UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners

v.

MAXELL, LTD.,
Patent Owner

Inter Partes Review No. IPR2025-01315

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. U.S. 8,471,950 UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. §§ 42.1-100, ET SEQ

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1008	JP2007-25559 to Shui

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CHART OF CLAIMS

[1Pre] A signal processor comprising:
[1a] a feature detection unit which detects a position where features of each pixel of an input picture signal have changed;
[1b] a region creation unit which creates a region by removing pixels with the features from an evaluated value extraction region;
[1c] an evaluated value extraction unit which extracts an evaluated value in accordance with the evaluated value extraction region;
[1d] a processing unit which applies predetermined processing to the picture signal; and
[1e] a control unit which controls the processing unit in accordance with the evaluated value having been extracted by the evaluated value extraction unit;
[1f] wherein the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.
[2Pre] A signal processor according to claim 1, wherein
[2a] the feature detection unit includes: a hold unit which holds position information of the detected pixels; and
[2b] the region creation unit which creates a region by excluding the held positions from an evaluated value extraction region.
[3Pre] A signal processor according to claim 2, wherein:
[3a] the processing unit includes a focus lens, and a drive unit for driving the focus lens;
[3b] a photoelectric conversion unit for performing photoelectric conversion is disposed between the focus lens and the extraction unit; and
[3c] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.
[4Pre] A signal processor according to claim 2, wherein:
[4a] the processing unit is a signal processing unit for adjusting white balance of an input picture signal; and
[4b] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.
[5Pre] A signal processor according to claim 2, wherein:
[5a] the region creation unit includes a region segmentation unit for segmenting an effective region in advance, and an overlap detection unit which detects

overlap of position information output from the hold unit with blocks segmented by the region segmentation unit; and
[5b] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.
[6Pre] A signal processor according to claim 2,
[6a] wherein the region creation unit includes a unit which keeps the total area of the evaluated value extraction region constant by excluding unnecessary portions from the evaluated value extraction region.
[7Pre] A signal according to claim 2, wherein:
[7a] the processing unit is a light intensity adjustment unit for controlling exposure;
[7b] a lens and a photoelectric conversion unit for performing photoelectric conversion are disposed between the light intensity adjustment unit and the extraction unit; and
[7c] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.
[8Pre] A signal processor according to claim 7, wherein:
[8a] the region creation unit includes a region segmentation unit for segmenting an effective region in advance, and an overlap detection unit which detects overlap of position information output from the hold unit with blocks segmented by the region segmentation unit; and
[8b] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.
[9Pre] A signal processor according to claim 7,
[9a] wherein the region creation unit includes a unit which keeps the total area of the evaluated value extraction region constant by excluding unnecessary portions from the evaluated value extraction region.
[10Pre] A signal processor according to claim 1, wherein:
[10a] the processing unit is a light intensity adjustment unit for controlling exposure;
[10b] a lens and a photoelectric conversion unit for performing photoelectric conversion are disposed between the light intensity adjustment unit and the extraction unit; and
[10c] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.

[11Pre] A signal processor according to claim 1,
[11a] wherein the region creation unit includes a unit which keeps the total area of the evaluated value extraction region constant by excluding unnecessary portions from the evaluated value extraction region.
[12Pre] A signal processor according to claim 1, wherein:
[12a] the processing unit includes a focus lens, and a drive unit for driving the focus lens;
[12b] a photoelectric conversion unit for performing photoelectric conversion is disposed between the focus lens and the extraction unit; and
[12c] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.
[13Pre] A signal processor according to claim 12,
[13a] wherein the region creation unit includes a unit which keeps the total area of the evaluated value extraction region constant by excluding unnecessary portions from the evaluated value extraction region.
[14Pre] A signal processor according to claim 1, wherein:
[14a] the processing unit is a signal processing unit for adjusting white balance of an input picture signal; and
[14b] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.
[15Pre] A signal processor according to claim 14,
[15a] wherein the region creation unit includes a unit which keeps the total area of the evaluated value extraction region constant by excluding unnecessary portions from the evaluated value extraction region.

I. INTRODUCTION

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. ("Samsung" or "Petitioners") hereby petition for inter partes review of U.S. Patent No. 8,471,950 ("'950 patent"). EX1001. The '950 patent describes a signal processor having a feature detection unit that detects a position where features of each pixel of an input picture signal have changed, a region creation unit that creates a region by removing pixels with the features from an evaluated value extraction region, and a control unit that controls processing based on the evaluated value from the region where pixels with certain features have been removed. As shown below, the techniques described in the '950 patent were known in the prior art.

In accordance with 37 C.F.R. § 42.104(a), Petitioner certifies that the '950 patent is available for inter partes review and that Petitioner is not barred or estopped from requesting an inter partes review challenging the patent claims on the grounds identified in this Petition.

II. STATEMENT OF PRECISE RELIEF REQUESTED

Petitioner requests cancelation of claims 1-15 of the '950 patent in view of the following grounds, which are based on, and substantial portions of which are adapted from, the declaration of Dr. Schonfeld (EX1003):

Ground	Claims	Statutory Basis	Prior Art
1	1-15	35 U.S.C. § 103	Tsujino in view of Iwasaki
2	1-15	35 U.S.C. § 103	Tsujino in view of Shui and Iwasaki
3	1-15	35 U.S.C. § 103	Shui in view of Iwasaki

III. THE '950 PATENT

A. Overview of the '950 Patent

The '950 patent issued from U.S. Patent Application No. 12/621,304 ("'304 application"), filed on 11/18/2009, and it claims priority to Japanese Patent Application No. 2008-303423, filed on 11/28/2008. EX1003, ¶29.

The '950 patent addresses the problem that when high-luminance portions exist in focusing lens position detection regions, conventional systems may need to repeatedly change regions and confirm the absence of high-luminance portions, which can be inefficient. EX1001, 1:20-31. The patented solution analyzes the image, detects problematic pixels (bright spots), and excludes them from the evaluation for controlling the intensity of the input signal via the processing unit. *Id.*, 3:9-22. EX1003, ¶¶30-31.

B. Overview of the '950 Patent's File History

The '304 application claims priority to Japanese patent application JP 2008-303423, filed on 11/28/2008. In the Notice of Allowance, the Examiner noted that the prior art failed to disclose "the active creation of a region from the entire image where pixels containing a certain feature are actively removed" and distinguished

the claimed invention from Takeda, which chooses a "separate fixed evaluation region when an area of irregular brightness is detected, which is not the same as creating a dynamic region where the irregularity is removed." EX1002, 3/19/2013 NOA, at page 4. EX1003, ¶¶32-34.

C. Person of Ordinary Skill in the Art

A person of ordinary skill in the art ("POSITA") at the time of the alleged invention of the '950 patent would have had a bachelor's degree in computer science, electrical or computer engineering, or a comparable field of study, plus approximately two to three years of professional experience with image processing, video processing, or other relevant industry experience. Additional education could substitute for professional experience, and significant industry experience could substitute for formal education. EX1003, ¶¶35-36.

IV. CLAIM CONSTRUCTION

The challenged claims are interpreted using the same claim construction standard that is used to construe the claim in a civil action. 37 C.F.R. § 42.100(b).

Petitioner does not contend that its proposed constructions are complete constructions of these elements or the claims for any other purpose, including for issues in the related litigation. Because the prior art discloses the preferred embodiments within the indisputable scope of the claims, the Board need not construe the outer bounds of the claims as part of these proceedings.

The '950 patent claims recite several "unit" terms that may implicate 35 U.S.C. § 112, ¶6. Petitioner addresses each below, providing both plain and ordinary meaning (POM) and means-plus-function (MPF) interpretations where appropriate.

While Petitioner has provided MPF interpretations for the below terms based on the '950 patent's specification, Petitioner expressly reserves the right to argue that the specification fails to disclose sufficient corresponding structure for one or more of these terms under § 112, ¶6.

1. POM Terms

Petitioner submits that the following terms should be interpreted under their POM, as these terms recite sufficiently definite structure. However, should the Board disagree, Petitioner also offers MPF interpretations.

a) Processing Unit (Claims 1, 3-5, 7, 8, 10, 12 & 14)

Function: Applying predetermined processing to the picture signal.

Structure: The corresponding structure shown at Elements 1 and 35 in Figs. 1, 10, 11 and 13 is a software algorithm executing on a processor. EX1001, 2:14-16; 4:53-58. The predetermined processing algorithm controls signal intensity of the input image signal and white balancing. *Id*., 3:6-59; 4:29-35; 6:35-44. EX1003, ¶¶39-40.

b) Control Unit (Claims 1, 3-5, 7, 8, 10, 12, 14)

Function: Controlling the processing unit in accordance with evaluated values.

Structure: The corresponding structure shown at Element 3 in Figs. 1, 6, 7, 10, 11 and 13 is a software algorithm executing on a processor. EX1001, 2:14-16 and 4:53-58. The control algorithm includes adjusting focus and exposure based on evaluated values, as well as controlling the processing unit and/or the drive unit that drives the lens and aperture. *Id*., 3:6-22; 5:1-29. EX1003, ¶¶41-42.

c) Hold Unit (Claims 2, 5 & 8)

Function: Holding position information of detected pixels.

Structure: The corresponding structure shown at Element 5 in Figs. 1, 6, 7, 10, 11 and 13 is a software algorithm executing on a processor. EX1001, 2:14-16, 4:53-58. The hold unit's algorithm includes storing and retrieving position information for multiple pixels, which requires rapid data storage and retrieval capabilities. *Id*., 3:39-59. EX1003, ¶¶43-44.

d) Light Intensity Adjustment Unit (Claim 7 & 10)

Function: Controlling exposure.

Structure: The light intensity adjustment unit is a controllable shutter mechanism for adjusting exposure. EX1001, Fig. 6 element 28, 4:60-

5:9. EX1003, ¶¶45-46.

e) Drive Unit (Claims 3 & 12)

Function: Driving the lens.

Structure: The drive unit is a component connected to the lens for controlling its movement. EX1001, Figs. 7 element 33,5:45-49; 5:60-64, 6:17-23. EX1003, ¶¶47-48.

f) Photoelectric Conversion Unit (Claims 3, 7, 10, 12)

Function: Converting light to electrical charge that indicates image intensity.

Structure: The photoelectric conversion unit is a component in the optical path. EX1001, Figs. 6, 7, and 10 element 30, 5:1-9; 5:14-18. EX1003, ¶¶49-50.

2. MPF Terms

Petitioner submits that the following terms should be interpreted as MPF due to the use of "unit" and lack of well-known structural meanings for each term. If the Board does not agree, then Petitioner submits that the elements should be interpreted according to their POM.

a) Feature Detection Unit (Claims 1 and 2)

Function: Detecting a position where features of each pixel of an input picture signal have changed.

