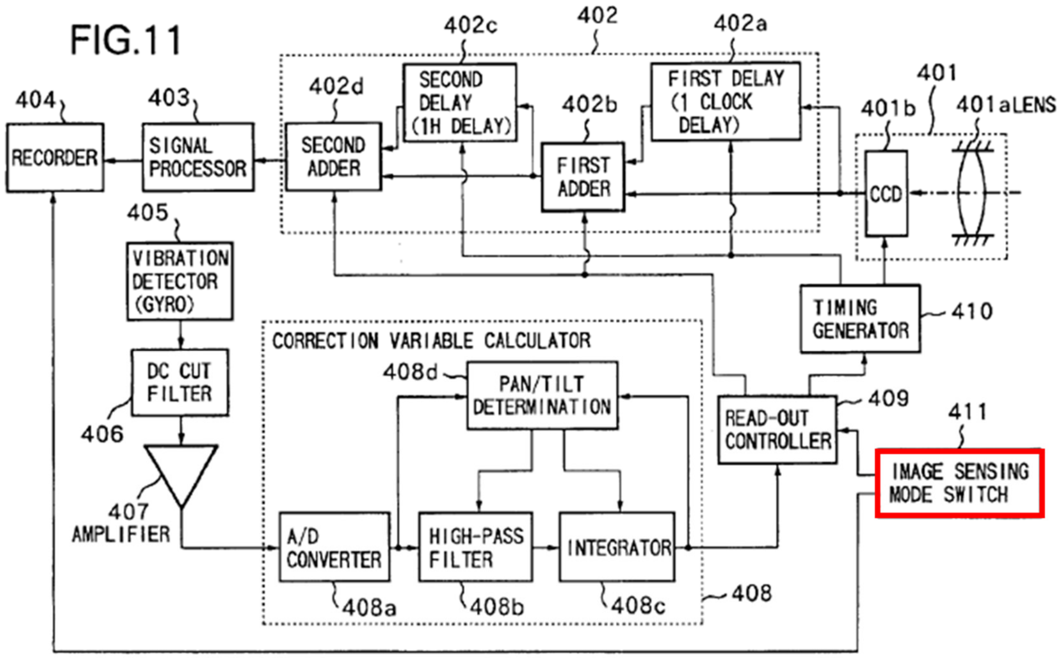



PRIOR ART

*Id.*, FIGS. 3-4.

In another embodiment, Kawahara discloses that the apparatus includes **image sensing mode switch 411** that "allows users to switch the record mode of the recording section 404 between a moving image recording mode and a still image recording mode." *Id.*, 11:1-8, FIG. 11 (reproduced below). Kawahara explains that "in a case of sensing a still image wherein correction between frames by image extraction is not important, a problem of deteriorating resolution in images rather arises." *Id.*, 7:66-8:2. Therefore, in this embodiment, Kawahara explains that the camera is operated such that the fine pixel-shifting operation is performed ***only*** in the moving image sensing mode and ***not*** in the still image recording mode. *Id.*, 11:18-12:6, FIG. 12. According to Kawahara, this selective use of the fine pixel-shifting operation has the advantage of making it possible "to obtain [a still] image where resolution is not greatly deteriorated." *Id.*, 12:7-13. In still other embodiments, Kawahara discloses that the anti-vibration signal can be deactivated entirely to prevent the performance of any pixel shifting operations. *Id.*, 18:48-53, FIGS. 14 and 17.

FIG.11




*Id.*, FIG. 11 (annotated).

### 2. Misawa Overview

*See supra* §IV.A.1.

### 3. Parulski Overview

*See supra* §IV.A.2.

### 4. Kawahara-Misawa-Parulski Combination

A POSITA would have been motivated to combine the references' teachings because all three pertain to electronic digital cameras for recording imagery such as still images and moving videos. LG-1005, 1:54-58; LG-1006, 1:9-13; LG-1007, 1:17-21, 7:58-59; LG-1003, ¶128. A POSITA would have been motivated to (1) modify Kawahara's camera to implement vibration correction only when recording moving images, as Misawa teaches, to reduce processing burden when recording still images and to prevent the deteriorated resolution of still images caused by Kawahara's anti-vibration technique; (2) add an LCD, as Parulski teaches, to Kawahara's camera and use a motion preview mode, as Parulski teaches, for monitoring on the LCD an image to be captured in Kawahara's still image recording mode; (3) add user control buttons, as Parulski teaches, to Kawahara's camera for selecting between monitoring operation and image recording operation in static image mode from a list displayed on the LCD; and (4) add a zoom functionality, as Parulski teaches, to Kawahara's camera for changing a view angle of images prior to recording. LG-1003, ¶128.

First, a POSITA would have been motivated to modify Kawahara's camera in view of Misawa to implement vibration correction only when recording moving images because this would reduce processing requirements when recording still images and prevent the deteriorated resolution of recorded still images while still providing stabilization to moving images (where vibration correction is more important). LG-1003, ¶129. Kawahara acknowledges that compared to the recording of moving images, "in a case of sensing a still image … a [vibration] correction between frames by image extraction is not important." LG-1007, 7:61-8:2. Moreover, Kawahara recognizes that its "fine pixel-shifting operation" for sub-pixel vibration correction will result in "deteriorated resolution in images." *Id.*; *see also id.*, 12:10-13. Therefore, while Kawahara discloses shifting a partial image extraction frame by an integer number of pixels in both a moving image sensing mode ***and*** a still image recording mode for vibration correction, Kawahara addresses the issue of deteriorated resolution in still images by using its "fine pixel-shifting operation" for sub-pixel correction ***only*** in a moving image sensing mode and ***not*** in a still image recording mode. *Id.*, 11:18-12:13, 15:44-55, FIGS. 12-13. In this way, Kawahara prevents the deteriorated resolution of still images (compared to moving images) and achieves reduced processing burden for recording still images. LG-1003, ¶129. Misawa achieves similar benefits by performing blur compensation (e.g., by shifting the read-out position of image data) ***only*** when recording moving images so that still pictures can be formed using "a full frame of image data" and with less processing burden compared to moving images. LG-1005, 7:30-48, 10:39-51. Misawa's disclosed solution is applicable to the problem of deteriorated resolution in still images caused by Kawahara's anti-vibration technique. LG-1003, ¶129. Therefore, a POSITA would have found it predictable to modify Kawahara's camera, as Misawa teaches, to selectively implement Kawahara's partial image extraction technique for vibration correction ***only*** when sensing moving images (just as Kawahara already discloses with respect to its "fine pixel-shifting operation"). As Mr. Hoarty explains, a POSITA would have recognized this combination would yield a reasonable expectation of success in reducing the processing requirements for recording still images and improving the resolution of recorded still images. LG-1003, ¶129.

