

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SNAPAID, LTD.
Patent Owner

U.S. PATENT NO. 11,671,702

Case IPR2025-TBD

**PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 11,671,702**

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LIST OF EXHIBITS¹

Exhibit No.	Description
1001	U.S. Patent No. 11,671,702
1002	<i>Curriculum Vitae</i> of Dan Schonfeld
1003	Declaration of Dan Schonfeld in support of <i>Inter Partes</i> Review
1004	U.S. Patent No. 8,508,622 (“Anon”)
1005	AN-1057 Using an Accelerometer for Inclination Sensing
1006	U.S. Patent No. 5,831,670 (“Suzuki”)
1007	U.S. Pat. App. Pub. No. 2008/0192129 (“Walker”)
1008	U.S. Pat. App. Pub. No. 2004/0012682 (“Kosaka”)
1009	U.S. Pat. App. Pub. 2009/0296989 (“Ramesh”)
1010	U.S. Pat. App. Pub. 2012/0201427A1 (“Jasinski”)
1011	U.S. Pat. App. Pub. 2002/0110286A1 (“Cheatle”)
1012	Liu et al., “Image Quality Assessment Using Multi-Method Fusion” IEEE 2012
1013	U.S. Pat. App. Pub. No. 2010/0246939 (“Aisaka”)
1014	U.S. Pat. App. Pub. No. 2005/0270381 (“Owens”)
1015	Excerpts from Hector Garcia-Molina et al., “DATABASE SYSTEMS The Complete Book,” 2009 (“Garcia-Molina”) Che-Hua Yeh et al., “Personalized Photograph Ranking and Selection System,” 2010 (“Yeh”)
1016	
1017	Cavalcanti, et al., “A Survey on Automatic Techniques for Enhancement and Analysis of Digital Photography,” 2013 (“Cavalcanti”)

¹ Unless otherwise specified, citations are to the original page, column, and line numbers in exhibits, and all emphasis is added unless otherwise noted.

I. INTRODUCTION

Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Petitioner” or “Samsung”) respectfully request *inter partes* review of claims 1-20 (“Challenged Claims”) of U.S. Patent No. 11,671,702 (“the ’702 Patent”).

II. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

Petitioner requests cancellation of the Challenged Claims as unpatentable under 35 U.S.C. §103.

A. Prior Art Patents and Printed Publications

Petitioner’s challenge is based on the following references, which predate the priority date to which the ’702 Patent is entitled:

1. U.S. Patent No. 8,508,622 (“Anon”) (EX1004) was filed on January 18, 2011, issued on August 13, 2013, and is prior art under at least 35 U.S.C §§102(a)(1) and 102(a)(2), and, to the extent the ’702 Patent is entitled to its earliest claimed priority date, pre-AIA 35 U.S.C. §102(e).

2. U.S. Patent No. 5,831,670 (“Suzuki”) (EX1006) was filed June 18, 1996, issued on November 3, 1998, and is prior art under at least 35 U.S.C §§102(a)(1) and 102(a)(2), and, to the extent the ’702 Patent is entitled to its earliest claimed priority date, pre-AIA 35 U.S.C. §102(b).

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3. U.S. Pat. App. Pub. No. 2008/0192129 (“Walker”) (EX1007) was filed December 23, 2004, published Aug. 14, 2008, and is prior art under at least 35 U.S.C §§102(a)(1) and 102(a)(2), and, to the extent the ’702 Patent is entitled to its earliest claimed priority date, pre-AIA 35 U.S.C. §102(b).

4. U.S. Pat. App. Pub. No. 2004/0012682 (“Kosaka”) (EX1008) was filed July 2, 2003, published January 22, 2004, and is prior art under at least 35 U.S.C §§102(a)(1) and 102(a)(2), and, to the extent the ’702 Patent is entitled to its earliest claimed priority date, pre-AIA 35 U.S.C. §102(b).

5. U.S. Pat. App. Pub. No. 2009/0296989 (“Ramesh”) (EX1009) was filed May 28, 2009, published December 3, 2009, and is prior art under at least 35 U.S.C §§102(a)(1) and 102(a)(2), and, to the extent the ’702 Patent is entitled to its earliest claimed priority date, pre-AIA 35 U.S.C. §102(b).