Structure: The overall structure shown at Element 4 in Figs. 1, 6, 7, 10, 11 and 13 is a software algorithm executing on a processor. EX1001, 2:14-16; 3:22-59; 4:36-58. The specific feature detection algorithm analyzes pixel data to identify changes in image features. *Id*., 2:22-47; 3:23-59. EX1003, ¶¶51-52.

b) Region Creation Unit (Claims 1, 2, 5, 6, 8, 9, 11, 13 and 15)

Function: Creating a region by removing pixels with the detected features from an evaluated value extraction region.

Structure: The overall structure shown as element 6 in Figs. 1, 6, 7 and 10, element 37 in Fig. 11 and element 43 in Fig. 13 is a software algorithm executing on a processor. EX1001, 2:14-16; 3:60-4:35; 4:53-58. The region creation algorithm manipulates pixel data to define specific regions for evaluation. *Id*., 2:60-3:5; 3:60-4:35. EX1003, ¶¶53-54.

c) Evaluated Value Extraction Unit (Claim 1, 3, 7, 10 and 12)

Function: Extracting an evaluated value in accordance with the created region.

Structure: The overall structure shown as Elements 7, 34, and 36 in Figs. 1, 6, 7, 10, 11 and 13 is a software algorithm executing on a processor. EX1001, 2:14-16; 4:23-40; 4:53-58. The evaluated value

extraction algorithm performs calculations on pixel data within defined regions. *Id*., 4:1-10; 4:23-40. EX1003, ¶¶55-56.

d) Region Segmentation Unit (Claims 5 & 8)

Function: Segmenting the effective region in advance.

Structure: The overall structure shown as Element 38 in Figs. 11 and 13 and is described as a software algorithm executing on a processor. EX1001, 2:14-16; 4:53-58; 7:5-44. The region segmentation algorithm divides the image into multiple regions for analysis. *Id*., 7:5-44. EX1003, ¶¶57-58.

e) Overlap Detection Unit (Claims 5 & 8)

Function: Detecting overlap of position information with segmented blocks.

Structure: The overall structure shown as Element 39 in Figs. 11 and 13 and is described as a software algorithm executing on a processor. EX1001, 2:14-16; 4:53-58; 7:5-44. The overlap detection algorithm compares pixel positions with predefined regions. *Id*., 7:5-44. EX1003, ¶¶59-60.

V. SUMMARY OF PRIOR ART

A. Tsujino

Tsujino was filed 8/26/2008, which predates the earliest priority date of the

'950 patent. Tsujino is prior art under at least 35 U.S.C. § 102(e). Tsujino relates to an electronic camera. EX1005, Fig. 1 element 10. Tsujino discloses a signal processor 26, luminance evaluator 28 and CPU 46 that work in conjunction to detect high-luminance pixels in an image, exclude the high-luminance pixels from evaluation to improve camera control functions such as signal intensity control via AGC 20. *Id.*, Figs. 1 and 11, 6:8-47 and 10:62 to 12:62. Tsujino is analogous art to the '950 patent and was not considered during prosecution of the '950 patent. EX1003, ¶¶61-63.

B. Shui

Shui was filed 7/21/2005, and published on 2/1/2007, which predates the earliest priority date of the '950 patent. Shui is prior art under at least 35 U.S.C. § 102(b). Shui relates to an apparatus that can accurately detect focal position even when high-luminance point light sources exist in the image. EX1006, ¶[0006]. Shui discloses dividing a focus area into multiple regions, obtaining focus evaluation values and photometric values across the entire focal range, and selectively excluding regions with high-luminance points from focus evaluation. *Id.*, ¶¶[0015]-[0016]. Shui detects positions where focus evaluation values peak and compares photometric values at positions before and after these peaks to determine whether they represent true focal positions or false peaks caused by point light sources. *Id.*, Figs. 1, 6, ¶¶ [0007]-[0008]. Shui is analogous art to the

'950 patent and was not considered during prosecution of the '950 patent. EX1003, ¶¶64-66.

C. Iwasaki

Iwasaki was filed 1/24/2007 and published on 8/16/2007 and is prior art under at least 35 U.S.C. § 102(b). Iwasaki relates to a camera and imaging method for appropriately photographing scenes having large differences in luminance. EX1007, Abstract, ¶[0007]. Iwasaki performs subject segmentation processing to group pixels into areas belonging to the same subject, calculates average luminance values for each grouped area, and determines proper exposure values so that the average luminance value of the group including the main subject becomes the standard output value. *Id.*, ¶¶ [0080]-[0082]. Iwasaki teaches excluding groups showing average luminance values that are larger than a predetermined value from exposure calculations and determining the highest remaining value as the basis for exposure correction. *Id.*, ¶¶ [0083]- [0084]. The system automatically adjusts exposure correction values and gradation characteristic data based on difference values between proper exposure values and the highest values to prevent white saturation of high-luminance subjects and black saturation of low-luminance subjects. *Id.*, ¶s [0085], [0086] and [0108]. The system selects gradation characteristic data suitable for processing the image data. *Id.*, ¶¶ [0085]; [0086]; [0105]. The digital processing circuit then executes gradation conversion

processing based on the selected gradation characteristic data to generate the appropriate photographed image data. *Id.*, ¶¶ [0100]; [0106]. Iwasaki is analogous art to the '950 patent and was not considered during prosecution of the '950 patent. EX1003, ¶¶67-70.

VI. GROUND 1: CLAIMS 1-15 ARE OBVIOUS OVER TSUJINO IN VIEW OF IWASAKI

A. Proposed Combination

Tsujino in view of Iwasaki discloses and renders obvious claims 1-15 of the '950 patent. A POSITA would have been motivated to combine Tsujino and Iwasaki because both references address the common problem of improving camera performance in challenging lighting conditions through selective evaluation of image regions. Tsujino teaches a system for excluding high-luminance pixels from autofocus evaluation to prevent focus errors caused by bright light sources. EX1005, 12:45-58. Iwasaki complements this approach by teaching exposure control techniques that similarly exclude problematic high-luminance regions from exposure calculations. EX1007, ¶[0084]. EX1003, ¶73.

Both references employ analogous methodologies of analyzing image regions and selectively excluding certain areas from processing to achieve better results. Tsujino's high-luminance excluding function for auto-focus (AF) control and Iwasaki's technique of excluding groups with average luminance values that are larger than a predetermined value from exposure calculations represent the

same underlying principle applied to different camera functions. EX1005, 12:45-58; EX1007, ¶[0084]. EX1003, ¶74.

A POSITA would have recognized that combining these complementary techniques would result in a comprehensive camera system capable of handling both autofocus and exposure control in scenes with challenging lighting conditions. Iwasaki's teachings would naturally extend Tsujino's selective evaluation approach from AF control to auto-exposure (AE) control, as both processes benefit from accurate scene analysis that excludes potentially misleading high-luminance regions. EX1007, ¶¶[0056]-[0058], [0085], [0086], [0100] [0105]-[0106]. EX1003, ¶75.

The combination would have been straightforward for a POSITA because both references use similar hardware architectures (image sensors, processing circuits, CPUs) and compatible image processing techniques (luminance evaluation, region-based analysis). EX1005, Fig. 1; EX1007, ¶¶[0053]-[0058]. A POSITA would have had a reasonable expectation of success in combining these references to create an improved camera system with enhanced performance in both focus and exposure control under difficult lighting conditions. EX1003, ¶76.

B. Claim 1

Tsujino in view of Iwasaki discloses claim 1.

1. [1pre]

Tsujino discloses a signal processor for image processing that performs autofocus and exposure control functions. EX1005, Fig. 1, 6:8-20. The signal processor in Tsujino includes multiple components working together to process image signals, including CDS/AGC/AD circuit 20 that performs correlated double sampling, automatic gain control, and analog-to-digital conversion on raw image signals. *Id.*, Fig. 1, 6:8-41. Additional processing components include signal-processing circuit 26 that applies white-balance adjustment and other image processing, luminance evaluation circuit 28 that calculates luminance evaluation values, focus evaluation circuit 30 that calculates focus evaluation values, and CPU 46 that controls these components based on the evaluation results. *Id.*, Fig. 1, 6:16-41, 7:4-41. Together, these components form a comprehensive signal processor that analyzes image data and controls various camera functions based on the analysis results. *Id.*, Fig. 1, 6:8-7:41. EX1003, ¶78.

The above argument also applies to preambles of claims 2-15. EX1003, ¶79.

2. [1a]

Tsujino discloses a CMOS-type image sensor that converts an optical image into a digital image. EX1005, 6:10-16. Further, Tsujino discloses CPU 46 detecting positions of high-luminance pixels that exceed a threshold by implementing a process that evaluates each pixel in the focus area to determine if its luminance value exceeds predefined thresholds. EX1005, Fig. 12; 11:26-36. When a light

source is detected in the scene, TH1 is used as the reference value (REF) for excluding high-luminance pixels from evaluation. *Id.*, Fig. 12; 11:47-55. This detection process systematically scans through the image in a raster scanning mode to identify positions where the luminance characteristics meet the specified criteria. *Id.*, Fig. 12; 11:26-36. Tsujino's pixel-by-pixel analysis identifies changes in luminance for each pixel of the input picture signal. *Id.*, 11:26-36. Therefore, Tsujino discloses a feature detection unit that detects a position where features of each pixel of an input picture signal have changed. EX1003, ¶80.

To the extent Patent Owner argues that Tsujino may not specifically teach detecting positions where features of pixels "have changed," Tsujino discloses data changes at the position of the light source, where "exceeding TH1" indicates a degree of change in data due to the light source. This corresponds to the '950 patent's disclosure where signal intensity distribution 13 changes at the position of the light source (Fig. 2 of the '950 patent), and at the same position, differential result 14 also changes and exceeds a threshold due to the light source ('950 patent, 3:32-42). Thus, a POSITA would have understood that the claimed "detecting a position where features of each pixel have changed" and Tsujino's threshold-based detection method are functionally equivalent because Tsujino's method identifies positions where pixel luminance values differ from a baseline threshold value, which represents a change in pixel characteristics. EX1005, Fig. 12, 11:26-36. A

POSITA would have recognized that when Tsujino's system detects pixels exceeding luminance thresholds, it is identifying positions where pixel features have changed relative to a reference state (*i.e.*, below-threshold state), which is particularly relevant when identifying high-luminance areas that affect autofocus performance. *Id.*, Fig. 12; 11:26-36. EX1003, ¶81.

Furthermore, to the extent Patent Owner still argues that Tsujino may not specifically teach detecting positions where features of pixels "have changed," a POSITA would have understood that Tsujino's threshold-based detection method considers a baseline range of luminance values that are below a threshold value and identifies pixel positions whose luminance values exceed that baseline (*i.e.*, luminance values that are higher than a threshold). This detection therefore identifies pixel locations whose luminance values have changed compared to the luminance values of other pixel locations in the image. Once again, this identification is particularly relevant when identifying high-luminance areas that affect autofocus performance. EX1005, Fig. 12; 11:26-36. EX1003, ¶82.