Second, a POSITA would have been motivated to add an LCD, as Parulski teaches, into Kawahara's camera so that the LCD could (1) present users an image preview to be captured in Kawahara's still image recording mode without using complex circuitry, (2) play back previously recorded images without an external monitor, and (3) provide status information or a reconfigurable push-button menu to users. LG-1003, ¶130; *see* LG-1006, 1:27-34, 2:24-53, 3:33-38, 7:41-48; LG-1007, 4:1-10, 13:53-55. Kawahara acknowledges the known use case of displaying captured images on a "video monitor or a finder or the like" while Parulski's LCD eliminates the need for an external display device by including the LCD as part of the camera. LG-1007, 13:53-55; LG-1006, 1:27-34; LG-1003, ¶130. In addition, Parulski describes how the LCD can be used, in motion preview mode, to allow users to compose images to their liking before capturing them. LG-1006, 3:33-38. A POSITA would therefore have found it predictable to incorporate Parulski's LCD and motion preview mode into Kawahara's camera to achieve similar advantages, and the combination would have had a reasonable expectation of success since both Parulski's and Kawahara's cameras are similarly configured to capture still images. LG-1003, ¶130.

Third, a POSITA would have been motivated to add user control buttons, as Parulski teaches, to Kawahara's digital camera so that, in the static image mode, users could select monitoring operation or recording operation from a list displayed on the camera's LCD. Upon modifying Kawahara's still image mode with Parulski's motion preview mode to include a monitoring operation (in addition to Kawahara's recording operation, as described above), a POSITA would have recognized the need for a user interface to select between these multiple operations. LG-1003, ¶131. Parulski provides a simple solution to this very problem by displaying a list of functions such as "Preview" and "Capture" on status area 94 of LCD display screen 92 as well as including control buttons 96 for selecting between the functions. LG-1006, 3:23-37, 7:51-54, FIG. 11. It would have been predictable for a POSITA to modify Kawahara to include Parulski's user interface to obtain the same user interface advantages with a reasonable expectation of success. LG-1003, ¶131.

Fourth, a POSITA would have been motivated to add Parulski's zooming function to Kawahara's camera. LG-1003, ¶132; *see* LG-1006, 1:27-34. Parulski describes that users can compose a picture by depressing "zoom in" or "zoom out" buttons "while observing the display image" and can then depress the capture button "[w]hen the user is satisfied with the composition on the color LCD display." LG-1006, 3:33-38. Therefore, a POSITA would have found it desirable to add Parulski's zooming function into Kawahara's camera to allow users to compose an image to their liking before capturing the image. Indeed, this would be consistent with the above-mentioned motivation to add a monitoring operation to Kawahara's camera in the first place. As such, a POSITA would have found it predictable to modify Kawahara's camera in this way and would have had a reasonable expectation of success since the zooming function would operate in the same way as in Parulski's camera to achieve similar advantages of improved image composition. LG-1003, ¶132.

#### 5. Claim 1

***[1.pre]***

To the extent the preamble is limiting, Kawahara-Misawa-Parulski renders it obvious. LG-1003, ¶133. Kawahara discloses "an image sensing apparatus" such as a "video camera." LG-1007, 1:8-12, 1:17-20. Misawa and Parulski likewise disclose electronic cameras. LG-1005, 1:9-14; LG-1006, 1:9-13.

***[1.1]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶134. Kawahara discloses a conventional image sensing apparatus that includes "an imaging sensor 410b such as a CCD [charge-coupled device] or the like" and shows, in FIG. 4, image sensing device 701 constructed with pixels arranged vertically and horizontally in a grid pattern. LG-1007, 1:40-41, 4:29-34, 6:22-26, 13:5-10, FIG. 4. Misawa and Parulski similarly disclose this feature. *See supra* §IV.A.4.[1.1]; LG-1003, ¶134.

***[1.2]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶135. Kawahara's camera includes vibration detector 405 such as a "vibration gyro sensor or the like" (LG-1007, 1:56-58); correction variable calculator 408 to obtain an angle displacement signal that serves as a correction target value (*id.*, 2:1-26); read-out controller 409 to "shift[] a read-out start position of the image sensing device 401b in accordance with the vibration correction target value signal" (*id.*, 2:27-32); and vibration correction section 402 "to correct image signals … to reduce vibration components of a moving image influenced by unsteady hands or the like" (*id.*, 1:42-45). These components—either alone or in combination—correspond to *an image-instability detector, configured to detect an amount of image-instability of the camera*. LG-1003, ¶135.

***[1.3]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶¶136-137. Kawahara discloses "signal processor 403 … that converts electric signals … to standard video signals such as NTSC signals or the like." LG-1007, 1:51-54.

This signal processor corresponds to *a signal processing unit configured to form image signals.*

Moreover, Kawahara discloses that the signals operated on by signal processor 403 can include extracted "partial area 202 … of [an] effective pixel area," with only the partial area being displayed on a monitor. LG-1007, 13:46-55, FIGS. 15A-15B; *see also id.*, FIG. 3 (showing extraction frames 602, 602'), FIG. 4 (showing extraction frames 703, 704). A POSITA would have recognized that partial area 202 and the various extraction frames of Kawahara correspond to different *predetermined view angles*, and that the image signals formed with these view angles are formed *by using effective pixels of the image sensing device*. LG-1003, ¶137.

***[1.4]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶¶138-139. Kawahara's camera includes "still image recording mode" for recording still images, and a POSITA would have recognized that "still image recording mode" corresponds to *a static image mode*. LG-1007, 11:1-8; LG-1003, ¶138. To the extent Kawahara does not explicitly disclose a "monitoring" operation in static image mode, Parulski discloses this feature—including "*during monitoring … to form image signals with a first view angle by using a first effective set of pixels of the image sensing device*." *See supra* §IV.A.4.[1.4].

A POSITA would have been motivated to modify Kawahara's still picture mode to include the monitoring operation of Parulski's motion preview mode since both references disclose cameras used for capturing static images. LG-1007, 1:8-16; LG-1006, 1:9-13; LG-1003, ¶139. A POSITA would have been motivated to make this combination at least because it would predictably allow users to improve the quality of captured images, as Parulski teaches. LG-1006, 3:33-38; LG-1003, ¶139. Parulski's motion preview mode would operate in a very similar manner to achieve the same advantages in Kawahara's camera, for example, by using Parulski's "relatively … simple digital image processing technique to produce a preview image of acceptable quality prior to initiation of [Kawahara's] still image [recording] mode." LG-1006, 2:29-31, *see also id.*, 5:15-17. Like Parulski, this technique could be implemented with Kawahara's camera by using a "fast dump" structure to eliminate lines of pixel charges from Kawahara's CCD and drive a color LCD display with decreased sensor readout time. *Id.*, 8:44-48, LG-1003, ¶139. A POSITA would have recognized that the combination would have a reasonable expectation of success. LG-1003, ¶139.