6. U.S. Pat. App. Pub. No. 2012/0201427A1 (“Jasinski”) (EX1010) was filed February 4, 2011, published August 9, 2012, and is prior art under at least 35 U.S.C §§102(a)(1) and 102(a)(2), and, to the extent the ’702 Patent is entitled to its earliest claimed priority date, at least pre-AIA 35 U.S.C. §102(a) and (e).

7. U.S. Pat. App. Pub. No. 2002/0110286A1 (“Cheatle”) (EX1011) was filed on January 9, 2002, published August 15, 2002, and is prior art under at least 35 U.S.C §§102(a)(1) and 102(a)(2), and, to the extent the ’702 Patent is entitled to its earliest claimed priority date, pre-AIA 35 U.S.C. §102(b).

8. Liu et al., “Image Quality Assessment Using Multi-Method Fusion” IEEE 2012 (EX1012) (“Liu”) was published on March 11, 2013. As discussed in Section III.C, *infra*, the ‘702 Patent is not entitled to either the October 23, 2012, or February 1, 2013, priority date of its provisional applications and therefore Liu is prior art under at least 35 U.S.C § 102(a)(1).

9. Hector Garcia-Molina *et al.*, “DATABASE SYSTEMS The Complete Book,” 2009 (“Garcia-Molina”) (EX1015), is a textbook published in 2009 on database design and is prior art under at least 35 U.S.C §§102(a)(1), and, to the extent the ‘702 Patent is entitled to its earliest claimed priority date, pre-AIA 35 U.S.C. §102(b).

B. Relief Requested

The grounds of the challenge are set forth below and supported by the declaration of Dr. Dan Schonfeld. EX1003.

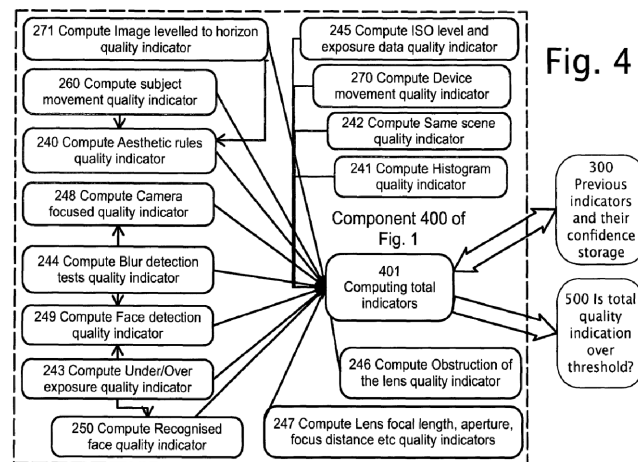
Ground	Claims	Basis	Proposed Statutory Rejection
1A	11-13, 17-19	§103	Anon, Suzuki and Garcia-Molina
1B	14	§103	Anon, Suzuki, Garcia-Molina and Ramesh
1C	15-16	§103	Anon, Suzuki, Garcia-Molina and Jasinski
1D	20	§103	Anon, Suzuki, Garcia-Molina, Jasinski, and Liu
2A	1-3, 5, 7-10	§103	Anon, Walker, Kosaka, Jasinski, and Garcia-Molina

2B	4	§103	Anon, Walker, Kosaka, Jasinski, Garcia-Molina and Cheatle
2C	6	§103	Anon, Walker, Kosaka, Jasinski, Garcia-Molina and Ramesh

III. THE '702 PATENT

A. Specification

The '702 Patent, titled “Real Time Assessment of Picture Quality,” was filed as U.S. Patent Application No. 17/666,585 on Feb. 8, 2022. The '702 Patent describes a method and system for real-time assessment of picture quality in camera devices. EX1001, Abstract. Multiple sensors (*e.g.*, accelerometers, lens modules) are used to determine a plurality of quality indicators (QIs) for the images. *Id.*, 2:23-42. The quality of captured images is evaluated by combining various quality indicators (QIs), as shown below in Figure 4.



The system provides real-time suggestions to users for improving photo quality based on the quality indicators. *Id.*, 3:22-26.

The '702 Patent admits the “[p]rior art has used certain independent quality indicators” and “quantif[ied] the quality by means of a total quality indicator.” EX1001, 2:42-62. The '702 Patent purports to distinguish the prior art by asserting that in its invention, “the weight of one indicator will take into account data from other quality indicators.” *Id.*, 3:1-2. But that feature is not found in any Challenged Claim.

B. Prosecution History

The prosecution of the '702 Patent was cursory. There was no substantive discussion of any prior art reference, and no claims were rejected over prior art.