In addition, Iwasaki teaches feature detection through its analyzing calculating section 34 that performs subject segmentation processing to group pixel areas belonging to the same subject and calculates average luminance values for each grouped area. EX1007, ¶¶[0080]-[0082]. This segmentation identifies positions where different subjects with different luminance characteristics are

located, which corresponds to detecting positions where pixel features have changed. The combination of Tsujino's threshold-based detection and Iwasaki's subject-based grouping provides a comprehensive approach to feature detection. EX1003, ¶83.

Tsujino and Iwasaki disclose this element under construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Tsujino CPU 46 in Fig. 1, Iwasaki analyzing calculating section 34 and CPU 42) that analyze pixel data to identify changes in image features. EX1003, ¶84.

3. [1b]

Tsujino teaches a system where CPU 46 designates evaluation areas on the object scene image and modifies focus evaluation values based on brightness characteristics. EX1005, Fig. 1, 12:41-45. CPU 46 implements a high-luminance excluding function that excludes pixels having luminance exceeding a threshold "TH1" from being considered during focus evaluation. *Id.*, Fig. 1, 12:45-58. This exclusion process creates regions where certain pixels (high-luminance pixels) are excluded from consideration during the evaluation process. *Id.*, Fig. 1, 12:41-45. EX1003, ¶85.

While the claim recites creating a region by removing pixels with the features from an evaluated value extraction region, Tsujino teaches excluding high-

luminance pixels from focus evaluation consideration. A POSITA would have understood that these teachings are functionally equivalent because in both cases, specific pixels with particular characteristics (high luminance) are identified and removed from the evaluation process, thereby creating a modified region consisting of only those pixels that remain after the exclusion process. EX1003, ¶86.

In addition, Iwasaki complements this approach by teaching a system that excludes groups showing average luminance values that are larger than a predetermined value from exposure calculations and determines the highest remaining value as the basis for processing. EX1007, ¶[0084]. This exclusion process creates modified regions by removing problematic luminance areas from consideration, which reinforces Tsujino's approach of creating regions by removing pixels with certain characteristics from evaluation regions. EX1003, ¶87.

Tsujino and Iwasaki disclose this element under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Tsujino CPU 46 in Fig. 1, Iwasaki analyzing calculating section 34 and CPU 42) that manipulate pixel data to define specific regions for evaluation by excluding pixels with particular characteristics. EX1003, ¶88.

4. [1c]

Tsujino teaches a system that calculates evaluation values from pixels in the region for autofocus control. EX1005, Fig. 12; 11:56-67. The system processes focus evaluation values by determining whether luminance evaluation values exceed threshold values. *Id.*, Fig. 12; 11:56-67. Specifically, when a vertical synchronization signal is generated, the system iterates coordinate values corresponding to an 8x8 block of pixels and evaluates whether non-excluded luminance evaluation values at those coordinates exceed predetermined thresholds. *Id.*, Fig. 12; 11:56-67. When the luminance value at a particular coordinate exceeds the predetermined threshold TH1, the system may modify focus evaluation values according to specific equations. In this way, Tsujino discloses extracting evaluated values (luminance evaluation values) in accordance with the evaluated value extraction region (non-excluded low-luminance pixels). *Id.*, Fig. 12, 11:56-67. This extraction process allows the system to properly adjust focus based on relevant pixel data while excluding potentially problematic high-luminance pixels. *Id.*, 12:1-10. EX1003, ¶89.

In addition, Iwasaki teaches extracting evaluated values through its analyzing calculating section 34 that performs divided photometry to obtain luminance values corresponding to respective pixels or groups of pixels and calculates proper exposure values based on these measurements. EX1007, ¶¶[0079], [0082]. This extraction of photometric values from defined subject

groups complements Tsujino's focus evaluation value extraction, demonstrating that evaluated value extraction from modified regions was well known in the art. EX1003, ¶90.

Tsujino and Iwasaki disclose this element under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors and evaluation circuits (Tsujino focus evaluation circuit 30 and luminance evaluation circuit 28 in Fig. 1, Iwasaki analyzing calculating section 34) that perform calculations on pixel data within defined regions. EX1003, ¶91.

5. [1d]

Tsujino discloses a processing unit (CDS/AGC/AD circuit 20) that applies predetermined processing to the picture signal. EX1005, Fig. 1. This circuit performs multiple predetermined signal processing functions including correlated double sampling, automatic gain control, and analog-to-digital conversion on the raw image signal when driven by driver 22. *Id.*, 6:31-36. CDS/AGC/AD circuit 20 receives the raw image signal output from the imaging portion 18 and applies these predetermined processing operations to prepare the signal for further processing. *Id.*, Fig. 1, 6:31-36. Additionally, Tsujino discloses signal-processing circuit 26 applying further processing, including white-balance adjustment, color separation, and YUV conversion to the raw image data outputted from CDS/AGC/AD circuit

20. *Id*., 6:32-41. This signal processing functionality may be considered part of the overall processing unit that handles various aspects of image processing in Tsujino's system. *Id.*, Fig. 1. EX1003, ¶92.

In addition, Iwasaki teaches a comprehensive processing unit including second digital processing circuit 37 that executes various image processing operations such as defective pixel correction, gradation conversion, white balancing, and edge enhancement on the image signals. EX1007, ¶¶[0064]-[0065]. This processing unit applies predetermined processing operations to picture signals, complementing Tsujino's CDS/AGC/AD circuit and signal processing circuit to show that comprehensive signal processing was well established in the art. EX1003, ¶93.

Tsujino and Iwasaki disclose this element under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—signal processing circuits and algorithms (Tsujino's CDS/AGC/AD circuit 20 and signal-processing circuit 26 in Fig. 1, Iwasaki's second digital processing circuit 37 and analog processing circuit 36) that apply predetermined processing operations to image signals. EX1003, ¶94.

6. [1e]

Tsujino discloses a control unit (CPU 46) that controls the processing unit (CDS/AGC/AD circuit 20 and signal processing circuit 26) based on evaluated

values (luminance evaluation values) extracted from the image. EX1005, Fig. 1 element 46. CPU 46 analyzes luminance evaluation values from luminance evaluation circuit 28 to calculate appropriate exposure values. *Id.*, 7:4-8. Based on these evaluated values, CPU 46 controls various processing parameters including aperture settings and exposure timing. *Id.*, 7:8-11. This control relationship directly affects image processing operations, as CPU 46 adjusts brightness parameters of the displayed image according to the evaluation values. *Id.*, 7:11-12. Furthermore, CPU 46 also uses luminance evaluation values from luminance evaluation circuit 28 to calculate focus evaluation values and based on those values controls the focus lens position. *Id.*, 7:20-23; *see also id*., 9:64-10:41 and 13:20-23. CPU 46 operation demonstrates how it controls the processing unit (CDS/AGC/AD circuit 20) based on evaluated values (luminance evaluation values) that have been extracted by the evaluation circuits in the system. *Id.*, Fig. 1 element 46, 7:4-12. EX1003, ¶95.

While Tsujino primarily discusses AF control, Iwasaki teaches complementary techniques for exposure control. Iwasaki discloses an analog processing circuit and digital processing circuit that perform various image processing functions, including analyzing calculating section 34 performing calculations for analyzing the image. EX1007, ¶¶[0053]-[0058]. Under control of Iwasaki's CPU 42, analyzing calculating section 34 calculates exposure correction

values based on the difference between proper exposure values and upper limit luminance values in predetermined luminance ranges, and determines appropriate gradation characteristics for image processing. EX1007, ¶¶[0056]-[0058]. Iwasaki's CPU 42 in conjunction with recording calculating section 38 controls second digital processing circuit 37 to execute various image processing operations on the image including defective pixel correction, gradation conversion, white balancing, and edge enhancement using the values extracted by analyzing calculating section 34. EX1007, ¶¶ [0064]-[0065] and annotated Fig. 1 below showing the control path. EX1003, ¶96.

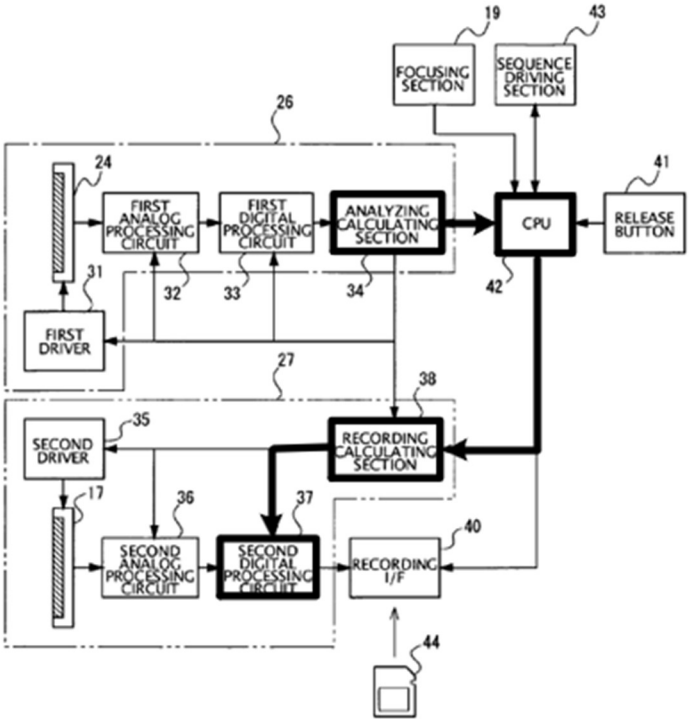

Fig.1

During operation, CPU 42 instructs analyzing calculating section 34 to

perform divided photometry to obtain luminance values corresponding to respective pixels or groups of pixels. EX1007, ¶ [0079]. Iwasaki's system calculates proper exposure values so that the average luminance value of the group including the main subject becomes the standard output value. EX1007, ¶ [0082]. Notably, Iwasaki teaches excluding groups showing average luminance values that are larger than a predetermined value from exposure calculations and determining the highest remaining value as the basis for exposure correction. EX1007, ¶[0084]. EX1003, ¶97.

Under control of Iwasaki's CPU 42, both analyzing calculating section 34 and recording calculating section 38 select appropriate gradation characteristic data based on the combination of proper exposure value and the highest value, and instruct the digital processing circuit 37 to execute gradation conversion processing according to the selected characteristics. EX1007, Figs. 4 and 14, ¶s [0058] and [0105]-[0106]. These teachings from Iwasaki complement Tsujino's system by providing sophisticated techniques for selectively processing image regions to improve the overall image quality. By incorporating Iwasaki's approach of excluding high-luminance groups from exposure calculations, Tsujino's system could achieve more balanced exposure across challenging lighting conditions, preserving details in both shadows and highlights that would otherwise be lost. Furthermore, Iwasaki's gradation conversion processing enhances Tsujino's

capability to render scenes with high dynamic range, allowing the combined system to produce more visually appealing images with natural-looking contrast and improved detail retention in both bright and dark areas. EX1003, ¶98.