***[1.5]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶¶140-141. As described above, Kawahara's camera includes "still picture mode" for recording still images, and a POSITA would have recognized that "still picture mode" corresponds to *a static image mode*. LG-1007, 11:1-8; LG-1003, ¶140. To the extent that Kawahara does not explicitly disclose that image signals are formed using *all effective pixels of the image sensing device* in this mode, a POSITA would have understood this feature is rendered obvious in view of Misawa and Parulski. Misawa discloses that, "[i]n order to record image data in the still mode, a full frame of image data is read out from frame memory 18 and processed" (LG-1005, 10:39-41) and that "the entire pixel data included in imaging field 400 [of the image sensor 12] is sequentially read out from frame memory 18" (*id.*, 8:60-66). *See also id.*, 3:30-38; 7:1-7, FIG. 4A. Similarly, Parulski discloses that in a still imaging mode, "all rows of image pixel charge corresponding to each line are progressively read out through the horizontal register 70 during a single scan" to form an image. LG-1006, 6:27-38.

A POSITA would have been motivated to combine the teachings of Misawa and/or Parulski with Kawahara in order to reduce the processing burden of recording still images and to solve the problem of deteriorated resolution in still images caused by Kawahara's anti-vibration technique. *See supra* §IV.B.4; LG-1003, ¶141. In addition, it would have been predictable to combine these teachings with a reasonable expectation of success since the solutions provided by Misawa and/or Parulski are very similar to those presented in Kawahara and are directed to the very same issue of image resolution identified by Kawahara. *See supra* §IV.B.4;

LG-1007, 7:66-8:2, 9:13-29, 9:38-42, 12:10-13, 12:52-53 (issue of deteriorated resolution in still images can be solved by performing fine pixel shifting operations for vibration correction only when sensing moving images); LG-1005, 2:7-14, 8:60-66, 10:39-41, (high resolution still images can be obtained from full frames of image data by compensating for camera movement with partial frames only when sensing moving images); LG-1006, 6:27-38 (high resolution still images can be obtained from all rows of image pixel charge by performing "line skipping" only when in motion mode); LG-1003, ¶141.

***[1.6a]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶¶142-143. Kawahara discloses "moving image recording mode" that corresponds to *recording in a moving video mode*. LG-1007, 11:1-8, FIG. 11; LG-1003, ¶142. Furthermore, Kawahara discloses various extraction frames that are used to form images in moving image recording mode, with the extraction frames corresponding to only a portion of the overall pixel area of the image sensing device. LG-1007, 13:46-55, FIGS. 15A-15B; *see also id.*, FIG. 3 (showing extraction frame 602, 602'), FIG. 4 (showing extraction frames 703, 704). A POSITA would have understood that Kawahara's image formation using these extraction frames corresponds to *forming image signals with a second view angle … by using a second effective set of pixels which is a portion of the array of pixels of the image sensing device*.

Kawahara-Misawa-Parulski also renders obvious that the second view angle (associated with the recording in the moving video mode) is *different from the first view angle* (associated with the monitoring in the static image mode). As described above, it would have been obvious to modify Kawahara's still picture mode to include the monitoring operation of Parulski's motion preview mode as well as Parulski's zooming function. *See supra* Sections IV.B.4 and IV.B.5.[1.4]. Since Parulski discloses "zoom in" and "zoom out" functionality in motion preview mode (i.e., during monitoring in static image mode), the combination of Kawahara and Parulski would enable **multiple** alternative view angles during monitoring in static image mode. LG-1006, 3:29-36; LG-1003, ¶143. Therefore, a POSITA would have understood that the combination of Kawahara and Parulski (in addition to Misawa) necessarily yields, in at least some instances, a second view angle that is different from the first view angle. LG-1006, 3:29-36; LG-1003, ¶143.

***[1.6b]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶144. Kawahara discloses moving a position of an extraction frame (comprising only a portion of the pixels of the entire image sensing device) in order to remove "displacement caused by vibration on the image sensing apparatus." LG-1007, 4:11-5:27, FIGS. 3-4; *see also id.*, 2:27-29. Kawahara also discloses that this vibration correction can be performed while recording moving images. *Id.*, 9:31-35. A POSITA would have understood Kawahara's disclosure as corresponding to *during recording in a moving video mode … to change a position of the second effective set of pixels according to the amount of image-instability detected by the image-instability detector, in order to correct the image-instability*. LG-1003, ¶144. A POSITA would also have recognized that Misawa also discloses this feature. *See supra* §IV.A.4.[1.6b].

***[1.7]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶¶145-146. Kawahara discloses recorder 404 that records signals converted by signal processor 403 as image signals and "employs a record format corresponding to the selected image sensing mode [e.g., a moving image recording mode or still image recording mode] depending on a recording medium." LG-1007, 1:53-55, 11:1-8. Kawahara also discloses that, when an image signal is converted and outputted, the signal can be reproduced or displayed "on a monitor." *Id.*, 3:62-4:10, 13:46-55.

To the extent Kawahara does not explicitly disclose a display unit as part of its camera, Parulski discloses this feature. *See supra* §IV.A.4.[1.7]. Based on Parulski's teachings, a POSITA would have been motivated to modify Kawahara to include an LCD as a monitor device and to include a preview mode processing circuit that generates image data to drive the LCD ("*a display unit configured to display an image corresponding to the image signals formed by the signal processing unit*"). LG-1003, ¶146; *see* LG-1006, 2:24-53, 3:33-38; *supra* §IV.B.4.

**6. Claim 2**

***[2]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶¶147-149. As described above, it would have been obvious to combine Kawahara and Parulski to obtain a camera in which the first view angle (associated with monitoring in static image mode) is *different* than the second view angle (associated with recording in moving video mode). *See supra* §IV.B.5.[1.6a]; LG-1003, ¶147. It also would have been obvious for the first view angle to be *larger* than the second view angle for at least the following reasons.

First, Parulski's line-skipping process in motion preview mode is described as displaying "the ***entire*** 3:2 aspect ratio sensor image on the 4:3 aspect ratio LCD, without introducing geometric distortion." LG-1006, 6:45-40 (emphasis added); *see also id.*, 7:33-40 (describing special "line skipping" readout mode that eliminated "geometric distortion"). This is in contrast to Kawahara's moving image recording mode, which uses only "a partial image from the entire image sensing area 601 of the image sensing device 401b." LG-1007, 5:6-9. Therefore, a POSITA would have recognized that adding Parulski's motion preview mode to Kawahara's camera would result in a first view angle (during monitoring in static image mode, as Parulski teaches) that is larger than a second view angle (during recording in moving video mode, as Kawahara teaches). LG-1003, ¶148. It would have been common sense for the view angle used during monitoring in static image mode to match the view angle used during recording in static image mode so that users could more accurately preview images before capturing them. *Id.* And, as described above, the obvious combination of Kawahara and Misawa would have resulted in a camera that uses the "full frame" of image data while recording in static image mode. *See supra* Sections IV.B.4 and IV.B.5.[1.5].