C. Priority Date

The '702 Patent claims priority to Provisional Application No. 61/717,216, filed on October 23, 2012, and Provisional Application No. 61/759,643, filed February 1, 2013. Neither provisional provides support for all limitations of any Challenged Claim. *Studiengesellschaft Kohle, M.B.H. v. Shell Oil Co.*, 112 F.3d 1561, 1564 (Fed. Cir. 1997) (“35 U.S.C. § 120 requires an applicant to meet the disclosure requirement of § 112, ¶1 in a single parent application in order to obtain an earlier filing date for individual claims.”). For example, neither provisional discloses “at least one appropriate suggestion from a pre-stored table of suggestions,” which is required by all Challenged Claims. As another example, the limitations of claim 20 are not found in either provisional. Neither provisional

includes disclosure of using multiple algorithms or an “artificial neural network employing deep learning algorithm” or “Peak Signal-to-Noise Ratio (PSNR) calculation.” Therefore, the ’702 Patent is not entitled to a priority date based on either provisional. *See* 35 U.S.C. § 119(e), 37 CFR § 1.78(a)(3)-(4); *see also Droplets, Inc. v. E*TRADE Bank*, 887 F.3d 1309, 1316 (Fed. Cir. 2018).

D. Person of Ordinary Skill in the Art

As Dr. Schonfeld explains in his declaration, a POSA at the time of the ’702 Patent would have had at least a bachelor’s degree in electrical engineering, computer science, or a related field, and at least two years of experience with image processing and analysis. Individuals with different education and additional experience could still be of ordinary skill in the art if that additional experience compensates for a deficit in their education and experience. EX1003, ¶¶51-53.

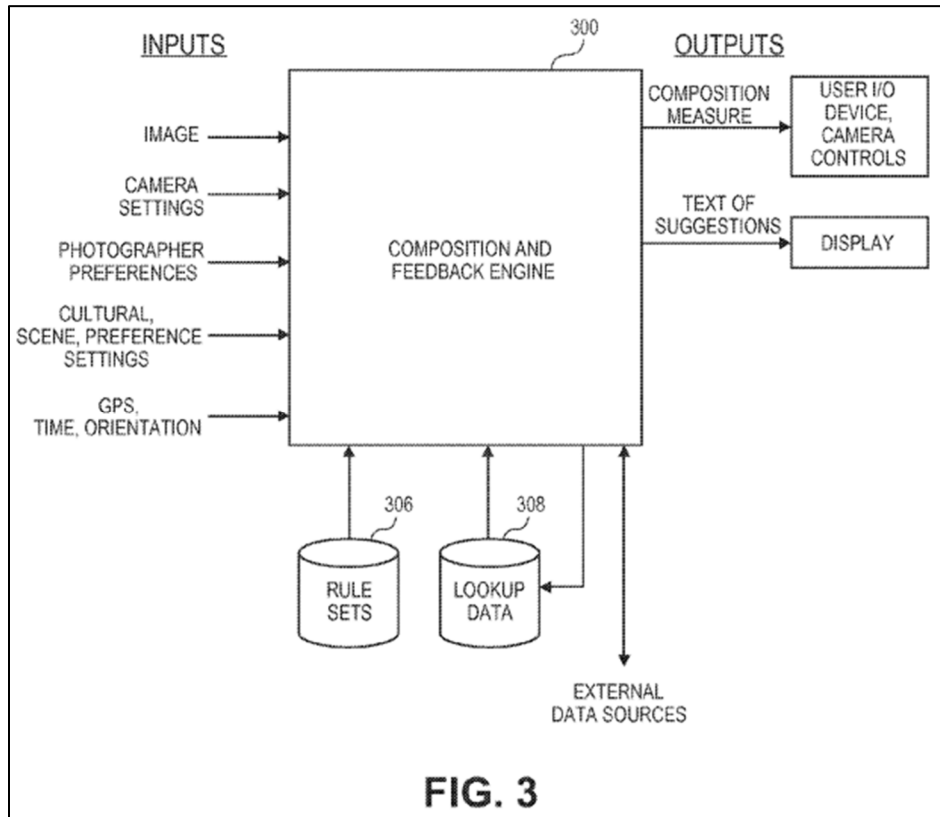
IV. CLAIM CONSTRUCTION

Claims in an IPR are construed under *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). For purposes of this proceeding only, terms in the Challenged Claims need not be construed. If PO raises claim construction arguments, Petitioner reserves the right to respond.