Tsujino and Iwasaki disclose this element under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Tsujino CPU 46 in Fig. 1, Iwasaki CPU 42 in conjunction with recording calculating section 38) that control processing operations based on evaluated values. EX1003, ¶99.

7. [1f]

Tsujino discloses a control unit (CPU 46) that controls the processing unit (CDS/AGC/AD circuit 20) based on evaluated pixel values (luminance evaluation values) from regions from which pixels having an extracted predetermined feature have been removed (non-excluded low-luminance pixels). EX1005, 7:4-12. CPU 46 calculates appropriate exposure values using luminance evaluation values from the luminance evaluation circuit. *Id.*, 7:4-8. These calculated exposure values are then used to control aperture settings and exposure timing through the driver as well as other features such as automatic gain control 20. *Id.*, 7:8-11. The system adjusts the brightness of displayed images based on these evaluations. *Id.*, 7:11-12. CPU 46 also uses luminance evaluation values from luminance evaluation circuit

28 to calculate focus evaluation values and based on those values controls the focus lens position. *Id.*, 7:20-23; *see also id*., 9:64-10:41 and 13:20-23. Tsujino's system excludes high-luminance pixels (those exceeding threshold TH1) from the evaluation process and then uses the luminance evaluation values from the remaining pixels to control camera functions. *Id.*, 11:26-36. This approach allows the system to make more accurate adjustments by removing potentially problematic high-luminance areas from consideration. *Id.*, 6:26-36. EX1003, ¶100.

While Tsujino primarily discusses AF control, Iwasaki teaches complementary techniques for AE control based on selective evaluation of image regions. As discussed above in element [1e], Iwasaki's system calculates proper exposure values and excludes groups showing average luminance values that are larger than a predetermined value from exposure calculations and determining the highest remaining value as the basis for exposure correction during AE control. EX1007, ¶¶[0082], [0084]. These teachings from Iwasaki complement Tsujino's system by providing techniques for selectively processing image regions to improve the overall image quality. This extension of Tsujino's teachings to AE control results in more precise exposure adjustments, improving the overall image quality. *Id*., 7:4-12. EX1003, ¶101.

Tsujino and Iwasaki disclose this element under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim

construction section above—software algorithms executing on signal processors (Tsujino CPU 46 in Fig. 1, Iwasaki CPU 42 in conjunction with recording calculating section 38) that control processing operations based on evaluated values. EX1003, ¶102.

C. Claim 2

Claim 2 depends from claim 1. Tsujino in view of Iwasaki teaches or renders obvious all the elements of claim 1, as described above. *See* elements [1pre]-[1f]. Tsujino in view of Iwasaki also discloses or renders obvious all the elements of claim 2 as described below. EX1003, ¶103.

1. [2a]

Tsujino teaches various memory components including SDRAM 34, memory control circuit 32, and other storage elements that function as working memory for CPU 46 and signal processing unit. EX1005, Fig. 1, 7:33-41. These memory components store image data and support various processing operations performed by the system. *Id.*, Fig. 1, 7:33-41. The memory control circuit manages data flow between storage components and processing units, allowing for efficient handling of image information. *Id.*, Fig. 1, 7:33-41. While the claim recites a hold unit that holds position information of detected pixels, Tsujino's memory system performs analogous functions by storing and managing image data that contains position information. *Id.*, Fig. 1, 7:33-41. A POSITA would have understood that

Tsujino's memory components stores position information of detected pixels because such information is required for the system to perform its image processing functions, including the pixel-by-pixel analysis described throughout Tsujino's disclosure. EX1003, ¶104.

Tsujino and Iwasaki disclose a hold unit under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Tsujino CPU 46 with SDRAM 34 in Fig. 1, Iwasaki CPU 42 with memory resources) utilizing memory components for storing and retrieving position information of detected pixels. EX1003, ¶105.

2. [2b]

As discussed in element [1b], Tsujino teaches a region creation unit that identifies and removes high-luminance pixels from an evaluated value extraction region. Additionally, as explained in element [2a], Tsujino's system includes memory components (*e.g.*, RAM) that store image data and processing information. A POSITA would have understood that these memory components store the position information of the detected high-luminance pixels in order for the system to properly exclude them from evaluation. The combination of the elements described in elements [1a] and [2a] allows Tsujino's system to process images while avoiding the negative effects of high-luminance areas on focus

evaluation. EX1003, ¶106.

D. Claims 3 and 12

Claim 3 depends from claim 2. Claim 12 depends from claim 1. Claims 3 and 12 recite identical elements. Tsujino in view of Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-[1f] and [2a]-[2b]. Tsujino in view of Iwasaki also discloses or renders obvious all the elements of claims 3 and 12 as described below. EX1003, ¶107.

1. [3a] and [12a]

Tsujino discloses a processing unit that includes a focus lens 12 and a CPU 46. EX1005, Fig. 1. Tsujino teaches that the focus lens 12 moves in a direction that increases the total value of focus evaluation values. *Id.*, 12:4-6. Driver 22 controls various components of the image sensor 16 and logically extends to controlling the movement of focus lens 12. *Id.*, Fig. 1, 7:1-12. Additionally, CPU 46 executes the AF process and sends control signals that drive the focus lens 12 to the appropriate position. *Id.*, 12:1-10. A POSITA would have understood that either driver 22 or CPU 46 (or both working together) function as the drive unit for driving the focus lens in Tsujino's system, as some mechanism exists to physically move the lens in response to the AF process calculations performed by CPU 46. EX1003, ¶108.

2. [3b] and [12b]

Tsujino discloses an imaging element positioned between the focus lens and

the processing components that performs photoelectric conversion of the optical image. EX1005, Fig. 1 element 18, 6:10-15. The imaging portion 18 of the image sensor 16 receives light that passes through the lens 12 and converts it to electrical signals that are then processed. *Id.*, Fig. 1, 6:10-15. This arrangement in Tsujino shows the photoelectric conversion unit (imaging sensor 16) positioned in the optical path between the focus lens 12 and the extraction/processing units that analyze the image data. *Id.*, Fig. 1. EX1003, ¶109.

Tsujino and Iwasaki disclose this element under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—image sensors (Tsujino imaging portion 18 in Fig. 1, Iwasaki recording-purpose image pickup device 17) that convert light into electrical signals representing image intensity. EX1003, ¶110.

3. [3c] and [12c]

See element [1f].

E. Claims 4 and 14

Claim 4 depends from claim 2. Claim 14 depends from claim 1. Claims 4 and 14 recite identical elements. Tsujino in view of Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-[1f] and [2a]-[2b]. Tsujino in view of Iwasaki also discloses or renders obvious all the elements of claims 4 and 14 as described below. EX1003, ¶112.

1. [4a] and [14a]

Tsujino discloses a signal-processing circuit that performs various image processing functions including white-balance adjustment to the raw image data. EX1005, Fig. 1 element 26, 6:36-41. Signal-processing circuit 26 in Tsujino processes the raw image data outputted from CDS/AGC/AD circuit 20 and applies white-balance adjustment as part of its image processing operations. *Id.*, 6:36-41. This signal processing unit is controlled by CPU 46 which adjusts various parameters based on evaluation values. *Id.*, 7:8-12. EX1003, ¶113.

2. [4b] and [14b]

See element [1f].

F. Claims 5 and 8

Claim 5 depends from claim 2. Claim 8 depends from claim 7. Claims 5 and 8 recite identical elements. Tsujino in view of Iwasaki discloses or renders obvious all the elements of claims 2 and 7 as described above and below. *See* elements [1pre]-[1f] and [7a]-[7c]. Tsujino in view of Iwasaki also discloses or renders obvious all the elements of claims 5 and 8 as described below. EX1003, ¶115.

1. [5a] and [8a]

Tsujino teaches dividing the focus area into multiple evaluation areas, which can be implemented by processing unit 26 that divides the imaging area into discrete blocks for evaluation purposes. EX1005, Fig. 2, 6:48-52. Tsujino further

discloses that the processing unit determines the presence of high-luminance pixels within these evaluation regions and tracks their positions. This functionality corresponds to the recited overlap detection unit. *Id.*, Fig. 11, 11:55-65. The system in Tsujino systematically processes each coordinate position within the focus area, determining whether luminance values exceed specific thresholds at each position. *Id.*, 11:55-60. When processing each coordinate, the system updates positions in a raster scanning direction and checks whether the updated coordinates have reached the end of the evaluation area. *Id.*, 11:60-65. This coordinate-based tracking and threshold comparison functions as an overlap detection mechanism that identifies when pixels with specific characteristics (such as high luminance values) overlap with or exist within the segmented evaluation blocks. *Id.*, Fig. 13-14, 12:1-10. A POSITA would have understood that Tsujino's pixel-level analysis could be adapted to work with block-based processing, as both approaches aim to mitigate the effects of high-luminance areas on image processing. Tsujino executes the "AF process" in the form of coordinate blocks after the light-source determining process, which aligns with the block-based approach of the claimed overlap detection unit. *Id*., Fig. 13 S43. Thus, a POSITA would have understood that Tsujino's coordinate-based tracking system functions in the same way as the claimed "overlap detection unit" because both systems identify the presence of pixels with specific characteristics within defined regions of an image to enable

appropriate processing of those regions. EX1003, ¶116.

While Tsujino teaches pixel-level detection and removal methods, and Iwasaki teaches subject segmentation processing that groups pixels into areas belonging to the same subject (¶s [0080]-[0082]), a POSITA would have been motivated to combine these approaches. Specifically, a POSITA would apply Iwasaki's block segmentation approach first to partition the image into multiple regions, then apply Tsujino's pixel-level detection and removal method to each of those pre-segmented blocks. This combination addresses the sequence required by the claims: first segmenting regions in advance, then detecting overlap of individual pixel positions with those segmented blocks. EX1003, ¶117.

Tsujino and Iwasaki disclose a region segmentation unit and overlap detection unit under either POM or MPF interpretation. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Iwasaki analyzing calculating section 34 and CPU 42 for region segmentation, and Tsujino's CPU 46 for pixel-level overlap detection in those regions) that divide images into multiple regions for analysis, and— compare individual pixel positions with predefined regions through coordinate-based tracking and threshold comparison applied to the pre-segmented blocks. EX1003, ¶118.

2. [5b] and [8b]

See element [1f].

G. Claims 6, 9, 11, 13 and 15

Claim 6 depends from claim 2. Claim 9 depends from claim 7. Claim 11 depends from claim 1. Claim 13 depends from claim 12. Claim 15 depends from claim 14. Claims 6, 9, 11, 13 and 15 recite identical elements. Tsujino in view of Iwasaki discloses or renders obvious all the elements of claims 1, 2, 7, 12 and 14 as described in the sections above and below. *See* elements [1pre]-[1f], [2a]-[2b], [7a]-[7c], [12a]-[12c], and [14a]-[14b]. Tsujino in view of Iwasaki also discloses or renders obvious all the elements of claims 6, 9, 11, 13 and 15 as described below. EX1003, ¶120.