Second, Parulski describes both "zoom in" and "zoom out" functionality in motion preview mode (i.e., during monitoring in static image mode). Therefore, as Mr. Hoarty explains, it would have been obvious to a POSITA to configure the zooming out function in motion preview mode to provide a first view angle larger than the second view angle of Kawahara's moving image recording mode. LG-1003, ¶149. A POSITA would have been motivated to do this to provide a wider view angle for composing and recording still images, and since the POSITA would recognize that Kawahara's vibration correction technique (which requires using a smaller view angle) would not need to be implemented in still picture mode, as Misawa teaches. *Id.*

### 7. Claim 3

***[3.pre]***

To the extent the preamble is limiting, Kawahara-Misawa-Parulski renders it obvious. LG-1003, ¶¶150-154. Kawahara, Misawa, and Parulski all disclose electronic cameras and methods for operating them. *See* LG-1007, 1:8-20; LG-1005, 54-58; LG-1006, 2:24-31; *supra* §IV.B.5.[1.pre]; LG-1003, ¶150.

Kawahara-Misawa-Parulski renders obvious that the camera includes the claimed "image sensing device." *See supra* §IV.B.5.[1.1]; LG-1003, ¶151.

Kawahara-Misawa-Parulski also renders obvious that the camera includes the claimed "signal processing unit." *See supra* §IV.B.5.[1.3]; LG-1003, ¶152.

Kawahara-Misawa-Parulski also renders obvious that the camera includes the claimed "display unit." *See supra* §IV.B.5.[1.7]; LG-1003, ¶153.

Kawahara-Misawa-Parulski also renders obvious that the camera includes the claimed "image-instability detector." *See supra* §IV.B.5.[1.2]; LG-1003, ¶154.

***[3.1]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶155. Kawahara discloses an image sensing mode switch 411 that "allows users to switch the record mode of the recording section 404 between a moving image recording mode and a still image recording mode." LG-1007, 11:1-8, FIG. 11. Therefore, Kawahara discloses a method for operating a camera that includes *selecting between a static image mode and a moving video mode*.

***[3.2]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶156. To the extent this element requires a list of operations to be displayed, Parulski describes this element. *See supra* §IV.A.6.[3.2]. And as described above, a POSITA would have been motivated to add Parulski's LCD and user control buttons to Kawahara to assist users with composing an image to their liking before capturing the image, and would have had a reasonable expectation of success in doing so. *See supra* §IV.B.4; LG-1003, ¶156.

***[3.3]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶157. Parulski discloses an LCD 92 that includes a status area 94 for displaying a list of operations including "zoom in" function, "zoom out" function, "preview" function, and "capture" function as well as corresponding user control buttons for selecting these operations. *See supra* Sections IV.A.6.[3.2], IV.B.7.[3.2]; LG-1003, ¶157. Parulski's "preview" function corresponds to operating the camera in a "motion preview mode" for producing a preview image prior to capturing a still image from the image sensor, and Parulski's "capture" function corresponds to operating the camera in a "still image mode" for capturing and storing the still image from the image sensor. LG-1006, 1:9-13, 2:25-31, 3:45-47, 6:27-31; LG-1003, ¶157. Therefore, Parulski's user-selectable "preview" function corresponds to *selecting an operation from a list of operations including a monitoring of an image in the static image mode*, and Parulski's user-selectable "capture" function corresponds to *selecting an operation from a list of operations including ... a recording of an image in the static image mode*. And as described above, a POSITA would have been motivated to add Parulski's LCD and user control buttons to Kawahara to assist users with composing an image to their liking before capturing the image, and would have had a reasonable expectation of success in doing so. *See supra* §IV.B.4; LG-1003, ¶157.

***[3.4]***

Kawahara-Misawa-Parulski renders obvious this element. LG-1003, ¶¶158-159. Kawahara discloses a camera with a selectable moving image recording mode capable of "sensing a moving image" and "employ[ing] a record format corresponding to the selected image sensing mode." LG-1007, 9:31-35, 11:1-8. This disclosure corresponds to *when in the moving video mode, selecting an operation from a list of operations including: recording of an image in the moving video mode*.

To the extent element [3.4] requires a list of operations to be displayed, this would have been obvious, at least because Parulski discloses an LCD 92 that includes a status area 94 for displaying a list of operations including a "capture" function. *See supra* §IV.B.7.[3.2]. Although Parulski describes capturing still images, it would have been obvious to provide a similar display and user control button for capturing moving pictures in Kawahara's moving image mode. LG-1003, ¶159. As Mr. Hoarty explains, a POSITA would have been motivated to do so in order to achieve a similar user experience across camera modes. *Id.*

***[3.5]***

*See supra* §IV.B.5.[1.4]; LG-1003, ¶160.

***[3.6]***

*See supra* §IV.B.5.[1.5]; LG-1003, ¶161.

***[3.7a]***

*See supra* §IV.B.5.[1.6a]; LG-1003, ¶162.

***[3.7b]***

*See supra* §IV.B.5.[1.6b]; LG-1003, ¶163.

### 8. Claim 4

***[4]***

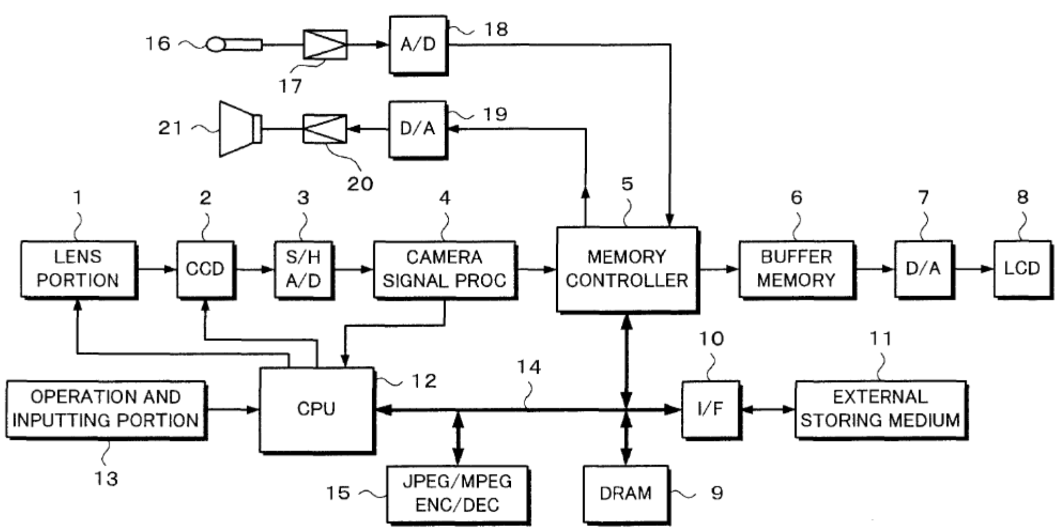
*See supra* §IV.B.6.[2]; LG-1003, ¶164.