V. OVERVIEW OF THE PRIOR ART

A. Anon

Anon discloses “[a]n image capturing device” that can “determine a plurality of image-based characteristics for a proposed image,” including “a likely quality of a composition and/or recommendations for improvement usable while the image or video is being taken.” EX1004, Abstract, 2:64-3:1. Anon “compute[s] a composition measure for the proposed image” from the plurality of image-based characteristics, which is used to “provide suggestions for altering at least one characteristic of the proposed image.” *Id.*, 1:59-2:8. Anon explains that “the photographer is provided with real time feedback as to composition and recommendations, or can be provided with such feedback after the fact.” *Id.*, 3:22-26. Anon’s system, which incorporates a “composition and feedback engine” 300, is illustrated in Figure 3 below:

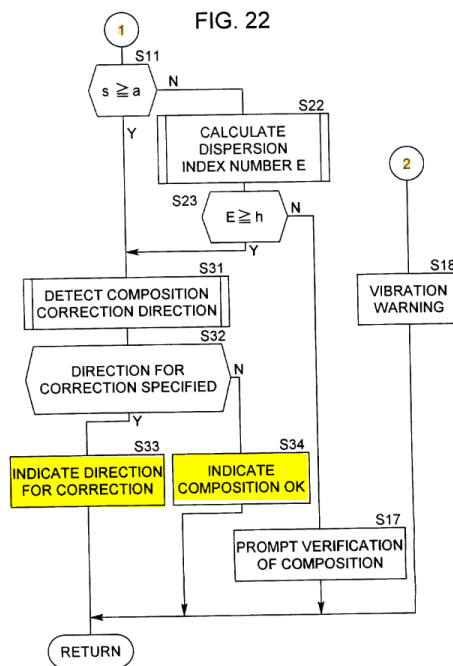


The composition and feedback engine (“CFE”) performs its evaluation and computation of a composition measure using a “weighted, combination of parameters.” *Id.* at 8:32-35; *see also* 6:42-45. Anon’s CFE uses inputs from the image capturing device, such as the image itself, device settings, and metadata, combines it with rule sets 306 and lookup data 308, and outputs recommendations to improve image quality. *Id.*, 7:4-21.

B. Suzuki

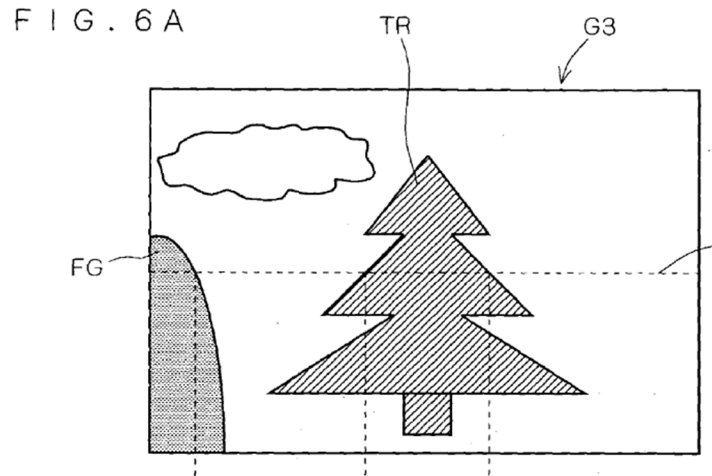
Suzuki discloses a camera system that evaluates composition quality based on various factors, including camera leveling, subject position, and presence of distracting elements (*e.g.*, tilted horizons, objects behind heads). EX1006, Abstract,

1:24-32, 1:49-57. For example, if the deviation of a horizontal edge (such as the horizon) from the true horizontal (*e.g.*, ΔY) is greater than a threshold, the system recognizes the horizon as tilted and triggers a recommendation for the user. *See id.*, 22:1-11. Suzuki further teaches the use of thresholds to evaluate image quality related values and to provide user feedback or recommendations when those factors are suboptimal. *Id.*, 7:34-43, Fig. 22.



C. Kosaka

Kosaka discloses a digital camera system that detects whether a user's finger is unintentionally obstructing the lens before an image is captured. *See e.g.*, EX1008, Fig. 6A.