1. [6a], [9a], [11a], [13a] and [15a]

Tsujino shows evaluation areas arranged in a grid pattern with a defined structure covering a specific portion of the imaging surface. EX1005, Fig. 2. Tsujino teaches a focus evaluation process that selectively excludes high-luminance pixels exceeding threshold TH1 from focus evaluation processing. *Id.*, 12:45-58. When the system excludes these pixels, the overall evaluation area remains intact while only the processing of specific pixels within that framework changes. *Id.*, Fig. 4, 9:55-63. These claims all require "keeps the total area of the evaluated value extraction region constant by excluding unnecessary portions from the evaluated value extraction region", and Tsujino's system accomplishes this by

maintaining the same evaluation grid structure while selectively excluding specific pixels within that structure that would otherwise negatively impact accurate focus evaluation. *Id.*, 9:55-10:41. EX1003, ¶121.

H. Claims 7 and 10

Claim 7 depends from claim 2. Claim 10 depends from claim 1. Claims 7 and 10 recite identical elements. Tsujino in view of Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-[1f] and [2a]-[2b]. Tsujino in view of Iwasaki also discloses or renders obvious all the elements of claims 7 and 10 as described below. EX1003, ¶122.

1. [7a] and [10a]

Tsujino teaches aperture unit 14 that functions as a light intensity adjustment unit for controlling exposure in the camera system. EX1005, Fig. 1, element 14. Aperture unit 14 shown in Tsujino's Fig. 1 is designed to adjust the amount of light entering the imaging system, which directly controls the exposure of the captured image. *Id.*, 7:4-12. Tsujino further explains that CPU 46 sets an amount of aperture to aperture unit 14 based on calculated appropriate EV values, demonstrating that this component actively controls light intensity for proper exposure. *Id.*, 7:13-23. EX1003, ¶123.

Tsujino and Iwasaki disclose a light intensity adjustment unit under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as

referenced in the claim construction section above—controllable mechanisms for adjusting exposure (Tsujino aperture unit 14 in Fig. 1, Iwasaki mechanical shutter 16 and aperture 14). EX1003, ¶124.

2. [7b] and [10b]

Tsujino discloses a lens and an image sensor that performs photoelectric conversion as shown in the system diagram. EX1005, Fig. 1, elements 12, 18. The imaging portion 18 performs photoelectric conversion of the optical image that passes through the lens 12. *Id.*, 6:8-16. While Tsujino's figures show the lens positioned before the aperture, a POSITA would have understood that the relative positioning of the lens and aperture could be reversed without affecting the functionality of the system. This represents a routine design choice in optical systems where components may be rearranged based on factors such as space constraints, manufacturing considerations, or specific optical performance requirements while maintaining the same functional relationship between components. *Id.*, Fig. 1. EX1003, ¶125.

Tsujino and Iwasaki disclose this element under either construction. Tsujino and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—movable optical lens components (Tsujino focus lens 12 in Fig. 1, Iwasaki focusing lens 13) capable of being repositioned to adjust focus, and—image sensors (Tsujino imaging portion 18 in Fig. 1, Iwasaki

recording-purpose image pickup device 17) that convert light into electrical signals representing image intensity. EX1003, ¶126.

3. [7c] and [10c]

See element [1f].

VII. GROUND 2: CLAIMS 1-15 ARE OBVIOUS OVER TSUJINO IN VIEW OF SHUI AND IWASAKI

A. Proposed Combination

Tsujino in view of Shui and Iwasaki discloses and renders obvious claims 1-15 of the '950 patent. A POSITA would have combined Tsujino, Shui, and Iwasaki by incorporating Shui's techniques for detecting changes in pixel features and creating regions by removing pixels with specific features from an evaluated value extraction region, along with Iwasaki's techniques for controlling processing based on evaluated values, into Tsujino's signal processor. EX1006, ¶[0016]; EX1007, ¶[0057]. Specifically, Tsujino's system can be modified to incorporate Shui's methods for detecting positions where features of pixels have changed (such as detecting positions where focus evaluation values peak and calculating differences between photometric values) and creating regions by excluding pixels with certain features from evaluation, while further implementing Iwasaki's approach to controlling image processing based on evaluation values extracted from regions where problematic pixels have been removed. EX1006, ¶[0011]; EX1007, ¶[0057].

EX1003, ¶129.

Tsujino already teaches a signal processor that performs autofocus and exposure control functions through its image sensor and processing components. EX1005, Fig. 1 element 26. Shui enhances this functionality by teaching a focal position detection method that obtains focus evaluation values and photometric values across the entire field from minimum distance to infinity, detects peak positions, and calculates differences between values at different positions to identify changes in pixel features. EX1006, ¶[0011]. Iwasaki further improves the system by providing a control unit that controls processing units based on evaluated values extracted from regions where pixels with certain features have been removed, allowing for more accurate exposure control and image processing. EX1007, ¶¶[0042], [0057]. EX1003, ¶130.

A POSITA would have been motivated to combine Tsujino, Shui, and Iwasaki because all three references address related technical problems of improving image capture performance in challenging lighting conditions. Such a combination involves integrating prior art elements according to known methods to yield predictable results. Tsujino already provides a framework for excluding high-luminance pixels from focus evaluation through its high-luminance excluding function. EX1005, cols. 7:4-12 and 11:26-36. Shui enhances this capability by teaching specific methods for detecting positions where focus evaluation values

peak and calculating differentials between photometric values to identify changes. EX1006, ¶[0016]. Iwasaki adds a control unit that controls various processing units (including focus lens driving, exposure adjustment, and image processing) based on evaluated values extracted from regions where problematic pixels have been removed. EX1007, ¶¶[0042], [0057]-[0058]. EX1003, ¶¶131-132.

When these references are combined, the resulting system would provide improved performance in challenging lighting conditions by not only excluding problematic high-luminance pixels from focus evaluation but also using the resulting evaluated values to control various processing operations. A POSITA would have had a reasonable expectation of success in making this combination because all three references use similar hardware components (imaging sensors, processing units) and image processing techniques (focus evaluation, photometric analysis, exposure control) that can be integrated through software modifications to existing camera systems. EX1003, ¶133.

B. Claim 1

Tsujino in view of Shui and Iwasaki discloses claim 1. EX1003, ¶134.

1. [1pre]

See Ground 1, element [1pre].

The above argument also applies to preambles of claims 2-15. EX1003, ¶¶135-136.

2. [1a]

See Ground 1, element [1a].

Tsujino, Shui, and Iwasaki disclose this element under either construction. These references disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Tsujino CPU 46 in Fig. 1, Shui digital signal processing unit 24 and CPU 42 in Fig. 1, Iwasaki analyzing calculating section 34 and CPU 42) that analyze pixel data to identify changes in image features. EX1003, ¶¶137-138.

To the extent Patent Owner argues that Tsujino may not teach detecting positions where features of pixels have changed, Shui teaches this element through its comprehensive focus evaluation system. Shui discloses a method that obtains focus evaluation values and photometric values across the entire focal range. EX1006, Fig. 6, ¶[0007]. Shui detects the position X_0 where focus evaluation values peak, which represents a position where pixel features exhibit significant change in brightness. *Id.*, ¶[0011]. Shui further analyzes positions before and after this peak (X_1 and X_2) and calculates the differential between their photometric values (ΔY_{1-2}), which directly identifies positions where brightness characteristics change. *Id.*, ¶[0007]. This approach enables Shui's system to distinguish between true peaks and false peaks caused by high-luminance point light sources. *Id.*, ¶[0008]. When combined with Tsujino's threshold-based detection method that

identifies pixels exceeding luminance thresholds, the resulting system can identify positions where pixel features change in visual characteristics. EX1005, Fig. 12 and 11:22-67. EX1003, ¶139.

The combination of Tsujino's pixel-by-pixel luminance evaluation with Shui's pixel-wise differential provides a comprehensive approach to feature detection that offers enhanced precision in identifying feature changes at the pixel level. EX1005, Fig. 12 and 11:22-67. A POSITA would have understood that Tsujino's detection of pixels exceeding brightness thresholds and Shui's detection of positions where focus evaluation values peak both represent methods of identifying positions where pixel features have changed, as both systems are designed to detect variations in pixel characteristics that affect autofocus performance. *Id.*, 11:22-65; EX1006, ¶[0016]. EX1003, ¶140.

3. [1b]

See Ground 1, element [1b].

To the extent Patent Owner argues that Tsujino may not teach "creating a region" within the image as claimed, Shui addresses this by teaching area-based analysis that creates regions within the image. Shui divides the focus area into multiple discrete regions for separate evaluation and processing. EX1006, Figs. 1 and 6, ¶[0015]. Shui's system obtains focus evaluation values for each divided area from minimum distance to infinity, allowing for targeted analysis of specific image

regions. *Id.*, ¶[0015]. When combined with Tsujino's approach of excluding high-luminance pixels from evaluation, Shui's region-based methodology provides a way to create modified regions that no longer contains problematic high-luminance pixels. *Id.*, ¶[0016]. This combination implements the claimed feature of creating a region by removing pixels with certain features from an evaluated value extraction region. This combined approach of Tsujino's pixel exclusion and Shui's area-based analysis creates a new evaluation region by excluding problematic areas which provides a more accurate representation of the scene. EX1003, ¶¶142-143.

A POSITA would have understood that Tsujino's exclusion of high-luminance pixels from evaluation combined with Shui's area-based analysis would result in creating regions where certain pixels are removed from evaluation, as both references aim to improve focus accuracy by selectively processing image data to exclude problematic high-luminance areas. EX1003, ¶144.

4. **[1c]**

   See Ground 1, element [1c].

5. **[1d]**

   See Ground 1, element [1d].

6. **[1e]**

   See Ground 1, element [1e].

7. **[1f]**

See Ground 1, element [1f].

C. Claim 2

Claim 2 depends from claim 1. The combination of Tsujino, Shui and Iwasaki renders obvious all the elements of claim 1, as described above. *See* elements [1pre]-[1f]. The combination of Tsujino, Shui and Iwasaki also discloses or renders obvious all the elements of claim 2 as described below. EX1003, ¶153.

1. [2a]

See Ground 1, element [2a].

Tsujino, Shui, and Iwasaki disclose a hold unit under either construction. These references disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Tsujino CPU 46 with SDRAM 34 in Fig. 1, Shui CPU 42 with RAM 46 in Fig. 1, Iwasaki CPU 42 with memory resources) utilizing memory components for storing and retrieving position information of detected pixels. EX1003, ¶¶154-155.