### C. [GROUND 3] – Tomita in view of Kawahara and further in view of Parulski Renders Obvious Claims 1-4

#### 1. Tomita Overview

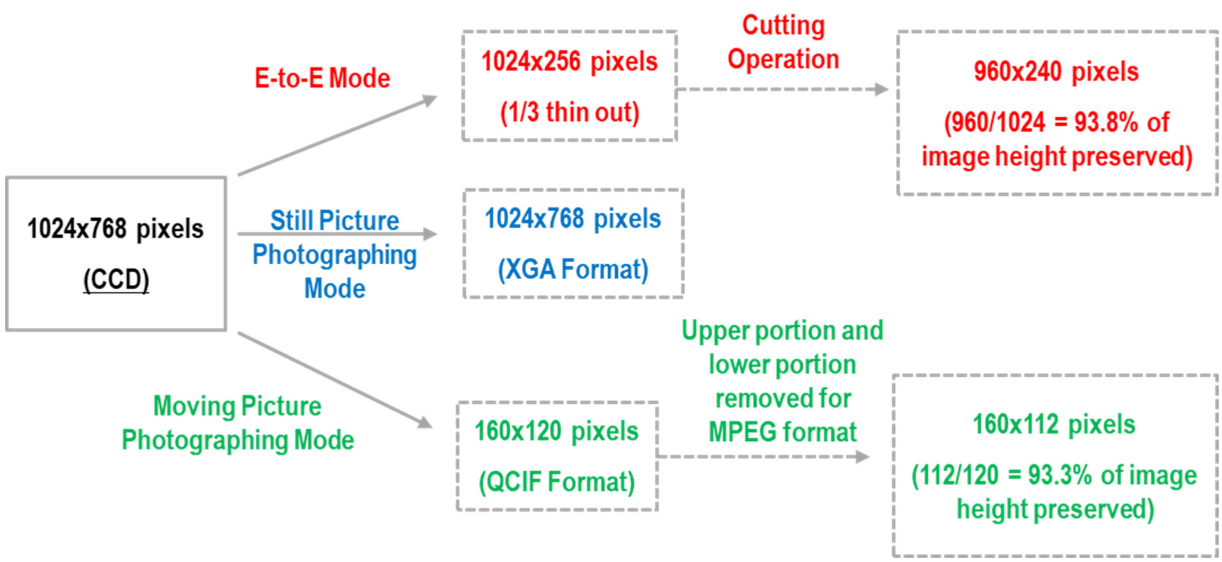
Tomita discloses a digital camera capable of photographing and recording a still picture, an audio attached still picture, and an audio attached moving picture. LG-1008, 4:24-28, FIG. 1; LG-1003, ¶¶79-83. The camera includes a CCD (Charge Coupled Device) having a 1024x768 pixel array as well as various signal processing components for forming image signals based on output signals of the CCD including "converting portion" 3, "signal processing portion" 4, "memory controller" 5, "CPU" 12, and "encoder/decoder" 15. LG-1008, 4:29-45, 5:11-6:3, FIG. 1. Tomita discloses that the camera includes LCD 8 to display pictures. *Id.*, 4:65-67, FIG. 1.

*Fig. 1*




*Id.*, FIG. 1.

Tomita describes that the camera includes various user-selectable modes including (1) a "line thin-out mode" or "E-to-E mode" in which users can view and compose an image prior to pressing the shutter button, (2) a "still picture photographing mode," and (3) a "moving picture photographing mode." *Id.*, 4:45-56, 4:65-5:10, 5:43-46, 6:65-7:45, 8:22-52. A visual summary of the modes is provided below:




LG-1003, ¶80.

In the **E-to-E mode**, the number of pixel lines of the CCD are thinned out by three (3) in the vertical direction (resulting in a 1024x256 pixel area), and a 960x240 pixel area is "cut" from the 1024x256 pixel area before being displayed on the camera's LCD. LG-1008, 4:40-41, 4:50-56, 7:11-32. In this manner, the E-to-E mode allows users to monitor a preview image and set an angle of view, focus, and/or exposure prior to pressing a shutter button to photograph an image. *See* *id.*, 7:11-32; LG-1003, ¶81.

When users ultimately press the shutter button, Tomita's camera is placed in **still picture photographing mode**. LG-1008, 7:33-38. In this mode, the camera's CCD outputs a high-resolution picture in XGA format (1024x768 pixels) that is directly stored to the camera's DRAM. *Id.*, 7:38-45. As Tomita explains, "[i]n the photographing mode, all pixels are read." *Id*., 4:38-39; LG-1003, ¶82.

Tomita describes that the camera can operate in **moving picture photographing mode** in order to record moving pictures. LG-1008, 7:56-59, 8:22-53. In this mode, users can set the picture size to QCIF format, corresponding to a 160x120 pixel area. *Id.*, 8:39-40, 5:51. However, as Tomita explains, since the size of each macro block in MPEG format is 16x16 pixels, "the upper portion and lower portion of a picture in the picture format QCIF are removed," resulting in a picture composed of 160x112 pixels stored to the camera's DRAM. *Id.*, 5:51-56, 8:39-42; LG-1003, ¶83.

#### 2. Kawahara Overview

*See supra* §IV.B.1.

#### 3. Parulski Overview

*See supra* §IV.A.2.

#### 4. Tomita-Kawahara-Parulski Combination

A POSITA would have been motivated to combine the teachings of Tomita, Kawahara, and Parulski because all three references pertain to digital cameras for recording still images and moving videos. LG-1006, 1:9-13; LG-1007, 1:17-21, 7:58-59; LG-1008, 1:6-19; LG-1003, ¶165. A POSITA would have been motivated to (1) add an image-instability detector, as Kawahara teaches, to Tomita's camera to implement vibration correction in Tomita's moving picture photographing mode and (2) add user control buttons, as Parulski teaches, to Tomita's camera for selecting between monitoring operation and image recording operation in static image mode from a list displayed on the LCD of Tomita's camera. LG-1003, ¶165.

First, a POSITA would have been motivated to modify Tomita's camera, based on Kawahara's teachings, to implement vibration correction while recording moving images in Tomita's "moving picture photographing mode." A POSITA would have been motivated to modify Tomita's camera to increase stability of moving pictures captured by Tomita's camera. LG-1003, ¶166. Tomita discloses forming relatively low-resolution images in moving picture photographing mode by using only a portion of the CCD's total pixel area (*see supra* §IV.C.1; LG-1003, ¶166), and Kawahara provides description of how analogous partial extraction frames can be used in conjunction with a vibration detector to implement vibration correction (*see supra* §IV.B.1; LG-1007, 13:46-55; LG-1003, ¶166). Moreover, Kawahara explains that its vibration correction technique is particularly important when recording moving images because moving images require "correction between frames." LG-1007, 7:66-8:2. Therefore, a POSITA would have found it predictable to add an image instability detector to Tomita's camera and implement vibration control, as Kawahara teaches, while recording moving images in Tomita's moving picture photographing mode. LG-1003, ¶166. Such a combination would amount to nothing more than using known techniques to improve similar devices in the same way. *Id.*; *see* MPEP §2143.

Second, a POSITA would have been motivated to add user control buttons, as Parulski teaches, to Tomita's digital camera so that users could select monitoring operation in static image mode (Tomita's "E-to-E mode"), recording operation in static image mode (Tomita's "still picture photographing mode"), or recording operation in moving video mode (Tomita's "moving picture photographing mode") from a list displayed on the camera's LCD. Tomita describes its E-to-E mode, still picture photographing mode, and moving picture photographing mode are selectable, for example, by users pressing a shutter button or using a mode switch. LG-1008, 4:40-42, 6:65-7:12, 7:33-38, 8:22-26. A POSITA would have been motivated to use an alternative user interface, such as Parulski's, to select between multiple modes. LG-1003, ¶167. Parulski provides a simple user interface for analogous selections by displaying a list of functions such as "Preview" and "Capture" on the status area 94 of LCD display screen 92 as well as including control buttons 96 for selecting between the functions. LG-1006, 3:23-37, 7:51-54, FIG. 11. It would have been predictable for a POSITA to modify Tomita's camera (which already includes an LCD) to implement Parulski's user interface to obtain the same benefits with a reasonable expectation of success. LG-1003, ¶167. As Mr. Hoarty explains, a POSITA would not have even had to modify the preview images formed in Tomita's E-to-E mode to make room for Parulski's status area on the LCD. *Id.* Thus, it would have been even ***simpler*** to implement Parulski's user interface with Tomita's camera compared to Parulski's. *Id.* Moreover, to the extent that images formed in Tomita's E-to-E mode ***would*** need to have a reduced number of pixel lines to be displayed, a POSITA would have been prompted to accomplish this with a reasonable expectation of success by using well-known line-thinning processes that do not decrease the view angle of images in Tomita's E-to-E mode. *Id.*

#### 5. Claim 1

***[1.pre]***

To the extent the preamble is limiting, Tomita-Kawahara-Parulski renders it obvious. LG-1003, ¶168. Tomita discloses a digital camera. LG-1008, 4:24-25, FIG. 1. Kawahara and Parulski disclose cameras. LG-1007, 1:8-12, 1:17-20; LG-1006, 1:9-13.

***[1.1]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶169. Tomita discloses a CCD (Charge Coupled Device) having a 1024x768 pixel array. LG-1008, 4:29-45. This CCD corresponds to *an image sensing device having an array of pixels arranged vertically and horizontally in a grid pattern*.

***[1.2]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶170. To the extent Tomita does not explicitly disclose an image-instability detector, Kawahara discloses this feature. *See supra* §IV.B.5.[1.2]. Additionally, as described above, a POSITA would have been motivated to add Kawahara's image-stability detector to Tomita's camera to increase stability of moving pictures captured by Tomita's camera. *See supra* §IV.C.4; LG-1003, ¶170.

***[1.3]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶¶171-172. Tomita discloses signal processing components for forming image signals based on output signals of the CCD including "converting portion" 3, "signal processing portion" 4, "memory controller" 5, "CPU" 12, and "encoder/decoder" 15. LG-1008, 5:11-6:3, FIG. 1. These components, either taken alone or in combination, correspond to *a signal processing unit configured to form image signals*.

Moreover, Tomita discloses that, depending on the mode of operation, image signals are formed with various predetermined view angles including a 960x240 pixel image in the E-to-E mode, 1024x768 pixel image in the still picture photographing mode, and 160x112 pixel image in the moving picture photographing mode. *See supra* §IV.C.1; LG-1003, ¶172. A POSITA would have recognized this as corresponding to *forming image signals with a predetermined view angle by using effective pixels of the image sensing device*. *Id.*

***[1.4]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶173. Tomita discloses "E-to-E mode" that allows users to monitor a preview image on the camera's LCD and set an angle of view, focus, and/or exposure prior to pressing a shutter button to photograph a still image. LG-1008, 7:11-32. This E-to-E mode corresponds to *monitoring in a static image mode*. Tomita also explains that, in the E-to-E mode, a 960x240 pixel area is "cut" from the area of 1024x256 pixels written to the buffer memory before displaying the image signals on the LCD. *Id.*; *see also supra* §IV.C.1. This disclosure corresponds to *during monitoring in a static image mode, to form image signals with a first view angle by using a first effective set of pixels of the image sensing device*. LG-1003, ¶173.

***[1.5]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶174. Tomita discloses a still picture photographing mode that corresponds to *recording in the static image mode*. LG-1008, 7:33-38. Tomita also discloses that, in this mode, the camera's 1024x256 pixel CCD outputs a high-resolution picture in XGA format (1024x768 pixels) directly stored to the camera's DRAM. *Id.*, 7:38-45. As Tomita states, "[i]n the [still picture] photographing mode, all pixels are read." *Id.*, 4:38-39. This disclosure corresponds to *during recording in the static image mode, to form image signals by using all effective pixels of the image sensing device*. LG-1003, ¶174.

***[1.6a]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶175. Tomita discloses a moving picture photographing mode that corresponds to *recording in a moving video mode*. LG-1008, 7:56-59, 8:22-53. Tomita also discloses that, in this mode, users can set the picture size to a QCIF format, corresponding to a 160x120 pixel area. *Id.*, 8:39-40, 5:51. However, as Tomita explains, since the size of each macro block in the MPEG format is 16x16 pixels, "the upper portion and lower portion of a picture in the picture format QCIF are removed," resulting in a cropped picture composed of 160x112 pixels that is stored to the camera's DRAM. *Id.*, 5:51-56, 8:39-42l. As explained by Mr. Hoarty and as shown in §IV.C.1, the view angle of this 160x112 pixel image is different from the first view angle (i.e., associated with the 960x240 pixel image formed during monitoring a static image in the E-to-E mode), and the image is formed using only a portion of the 1024x768 pixel array of the CCD. LG-1003, ¶175, *see supra*

§IV.C.1. Therefore, the foregoing cited portions of Tomita's disclosure corresponds to *during recording in a moving video mode, to form image signals with a second view angle, different from the first view angle, by using a second effective set of pixels which is a portion of the array of pixels of the image sensing device*. LG-1003, ¶175.