To the extent that Patent Owner argues that Tsujino does not disclose this feature, Shui further teaches detecting positions where focus evaluation values peak and calculating differences between photometric values at positions before and after these peaks. EX1006, ¶[0011]. Shui implements memory components including ROM 44, RAM 46, and flash ROM 48 that function together to store

position information and other data necessary for camera operations. *Id.*, ¶[0036]. The RAM 46 serves as working memory that stores the detected position information during processing operations. *Id.*, ¶[0036]. A POSITA would have understood that Shui's memory components hold position information of detected pixels because such information is required for Shui's focus detection method to function properly when comparing values at different positions. *Id.*, ¶[0065]. The combination of Tsujino and Shui would result in a hold unit that holds position information of detected pixels, providing the benefit of more accurate focus detection even in challenging lighting conditions. EX1003, ¶156.

2. [2b]

See Ground 1, element [2b].

D. Claims 3 and 12

Claim 3 depends from claim 2. Claim 12 depends from claim 1. Claims 3 and 12 recite identical elements. The combination of Tsujino, Shui and Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-[1f] and [2a]-[2b]. The combination of Tsujino, Shui and Iwasaki also discloses or renders obvious all the elements of claims 3 and 12 as described below. EX1003, ¶158.

1. [3a] and [12a]

See Ground 1, elements [3a] and [12a].

Tsujino, Shui, and Iwasaki disclose a drive unit under either construction. These references disclose the same or equivalent structures as referenced in the claim construction section above—movable optical lens components (Tsujino focus lens 12 in Fig. 1, Shui focus lens 12f in Fig. 1, Iwasaki focusing lens 13) capable of being repositioned to adjust focus, and—electrical driver circuits and control components (Tsujino driver 22 in Fig. 1, Shui focus motor driver 62f in Fig. 1, Iwasaki sequence driving section 43) for controlling movement of optical components. EX1003, ¶¶159-160.

To the extent that Patent Owner argues that Tsujino does not teach this feature, Shui discloses a focus lens 12f that is driven by a dedicated focus motor 60f for controlling lens movement along the imaging optical axis. EX1006, Fig. 1, ¶[0037]. Shui further explains that the focus motor 60f moves the focus lens 12f back and forth on the imaging optical axis to change the image location. *Id.*, ¶[0037]. Additionally, Shui teaches that CPU 42 controls the driving of the focus motor 60f via a focus motor driver 62f, providing a complete system for precise lens positioning. *Id.*, ¶[0037]. This teaching, when combined with Tsujino's focus lens system, provides a complete drive unit for driving the focus lens as claimed. EX1003, ¶161.

2. [3b] and [12b]

See Ground 1, elements [3b] and [12b].

3. [3c] and [12c]

See element [1f].

E. Claims 4 and 14

Claim 4 depends from claim 2. Claim 14 depends from claim 1. Claims 4 and 14 recite identical elements. The combination of Tsujino, Shui and Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-[1f] and [2a]-[2b]. The combination of Tsujino and Shui also discloses or renders obvious all the elements of claims 4 and 14 as described below. EX1003, ¶165.

1. [4a] and [14a]

See Ground 1, elements [4a] and [14a].

2. [4b] and [14b]

See element [1f].

F. Claims 5 and 8

Claim 5 depends from claim 2. Claim 8 depends from claim 7. Claims 5 and 8 recite identical elements. Tsujino in view of Shui and Iwasaki discloses or renders obvious all the elements of claims 2 and 7 as described above and below. *See* elements [1pre]-[1f], [2a]-[2b] and [7a]-[7c]. Tsujino in view of Shui and Iwasaki also discloses or renders obvious all the elements of claims 5 and 8 as described below. EX1003, ¶168.

1. [5a] and [8a]

See Ground 1, elements [5a] and [8a].

Tsujino, Shui, and Iwasaki disclose a region segmentation unit and an overlap detection unit under either construction. These references disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Tsujino CPU 46 in Fig. 1, Shui digital signal processing unit 24 and CPU 42 in Fig. 1, Iwasaki analyzing calculating section 34 and CPU 42) that manipulate pixel data to define specific regions for evaluation by excluding pixels with particular characteristics. EX1003, ¶170.

2. [5b] and [8b]

See element [1f].

G. Claims 6, 9, 11, 13 and 15

Claim 6 depends from claim 2. Claim 9 depends from claim 7. Claim 11 depends from claim 1. Claim 13 depends from claim 12. Claim 15 depends from claim 14. Claims 6, 9, 11, 13 and 15 recite identical elements. The combination of Tsujino, Shui and Iwasaki discloses or renders obvious all the elements of claims 1, 2, 7, 12 and 14 as described in the sections above and below. *See* elements [1pre]-[1f], [2a]-[2b], [7a]-[7c], [12a]-[12c], and [14a]-[14b]. The combination of Tsujino, Shui and Iwasaki also discloses or renders obvious all the elements of

claims 6, 9, 11, 13 and 15 as described below. EX1003, ¶172.

1. [6a], [9a], [11a], [13a] and [15a]

See Ground 1, elements [6a], [9a], [11a], [13a] and [15a].

To the extent that patent owner argues that Tsujino does not teach this feature, Shui teaches a focus position detection method that divides the focus area into multiple regions for evaluation purposes. EX1006, ¶[0015]. Shui's system obtains focus evaluation values for each divided area across the entire range. *Id.*, ¶[0015]. Shui teaches a technique that maintains the overall evaluation framework while selectively excluding areas that contain problematic features such as high-luminance point light sources. *Id.*, ¶[0016]. In Shui's approach, the system calculates deviation amounts of peak positions across different areas and then performs focal position detection by excluding only those areas where the deviation amount exceeds an allowed value. *Id.*, ¶[0018]. This methodology allows Shui's system to maintain the total evaluation area as a constant while intelligently removing only those portions that would negatively impact accurate focus evaluation. *Id.*, ¶[0018]. A POSITA would have understood that Shui's technique of maintaining the overall evaluation framework while selectively excluding problematic areas keeps the total area constant while removing portions that would compromise focus accuracy. *Id.*, ¶[0016]. The combination of Tsujino and Shui results in a region creation unit that keeps the total area of the evaluated value

extraction region constant by excluding unnecessary portions from the evaluated value extraction region. EX1003, ¶174.

H. Claims 7 and 10

Claim 7 depends from claim 2. Claim 10 depends from claim 1. Claims 7 and 10 recite identical elements. The combination of Tsujino, Shui and Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-[1f] and [2a]-[2b]. The combination of Tsujino, Shui and Iwasaki also discloses or renders obvious all the elements of claims 7 and 10 as described below. EX1003, ¶175.

1. **[7a] and [10a]**

   See Ground 1, elements [7a] and [10a].

2. **[7b] and [10b]**

   See Ground 1, elements [7b] and [10b].

3. **[7c] and [10c]**

   See element [1f].

If Patent Owner argues the portions of Tsujino, Shui and Iwasaki cited above relate to different, incompatible embodiments (which they do not), it would have been obvious to a POSITA to combine such embodiments into a single system at least because such embodiments are described in the same prior art references, are fully compatible with each other, and could be combined with minimal effort to

achieve predictable results. EX1003, ¶181.

VIII. GROUND 3: CLAIMS 1-15 ARE OBVIOUS OVER SHUI IN VIEW OF IWASAKI

A. Proposed Combination

Shui in view of Iwasaki discloses and renders obvious claims 1-15 of the '950 patent. A POSITA would have been motivated to combine Shui and Iwasaki because both references address the common problem of improving camera performance in challenging lighting conditions through selective evaluation of image regions. Shui teaches a system for detecting and excluding high-luminance point light sources from focus evaluation to prevent focus errors caused by bright light sources. EX1006, ¶¶[0016], [0018]. Iwasaki complements this approach by teaching exposure control techniques that similarly exclude problematic high-luminance regions from exposure calculations. EX1007, ¶[0084]; EX1003, ¶183.

Both references employ analogous methodologies of analyzing image regions and selectively excluding certain areas from processing to achieve better results. Shui's technique of excluding areas with high-luminance point light sources from focus evaluation and Iwasaki's technique of excluding groups with average luminance values that are larger than a predetermined value from exposure calculations represent the same underlying principle applied to different camera functions. EX1006, ¶[0016]; EX1007, ¶[0084]; EX1003, ¶184.

A POSITA would have recognized that combining these complementary

techniques would result in a comprehensive camera system capable of handling both autofocus and exposure control in scenes with challenging lighting conditions. Iwasaki's teachings would naturally extend Shui's selective evaluation approach from AF control to AE control, as both processes benefit from accurate scene analysis that excludes potentially misleading high-luminance regions. EX1007, ¶¶[0056]-[0058], [0105]-[0106]; EX1003, ¶185.

The combination would have been straightforward for a POSITA because both references use similar hardware architectures (image sensors, processing circuits, CPUs) and compatible image processing techniques (luminance evaluation, region-based analysis). EX1006, Fig. 1; EX1007, ¶¶[0053]-[0058]. A POSITA would have had a reasonable expectation of success in combining these references to create an improved camera system with enhanced performance in both focus and exposure control under difficult lighting conditions. EX1003, ¶186.

B. Claim 1

The combination of Shui and Iwasaki discloses claim 1.

1. [1pre]

Shui's disclosure shows a signal processor architecture designed for processing image signals and performing various camera functions. EX1006, Fig. 1. The signal processor in Shui comprises multiple interconnected components that work together to analyze and process image data, including an analog signal

processing unit that performs initial signal conditioning. *Id.*, Fig. 1 element 18. This architecture further includes a digital signal processing unit that handles more complex signal transformations and analysis. *Id.*, Fig. 1 element 24 and ¶[0042]. Additionally, Shui's processor incorporates a CPU that coordinates the overall operation and makes control decisions based on the processed image data. *Id.*, Fig. 1 element 42 and ¶[0043]. Together, these components form a comprehensive signal processor that manages autofocus functions and other camera operations based on image analysis results. *Id.*, ¶[0033]; EX1003, ¶188.

The above argument also applies to preambles of claims 2-15.

2. [1a]

Shui in view of Iwasaki teaches this element. Shui teaches a system that detects positions where features of pixels have changed by implementing a comprehensive method for analyzing image data across focal positions. EX1006, ¶[0007]. The system obtains focus evaluation values and photometric values across the entire focal range and identifies specific positions where these values peak. *Id.*, ¶[0008]. Shui's approach identifies positions X_1 and X_2 that are located before and after a detected peak position X_0, and calculates the differential $\Delta Y_{1\text{-}2}$ between photometric values Y_1 and Y_2 at these respective positions. *Id.*, ¶[0011]; EX1003, ¶190.

Shui further teaches that the detected focus evaluation value peak X_0 is

treated as the focal position when the differential ΔY_{1-2} is less than an allowed threshold. EX1006, ¶[0011]. On the other hand, the detected focus evaluation value peak X_0 is treated as a false peak due to a point light source when the differential ΔY_{1-2} is greater or equal than the allowed threshold. *Id.*, ¶[0011]. This threshold of the differential calculation identifies positions where pixel features have changed, and the system uses these calculations to determine whether detected peaks represent actual subject features or false readings from high-luminance sources. *Id.*, ¶[0012]; EX1003, ¶191.