***[1.6b]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶176. While Tomita discloses *recording in a moving video mode* (*see supra* §IV.C.5.[1.6a]), it does not explicitly disclose a technique for correcting image-instability in this mode. However, Kawahara discloses this feature. *See supra* §IV.B.5.[1.6b]. Furthermore, as described above, it would have been obvious to a POSITA to combine the teachings of Kawahara with Tomita's camera to increase the stability of moving pictures captured by Tomita's camera. *See supra* §IV.C.4; LG-1003, ¶176.

***[1.7]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶177. Tomita discloses the camera includes "displaying portion (LCD 8)" configured to display photographed pictures formed by the signal processing unit (including both still pictures and moving pictures). LGE-1008, 4:65-67; *see also id.*, FIG. 1, 7:24-32, 8:60-62, 9:4-10. This LCD corresponds to the claimed *display unit*.

### 6. Claim 2

***[2]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶¶178-179. As described above, Tomita discloses a camera in which the first view angle (associated with monitoring in static image mode) is *different* than the second view angle (associated with recording in moving video mode). *See supra* §IV.C.5.[1.6a]; LG-1003, ¶178.

Tomita discloses that the first view angle can be *larger* than the second view angle. As explained by Mr. Hoarty and as shown in §IV.C.1, the view angle of the 960x240 pixel image formed in E-to-E mode (i.e., the first view angle) preserves ***93.8%*** of the image height prior to the cutting operation. *See supra* §IV.C.1; LG-1003, ¶179. This is larger than the view angle of the 160x112 pixel image (i.e., the second view angle) formed in moving picture photographing mode, which preserves only ***93.3%*** of the image height prior to removing the upper and lower portions of the 160x120 pixel QCIF format image. *See id.* Therefore, a POSITA would understand that Tomita discloses that *the first view angle is larger than the second view angle*. LG-1003, ¶179.

### 7. Claim 3

***[3.pre]***

To the extent the preamble is limiting, Tomita-Kawahara-Parulski renders it obvious. LG-1003, ¶¶180-184. Tomita, Kawahara, and Parulski all disclose cameras and methods for operating them. *See* LG-1008, 4:24-28; LG-1007, 1:8-20; LG-1006, 2:24-31; *supra* §IV.C.5.[1.pre]; LG-1003, ¶180.

Tomita-Kawahara-Parulski also renders obvious that the camera includes the claimed "image sensing device." *See supra* §IV.C.5.[1.1]; LG-1003, ¶181.

Tomita-Kawahara-Parulski also renders obvious that the camera includes the claimed "signal processing unit." *See supra* §IV.C.5.[1.3]; LG-1003, ¶182.

Tomita-Kawahara-Parulski also renders obvious that the camera includes the claimed "display unit." *See supra* §IV.C.5.[1.7]; LG-1003, ¶183.

Tomita-Kawahara-Parulski also renders obvious that the camera includes the claimed "image-instability detector." *See supra* §IV.C.5.[1.2]; LG-1003, ¶184.

***[3.1]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶185. Tomita discloses that E-to-E mode, still picture photographing mode, and moving picture photographing mode are selectable, for example, by users pressing a shutter button or using a mode switch. LG-1008, 4:40-42, 6:65-7:12, 7:33-38, 8:22-26. Therefore, Tomita discloses a method for operating a camera that includes *selecting between a static image mode and a moving video mode*.

***[3.2]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶186.

To the extent this element requires a list of operations to be displayed, Parulski describes this element. *See supra* §IV.A.6.[3.2]. And as described above, it would have been obvious to a POSITA to add Parulski's display features and user control buttons to Tomita's camera as an alternative user interface for selecting between Tomita's modes. *See supra* §IV.C.4; LG-1003, ¶186.

***[3.3]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶187. As described above, Parulski discloses an LCD 92 that includes status area 94 for displaying a list of operations including "zoom in" function, "zoom out" function, "preview" function, and "capture" function as well as corresponding user control buttons for selecting these operations. *See supra* Sections IV.A.6.[3.2], IV.B.7.[3.2], IV.C.7.[3.2]; LG-1003, ¶187. Parulski's "preview" function corresponds to operating the camera in "motion preview mode" for producing a preview image prior to capturing a still image from the image sensor, and Parulski's "capture" function corresponds to operating the camera in "still image mode" for capturing and storing the still image from the image sensor. LG-1006, 1:9-13, 2:25-31, 3:45-47, 6:27-31; LG-1003, ¶187. Therefore, Parulski's user-selectable "preview" function corresponds to *selecting an operation from a list of operations including a monitoring of an image in the static image mode*, and Parulski's user-selectable "capture" function corresponds to *selecting an operation from a list of operations including … a recording of an image in the static image mode*. And as described above, it would have been obvious to a POSITA to add Parulski's display features and user control buttons to Tomita's camera as an alternative user interface for selecting between Tomita's modes. *See supra* §IV.C.4; LG-1003, ¶187.

***[3.4]***

Tomita-Kawahara-Parulski renders obvious this element. LG-1003, ¶¶188-189. Tomita discloses a camera with a selectable moving picture photographing mode, which can be selected, for example, when users press a shutter of the camera to photograph a moving picture. LG-1008, 8:22-26. This disclosure corresponds to *when in the moving video mode, selecting an operation from a list of operations including: recording of an image in the moving video mode*.

To the extent element [3.4] requires a list of operations to be displayed, this would have been obvious, at least because Parulski discloses an LCD 92 that includes status area 94 for displaying a list of operations including a "capture" function. *See supra* Sections IV.A.6.[3.2], IV.B.7.[3.2], IV.C.7.[3.2]. Although Parulski describes capturing still images, it would have been obvious to provide a similar display and user control button for capturing moving pictures in Tomita's moving picture photographing mode. LG-1003, ¶189. As Mr. Hoarty explains, a

POSITA would have been motivated to do so to achieve a similar user experience across camera modes. *Id*.

***[3.5]***

*See supra* §IV.C.5.[1.4]; LG-1003, ¶190.

***[3.6]***

*See supra* §IV.C.5.[1.5]; LG-1003, ¶191.

***[3.7a]***

*See supra* §IV.C.5.[1.6a]; LG-1003, ¶192.

***[3.7b]***

*See supra* §IV.C.5.[1.6b]; LG-1003, ¶193.

#### 8. Claim 4

***[4]***

*See supra* §IV.C.6.[2]; LG-1003, ¶194.

## V. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

### A. *Fintiv*

The facts do not favor denial under *Apple v. Fintiv*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential). The merits of Petitioner's arguments are compelling, and supporting evidence is substantial. That "alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*." LG-1010, 4-5.

***Factor 1*** is neutral; neither party has requested a stay in litigation.

***Factor 2*** favors institution; no trial date is set. The Board will issue its FWD around August 2026, approximately ***1.5 years*** before any projected trial date (1/25/2028). LG-1011, 66.

***Factor 3*** favors institution; Petitioner has filed this Petition before the one-year bar, and litigation is in early stages with claim construction not yet underway and initial invalidity contentions not yet served. Significant resources have not been expended.

***Factor 4*** favors institution; Patent Owner only alleges infringement of claims 3 and 4, while this Petition challenges more than the asserted claims. Accordingly, a material number of Challenged Claims will likely be unaddressed in the litigation. *See Apple, Inc. v. SEVEN Networks, LLC*, IPR2020-00156, Paper 10, 21-22 (June 15, 2020).

***Factor 5:*** The parties in the parallel litigation are the same.

***Factor 6*** favors institution; the merits of this Petition are compelling and the references forming the grounds demonstrate the obviousness of the claims. *See supra* §IV.

### B. *General Plastic*

The factors in *General Plastic Industries Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017) (precedential) do not favor denial.

***Factor 1****:* While other parties—ZTE Corporation and ZTE (USA), Inc. (collectively "ZTE")—challenged the '729 Patent in IPR2018-00238, respectively, Petitioner here was neither the same petitioner nor a real party-in-interest. Rather, Petitioner and the prior petitioners are competitors who sell different products and do not have a "significant relationship … with respect to [the challenged patent]." *Valve Corp. v. Elec. Scripting Prods., Inc.*, IPR2019-00062, Paper 11 at 2, 9 (PTAB Apr. 2, 2019) (precedential).

***Factors 2-5****:* The remaining *General Plastic* factors are "necessarily outweigh[ed]" when different petitioners have no "significant relationship." *Videndum Prod. Sols., Inc. v. Rotolight Ltd.*, IPR2023-01218, Paper 12, at 6 (PTAB Apr. 19, 2024) (Vidal). *Videndum* is controlling here.

***Factors 6-7*** favor institution. The Petition presents compelling evidence of unpatentability and furthers "the Board's mission to improve patent quality." *Code200, UAB v. Bright Data Ltd.*, IPR2022-00861, 2022 WL 3646167, at *3 (PTAB Aug. 23, 2022) (precedential). The Petition—the only one challenging the '729 Patent before the Board—provides an efficient means for resolving patentability. *See Micron Tech., Inc. v. Sonrai Memory Ltd.*, IPR2023-00909, Paper 7, 9 (PTAB Nov. 28, 2023).

### C. *Advanced Bionics* Test Favors Institution - 35 U.S.C. §325(d)

The grounds advanced in this Petition are based on four prior art references:

Misawa, Parulski, Kawahara, and Tomita. Neither the Office nor the Board has previously considered these specific references, or combinations of the references as proposed by this Petition.[2] For this reason alone, discretionary denial is improper under *Advanced Bionics*. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, 8-9 (PTAB Feb. 13, 2020) (precedential).

Using the Board's two-part framework and evaluation of "the *Becton* factors," such evaluation favors institution. *Id*., 8-10 (citing *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential as to §III.C.5, first paragraph) ("*Becton*"); *see* Trial Practice Guide July

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[2] A priority patent (U.S. Patent No. 5,828,406) to the Parulski reference relied upon in this Petition was cited by the applicant during prosecution and appears on the face of the '729 patent, and this same priority patent was used in Ground 1 of IPR2018-00238 filed by ZTE ("the ZTE IPR"). The Examiner did not substantively consider the Parulski '406 patent during prosecution, and certainly did not consider the combinations of the related Parulski '218 reference presented in this Petition. EX-1002. Moreover, while the Board substantively considered the Parulski '406 patent during the ZTE IPR, the Board did not consider the combinations of the related Parulski '218 reference presented in this Petition.

2019 Update, 28-31, Fed. Reg. 33,925 (July 16, 2019).

*Becton* factors (a)-(c), and (d) support institution because this Petition does not present substantially the same prior art combinations or arguments that were previously before the Office. Indeed, none of the specific references used herein were previously considered by the Office or the Board.[3] Thus, the present combinations are not cumulative of those previously before the Board or Office.

Given part 1 is not satisfied, there is no reason for the Board to advance to part 2. *Advanced Bionics,* Paper 6 at 8. But even if *Becton* factors (e) and (f) are considered, they favor Petitioner. For example, as previously noted, (i) neither the Board nor the Office has previously considered any of the references and certainly did not consider the combinations of references presented in this petition and (ii) the Board has not made any factual findings as to the teachings of the combinations of references as presented in this Petition.[4] *Id.*, 26.

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[3] *See* n. 1.

[4] In an IPR directed to U.S. Patent No. 8,339,493 (IPR2018-00904), which is in the same family as the '729 patent challenged herein, Petitioner relied on a combination of Misawa and Parulski. However, the Board did not consider the merits of the obviousness grounds presented herein and made no factual findings as to the

## VI. CONCLUSION AND FEES

The Challenged Claims are unpatentable. Petitioner authorizes charge of fees to Deposit Account 06-1050.

## VII. MANDATORY NOTICES UNDER 37 C.F.R §42.8(a)(1)

### A. Real Party-In-Interest Under 37 C.F.R. §42.8(b)(1)

LG Electronics, Inc. and LG Electronics USA, Inc. are the real parties-in-interest.

### B. Related Matters Under 37 C.F.R. §42.8(b)(2)

The '729 Patent is the subject of a civil action, *Maxell, Ltd. v. LG Electronics Inc. et al*., 5-23-cv-00152 E.D. Tex. filed December 29, 2023 (transferred) and *Maxell, Ltd. v. LG Electronics Inc. et al*., 5-24-cv-04972 N.D. Cal. filed August 9, 2024 (pending), *Maxell, Ltd. v. Apple Inc.,* 6-21-cv-00158 (WDTX) filed February 19, 2021, *Maxell Ltd. v. ZTE Corporation,* 5-18-cv-00080 (EDTX) filed June 15, 2018; *ZTE Corporation et al v. Maxell, Ltd. et al.,*IPR2018-00238 (PTAB) filed November 22, 2017 and *Maxell, Ltd. v. ZTE Corporation et al.,* 5-16-cv-00179 (EDTX) filed November 18, 2016.

Petitioner is not aware of any other disclaimers, reexamination certificates, or IPR petitions addressing the '729 Patent.

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teaching of the combination of Misawa and Parulski. *Olympus Corp. et al. v. Maxell Ltd.*, IPR2018-00904, Paper 9 (PTAB Dec. 26, 2018).

### C. Lead And Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

Petitioner provides the following designation of counsel.

| Lead Counsel | Backup counsel |
|---|---|
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### D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at IPR18768-0217IP5@fr.com

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Respectfully submitted,

Dated January 10, 2025

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**CERTIFICATION UNDER 37 CFR §42.24**

Under the provisions of 37 CFR §42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,990 words, which is less than the 14,000 allowed under 37 CFR §42.24.

Dated January 10, 2025

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## CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on January 10, 2025, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided by Express Mail, to the Patent Owner, by serving the correspondence address of record as follows:

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