Shui's approach relies on both pixel-wise differentials and area differentials, providing a comprehensive method for detecting feature changes. The pixel-wise differentials offer detailed information about local brightness changes, thus detecting changes in each pixel of the input picture signal. EX1006, ¶[0011]. A POSITA would have understood that Shui's detection of positions in the image where the calculated differential meets or exceeds a threshold, directly corresponds to detecting positions where features of pixels have changed, because these calculations identify locations in the image where visual characteristics transition or differ from surrounding pixels. *Id.*, ¶[0056]-[0057]; EX1003, ¶192.

Moreover, a POSITA would have further understood that Shui's method where the calculated differential between focus evaluation values at adjacent focal positions to the detected focus evaluation value peak corresponds to detecting

positions where features of pixels have changed because these differentials identify pixel locations where the focus evaluation values have an abrupt change around the peak due to a point light source. EX1006, ¶¶[0012], [0056]-[0057]; EX1003, ¶193.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Shui digital signal processing unit 24 and CPU 42 in Fig. 1, Iwasaki analyzing calculating section 34 and CPU 42) that analyze pixel data to identify changes in image features. EX1003, ¶194.

3. [1b]

Shui teaches a system that creates regions by selectively excluding areas with specific features from evaluation. EX1006, ¶[0016]. Shui describes dividing a focus area into multiple areas and obtaining focus evaluation values for each area. *Id.*, ¶[0015]. Shui then explains that the system calculates differentials between minimum and maximum photometric values in each area to identify areas containing unwanted features. *Id.*, ¶[0016]. When these differentials meet or exceed an allowed threshold value, the system excludes those areas from further processing. *Id*. This process creates a modified region by removing pixels with particular characteristics from the evaluation region. *Id*. Shui's method of excluding areas based on differential calculations effectively creates a new region

from an initial larger area (*e.g.*, areas A, B, and C combined in Fig. 16) by removing problematic areas (*e.g.*, area C), resulting in a refined region (*e.g.*, areas A and B combined). *Id.*, ¶¶[0015] and [0016]; EX1003, ¶195.

A POSITA would have understood that this exclusion process in Shui directly corresponds to the claimed region creation unit, which creates a region by removing pixels with the features because Shui teaches generating a refined evaluation region by eliminating unwanted pixel data in regions with a high-luminance point light source that would otherwise interfere with accurate focal position detection. EX1003, ¶196.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Shui digital signal processing unit 24 and CPU 42 in Fig. 1, Iwasaki analyzing calculating section 34 and CPU 42) that manipulate pixel data to define specific regions for evaluation by excluding pixels with particular characteristics. EX1003, ¶197.

4. [1c]

Shui in view of Iwasaki teaches this element. Shui teaches a comprehensive system for obtaining and processing focus evaluation values from defined regions within an image frame. EX1006, ¶[0015]. Shui describes a process where focus

evaluation values are extracted for each divided area of the image across the entire range from minimum distance to infinity. *Id*. These values are then analyzed to identify areas with high-luminance sources. *Id*., ¶[0016]. After identifying problematic areas, Shui's system performs focal position detection by excluding the focus evaluation values for areas where calculated differentials exceed an allowed value. *Id*., ¶[0018]. This refined data, which has excluded high-luminance areas, is then used in subsequent processing to determine optimal focal positions. *Id*., ¶[0022]. A POSITA would have recognized that Shui's refined evaluation data, after excluding problematic areas, serves a similar function to the evaluated value because the approach aims to improve focus accuracy by mitigating the effects of high-luminance sources. EX1003, ¶198.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors and evaluation circuits (Shui digital signal processing unit 24 in Fig. 1, Iwasaki analyzing calculating section 34) that perform calculations on pixel data within defined regions. EX1003, ¶199.

5. [1d]

Shui teaches a comprehensive signal processing architecture that includes multiple processing units designed to apply predetermined processing to the

picture signal. EX1006, Fig. 1 elements 18 and 24. Shui describes analog signal processing unit 18 that includes a sampling hold circuit, a color separation circuit, a gain adjustment circuit and the like, and performs correlated double sampling (CDS) processing of the image signals sequentially output from the imaging element 14 as well as color separation processing into the RGB color signals, and adjustment of the signal levels of the color signals (pre-white balance processing). *Id.*, ¶[0039]. EX1003, ¶200.

Additionally, Shui's digital signal processing unit 24 applies further predetermined processing to the image signal, as it includes a synchronization circuit, a gamma correction circuit, a contour correction circuit, and a luminance/color difference signal generation circuit, and the like, processes the image signal stored in RAM 46 according to instructions from CPU 42, and generates a luminance, blue-difference chrominance and red-difference chrominance (YUV) signal composed of a luminance signal and a color difference signal. *Id.*, ¶[0042]. EX1003, ¶201.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—signal processing circuits and algorithms (Shui analog signal processing unit 18 and digital signal processing unit 24 in Fig. 1, Iwasaki second digital processing circuit 37 and analog processing circuit 36) that apply

predetermined processing operations to image signals. EX1003, ¶202.

6. [1e]

Shui discloses a control unit that controls the processing unit in accordance with evaluated values extracted by the evaluation unit. EX1006, Fig. 1 element 42, ¶[0036]. The control unit (CPU 42) in Shui coordinates the overall operation of the camera system and makes control decisions based on the processed image data. *Id.*, ¶[0034]. CPU 42 executes various processes using memory resources and applies instructions to digital signal processing unit 24 based on the values obtained from detection units. *Id.*, ¶[0036]. The system controls signal processing operations according to the evaluation values obtained from regions of the image. *Id.*, ¶[0042]; EX1003, ¶203.

Iwasaki teaches complementary techniques for exposure control based on selective evaluation of image regions. Iwasaki discloses an analog processing circuit and digital processing circuit that perform various image processing functions, including analyzing calculating section 34 performing calculations for analyzing the image. EX1007, ¶¶[0053]-[0058]. Under control of CPU 42, Iwasaki's analyzing calculating section 34 calculates exposure correction values based on the difference between proper exposure values and upper limit luminance values in predetermined luminance ranges, and determines appropriate gradation characteristics for image processing. EX1007, ¶¶[0056]-[0058]. Iwasaki's CPU 42

controls second digital processing circuit 37 to execute various image processing operations on the image including defective pixel correction, gradation conversion, white balancing, and edge enhancement. EX1007, ¶¶[0064]-[0065]; EX1003, ¶204.

During operation, Iwasaki's CPU 42 in conjunction with recording calculating section 38 instructs analyzing calculating section 34 to perform divided photometry to obtain luminance values corresponding to respective pixels or groups of pixels. EX1007, ¶[0079]. Iwasaki's system calculates proper exposure values so that the average luminance value of the group including the main subject becomes the standard output value. EX1007, ¶[0082]; EX1003, ¶205.

Notably, Iwasaki teaches excluding groups showing average luminance values larger than a predetermined value from exposure calculations and determining the highest remaining value as the basis for exposure correction. EX1007, ¶[0084]. Under control of Iwasaki's CPU 42, both analyzing calculating section 34 and recording calculating section 38 select appropriate gradation characteristic data based on the combination of the proper exposure value and the highest value, and instruct the digital processing circuit 37 to execute gradation conversion processing according to the selected characteristics. EX1007, Figs. 4 and 14, ¶¶[0058]; [0105]-[0106]. These teachings from Iwasaki complement Shui's system by providing techniques for selectively processing image regions to

improve the overall image quality. EX1003, ¶206.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Shui CPU 42 in Fig. 1, Iwasaki CPU 42) that control processing operations based on evaluated values. EX1003, ¶207.

7. [1f]

Shui teaches a control unit that controls processing operations based on evaluated values obtained from regions where certain pixels have been excluded from consideration. EX1006, ¶[0042]. Shui's system includes a digital signal processing unit that processes image signals according to instructions from CPU 42, which serves as the control unit. EX1006, ¶[0042]. CPU 42 receives evaluated values from detection units and uses these values to make control decisions for the processing components. *Id.*, ¶[0050]. Specifically, when performing automatic exposure control, CPU 42 obtains integrated values (evaluated values) from the auto-exposure (AE) detection unit and uses these values to control exposure parameters. *Id.*, ¶[0050]. In the context of focus detection, the system similarly uses evaluated values from regions where pixels with certain features (such as high luminance point light sources) have been removed to control the processing unit. *Id.*, ¶[0016]; EX1003, ¶208.

Iwasaki teaches complementary techniques for AE control based on selective evaluation of image regions. As discussed above in element [1e], Iwasaki's system calculates proper exposure values and excludes groups showing average luminance values that are larger than a predetermined value from exposure calculations and determining the highest remaining value as the basis for exposure correction during AE control. EX1007, ¶¶[0082], [0084]. These teachings from Iwasaki complement Tsujino's system by providing techniques for selectively processing image regions to improve the overall image quality. This extension of Shui's teachings to comprehensive camera control, including both AF and AE, results in more accurate focus and exposure adjustments by considering evaluation values from regions that exclude potentially misleading high-luminance areas. EX1003, ¶209.

C. Claim 2

Claim 2 depends from claim 1. Shui and Iwasaki teaches or renders obvious all the elements of claim 1, as described above. *See* elements [1pre]-[1f]. Shui and Iwasaki also discloses or renders obvious all the elements of claim 2 as described below. EX1003, ¶210.

1. [2a]

Shui in view of Iwasaki teaches this element. Shui teaches a comprehensive memory architecture that includes ROM and RAM components designed to store

various types of data needed for camera operations. EX1006, ¶[0036]. Shui includes a CPU that deploys programs from ROM to RAM and uses the RAM as working memory during execution of various processes. *Id.*, ¶[0036]. Shui further explains that when performing focus detection operations, the system obtains focus evaluation values and photometric values across multiple positions, which requires storing position information in memory. *Id.*, ¶[0067]. The claim requires a hold unit that holds position information of detected pixels, and Shui's memory system performs this exact function by storing position data of detected features during focus evaluation operations. EX1003, ¶211.

Shui and Iwasaki disclose a hold unit under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Shui CPU 42 with RAM 46 in Fig. 1, Iwasaki CPU 42 with memory resources) utilizing memory components for storing and retrieving position information of detected pixels. EX1003, ¶212.

2. [2b]

Shui teaches a system that creates regions by selectively excluding areas with specific features from evaluation. EX1006, ¶[0016]. Shui describes dividing a focus area into multiple regions and obtaining focus evaluation values for each divided area. *Id.*, ¶[0015]. Shui then explains that the system calculates

differentials between minimum and maximum photometric values in each area to identify regions containing unwanted features. *Id.*, ¶[0016]. When these differentials exceed an allowed threshold value, the system excludes those regions from further processing. *Id.*, ¶[0016]. This process creates a modified region by removing pixels with particular characteristics from the evaluation region. *Id.*, ¶[0016]; EX1003, ¶213.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Shui digital signal processing unit 24 and CPU 42 in Fig. 1, Iwasaki analyzing calculating section 34 and CPU 42) that manipulate pixel data to define specific regions for evaluation by excluding pixels with particular characteristics. EX1003, ¶214.

D. Claims 3 and 12

Claim 3 depends from claim 2. Claim 12 depends from claim 1. Claims 3 and 12 recite identical elements. Shui in view of Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-[1f] and [2a]-[2b]. Shui in view of Iwasaki also discloses or renders obvious all the elements of claims 3 and 12 as described below. EX1003, ¶215.

1. [3a] and [12a]

Shui in view of Iwasaki teaches this element. Shui teaches a comprehensive imaging system that includes a focus lens component and a dedicated motor for driving the lens. EX1006, Fig. 1, ¶[0037]. Shui describes how the focus lens is positioned and moved along the optical axis by the focus motor to adjust the image location for proper focusing. *Id.*, Fig. 1, ¶[0037]. Shui further explains that this lens movement mechanism is controlled by CPU 42 through a dedicated motor driver 62f to achieve precise positioning during autofocus operations. *Id.*, Fig. 1, ¶[0037]. This arrangement in Shui provides the same functionality as the claimed processing unit includes a focus lens, and a drive unit for driving the focus lens because both systems incorporate a lens element and a mechanism to move that lens for focusing purposes. EX1003, ¶216.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—movable optical lens components (Shui focus lens 12f in Fig. 1, Iwasaki focusing lens 13) capable of being repositioned to adjust focus, and—electrical driver circuits and control components (Shui focus motor driver 62f in Fig. 1, Iwasaki sequence driving section 43) for controlling movement of optical components. EX1003, ¶217.

2. [3b] and [12b]

Shui teaches a photoelectric conversion unit positioned between the focus

lens and processing components in its imaging system architecture. EX1006, Fig. 1, ¶[0038]. Shui describes an imaging element 14 that contains photo diodes arranged on a light receiving surface that convert incident light into signal charges based on the volume of light received. *Id.*, Fig. 1, ¶[0038]. This imaging element is positioned in the optical path after the focus lens 12f and before the signal processing components, as shown in the system diagram of Fig. 1. *Id.*, Fig. 1. The photoelectric conversion functionality is described as the imaging element converting light into electrical signals that are subsequently processed by downstream components. *Id.*, ¶[0038]; EX1003, ¶218.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—image sensors (Shui imaging element 14 in Fig. 1, Iwasaki recording-purpose image pickup device 17) that convert light into electrical signals representing image intensity. EX1003, ¶219.

3. [3c] and [12c]

See element [1f].

E. Claims 4 and 14

Claim 4 depends from claim 2. Claim 14 depends from claim 1. Claims 4 and 14 recite identical elements. Shui in view of Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-

[1f] and [2a]-[2b]. Shui in view of Iwasaki also discloses or renders obvious all the elements of claims 4 and 14 as described below. EX1003, ¶221.

1. [4a] and [14a]

Shui teaches a comprehensive signal processing architecture that includes a digital signal processing unit designed to perform various image processing functions. EX1006, Fig. 1, ¶[0042]. This digital signal processing unit contains multiple circuits including synchronization, gamma correction, and contour correction components that process image signals according to CPU instructions. *Id.*, ¶[0042]. The analog signal processing unit in Shui also performs pre-white balance processing on color signals. *Id.*, ¶[0039]. The claim requires a processing unit for adjusting white balance of an input picture signal, and Shui's digital signal processing system performs this function by processing image data to adjust color balance. *Id.*, ¶¶[0039], [0042]; EX1003, ¶222.

2. [4b] and [14b]

See element [1f].

F. Claims 5 and 8

Claim 5 depends from claim 2. Claim 8 depends from claim 7. Claims 5 and 8 recite identical elements. Shui in view of Iwasaki discloses or renders obvious all the elements of claims 2 and 7 as described above and below. *See* elements [1pre]-[1f] and [7a]-[7c]. Shui in view of Iwasaki also discloses or renders obvious all the

elements of claims 5 and 8 as described below. EX1003, ¶224.

1. [5a] and [8a]

Shui teaches a method that divides the focus area into multiple regions for evaluation purposes. EX1006, ¶[0015]. Shui further implements a region segmentation approach by dividing the focus area into discrete sections (such as quadrants shown in Fig. 11) to isolate and analyze different portions of the image independently. *Id.*, ¶[0103]. The system then detects when position information from detected features overlaps with these segmented blocks by calculating differentials between photometric values in each region and comparing them against threshold values. *Id.*, ¶[0016]. When the differential exceeds the threshold, the system identifies that region as containing unwanted features (such as high luminance point light sources) that should be excluded from focus evaluation. *Id.*, ¶[0016]. This approach functions as an overlap detection unit by identifying which segmented regions contain problematic pixel features that would interfere with accurate focus evaluation. *Id.*, ¶[0124]; EX1003, ¶225.

Shui and Iwasaki disclose a region segmentation unit and an overlap detection unit under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—software algorithms executing on signal processors (Shui digital signal processing unit 24 and CPU 42 in Fig. 1, Iwasaki analyzing calculating section 34 and CPU

42) that divide images into multiple regions for analysis. EX1003, ¶226.

2. [5b] and [8b]

See element [1f].

G. Claims 6, 9, 11, 13 and 15

Claim 6 depends from claim 2. Claim 9 depends from claim 7. Claim 11 depends from claim 1. Claim 13 depends from claim 12. Claim 15 depends from claim 14. Claims 6, 9, 11, 13 and 15 recite identical elements. Shui in view of Iwasaki discloses or renders obvious all the elements of claims 1, 2, 7, 12 and 14 as described in the sections above and below. *See* elements [1pre]-[1f], [2a]-[2b], [7a]-[7c], [12a]-[12c], and [14a]-[14b]. Shui in view of Iwasaki also discloses or renders obvious all the elements of claims 6, 9, 11, 13 and 15 as described below. EX1003, ¶228.

1. [6a] , [9a], [11a], [13a] and [15a]

Shui teaches a focal position detection method that divides the focus area into multiple regions for evaluation purposes. EX1006, ¶[0018]. The system obtains focus evaluation values for each divided area and selectively excludes certain areas from the evaluation process. *Id.*, ¶[0015]. When implementing area-based analysis, Shui's system maintains the overall evaluation framework while removing specific regions that contain unwanted features. *Id.*, ¶[0016]. The claim requires a region creation unit that keeps the total area of the evaluated value

extraction region constant by excluding unnecessary portions, and Shui's system performs this function by maintaining the overall focus area structure while selectively excluding specific regions that negatively impact focus accuracy. *Id.*, ¶[0124]. Shui's approach divides the focus area into multiple regions and then selectively excluding certain regions from evaluation keeps the total evaluation area constant while removing portions that interfere with accurate focus determination. *Id.*, ¶¶[0015]-[0016]; EX1003, ¶229.

H. Claims 7 and 10

Claim 7 depends from claim 2. Claim 10 depends from claim 1. Claims 7 and 10 recite identical elements. Shui in view of Iwasaki discloses or renders obvious all the elements of claims 1 and 2 as described above. *See* elements [1pre]-[1f] and [2a]-[2b]. Shui in view of Iwasaki also discloses or renders obvious all the elements of claims 7 and 10 as described below. EX1003, ¶230.

1. [7a] and [10a]

Shui teaches a comprehensive exposure control system that includes an iris mechanism 12 and dedicated motor 60i designed to adjust light intensity entering the camera. EX1006, Fig. 1, ¶[0037]. Shui describes how the iris is driven by a dedicated motor to modify aperture settings, which directly controls the amount of light reaching the imaging sensor. *Id.*, Fig. 1, ¶[0037]. This arrangement provides precise control over exposure parameters through mechanical adjustment of the

aperture opening size. *Id.*, Fig. 1, ¶[0037]; EX1003, ¶231.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—controllable mechanisms for adjusting exposure (Shui iris mechanism 12i and motor 60i in Fig. 1, Iwasaki mechanical shutter 16 and aperture 14). EX1003, ¶232.

2. [7b] and [10b]

Shui teaches a photoelectric conversion unit positioned between the focus lens and processing components in its imaging system architecture. EX1006, Fig. 1, ¶[0038]. Shui describes an imaging element 14 that contains photo diodes arranged on a light receiving surface that convert incident light into signal charges based on the volume of light received. *Id.*, Fig. 1, ¶[0038]. This imaging element is positioned in the optical path after the focus lens 12f and before the signal processing components, as shown in the system diagram of Fig. 1. *Id.*, Fig. 1. The photoelectric conversion functionality is described as the imaging element converting light into electrical signals that are subsequently processed by downstream components. *Id.*, ¶[0038]. While the figures show the lens positioned before the aperture, a POSITA would have understood that the relative positioning of the lens and aperture could be reversed without affecting the functionality of the system. This represents a routine design choice in optical systems where

components may be rearranged based on factors such as space constraints, manufacturing considerations, or specific optical performance requirements while maintaining the same functional relationship between components. *Id.*, Fig. 1, ¶[0037]; EX1003, ¶233.

Shui and Iwasaki disclose this element under either construction. Shui and Iwasaki disclose the same or equivalent structures as referenced in the claim construction section above—movable optical lens components (Shui focus lens 12f in Fig. 1, Iwasaki focusing lens 13) capable of being repositioned to adjust focus, and—image sensors (Shui imaging element 14 in Fig. 1, Iwasaki recording-purpose image pickup device 17) that convert light into electrical signals representing image intensity. EX1003, ¶234.

3. [7c] and [10c]

See element [1f].

IX. MANDATORY NOTICES UNDER 37 C.F.R. §§ 42.8(B)(1)-(4)

A. Real Party-In-Interest

Petitioner is the real party-in-interest.

B. Related Matters

The '950 patent is subject to the following action: *Maxell, Ltd. v. Samsung Elecs. Co., Ltd.*, No. 5:25-cv-00052 (E.D. Tex.).

C. Lead and Backup Counsel

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D. Service Information

Service information for lead and backup counsel is provided above. Petitioner consents to electronic service to DLA-Maxell-2-IPRs@us.dlapiper.com and the email addresses listed above.

X. CONCLUSION

The claims of the '950 patent should be found unpatentable for the reasons set forth in this petition.

Date: August 29, 2025

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner certifies that this petition includes 13,934 words, as measured by Microsoft Word, exclusive of the table of contents, mandatory notices under § 42.8, certificates of service, word count, claim listing, and exhibits.

Date: August 29, 2025

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CERTIFICATE OF SERVICE

The undersigned certifies pursuant to 37 C.F.R. §§ 42.6(e) and 42.105 that on August 29, 2025, a true and correct copy of this petition for *inter partes* review of U.S. Patent No. 8,471,950 was served by emailing a copy of the same (by agreement) to the following attorneys for the Patent Owner:

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A courtesy copy was sent to the counsel below via electronic mail: maxell-samsung-service@mayerbrown.com

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