The system operates by analyzing a series of live view images (or images for autofocus) in real time, prior to the actual image capture. *See, e.g., id.*, Figs. 4A-8, ¶¶[0074], [0075]. Kosaka teaches that the camera notifies the user of such an obstruction before the image is taken, allowing the user to correct the issue and avoid capturing an image with a finger or other object blocking the lens. *See id.* at Figs. 9-10, 23-25, ¶[0089] (“Examples of the notifying operation are, concretely, indication of a note by characters of ‘Note: finger is in’ on the display 7 or a predetermined figure and output of sound of a note from a speaker or voice”).

D. Walker

Walker describes a system and method for the automatic capture, management, and storage of images using imaging devices such as digital cameras. EX1007, Abstract, ¶¶[0020]-[0026]. The invention is designed to acquire images, evaluate their quality, and manage storage resources efficiently. The system leverages a weighted combination of sensors and image analysis algorithms to

optimize both the quality of captured images and the use of available memory. *See Id.*, Fig. 9.

↖ 900

IMAGE IDENTIFIER 905	EXPOSURE RATING 910	SHARPNESS RATING 915	COMPOSITION RATING 920	SUBJECT RATING 925	OVERALL RATING 930
WEDDING-01	8.5	7.2	7.1	8.0	7.7
WEDDING-02	6.0	7.5	7.2	N/A	6.9
WEDDING-03	2.1	5.1	1.4	5.0	3.4
WEDDING-04	5.2	6.0	5.5	5.7	5.6
BEACHTRIP-05	4.5	7.0	3.2	4.1	4.7
BEACHTRIP-06	4.1	7.4	7.5	N/A	6.3
BEACHTRIP-07	6.3	7.9	6.9	7.1	7.1
YOSEMITE-08	7.2	4.5	7.4	N/A	6.4
YOSEMITE-09	4.0	5.5	3.9	2.3	3.9
YOSEMITE-10	7.7	7.3	6.3	5.9	6.8

FIG. 9

A key aspect of the disclosed device is its ability to capture images based on predefined conditions or triggers, such as the orientation of the camera, user behavior (e.g., holding the camera steady or looking through the viewfinder), or environmental factors (e.g., lighting or sound levels). EX1007, ¶¶[0262], [0267], [0275-0286].

Once images are acquired, the system employs image analysis software to rate their quality based on factors like exposure, sharpness, composition, and subject/face detection. *Id.*, ¶¶[0275]-[0286]. These ratings are used to determine whether an

image should be stored, compressed, or deleted, and at what resolution or compression level it should be saved. *Id.* at ¶¶[0271], [0275].

VI. SPECIFIC GROUNDS FOR PETITION UNDER 37 C.F.R. § 42.104(B)

A. Ground IA: Claims 11-13 and 17-19 are Obvious in View of Anon, Suzuki and Garcia-Molina

1. Independent Claim 11

- i. *[11.pre.] “A method for estimating quality of at least one image from a plurality of images, for use with a device that comprises in a single enclosure a digital camera module or functionality that comprises at least one optical lens for focusing received light from a scene and an image sensor coupled to the optical lens for capturing an image of the scene; a motion sensor for sensing the device motion; wherein the motion sensor consists of, or comprises, an accelerometer, a gyroscope or both, and a processor coupled to at least one image sensor and to the digital camera for receiving data therefrom, the method by the processor comprising use of at least one value and weight:”*

To the extent that the preamble is limiting, Anon discloses a method for estimating image quality of at least one image from a plurality of images by analyzing multiple image-based characteristics, computing a composition measure, and providing real-time feedback and suggestions to the user. *See* EX1004, 2:9-14, 2:16-28, 2:33-38, 3:14-26.

Anon describes “[a]n image capturing device includ[ing] an image sensing device, a processor, and a memory.” *Id.*, Abstract, 1:59-2:8. Anon explains that

“light passing through **lens 102** impinges on **CCD 104** to form a digital, electronically readable image” (*Id.*, 5:54-56) and “Camera 100 is equipped with a processor 106 ... and a composition and feedback engine (‘engine’) 108” (*Id.*, 5:56-59). A POSA would have understood this to mean that Anon’s device comprises at least one optical lens for focusing received light from a scene and an image sensor (i.e., CCD) coupled to the lens for capturing an image of the scene. EX1003, ¶58.

Anon discloses that the device is a single, integrated unit, explaining that “[i]n a typical operation, the photographer uses a device that is either a camera (e.g., point-and-shoot, DSLR, SLR) or a multi-purpose device that includes a camera (such as a mobile telephone with a camera)” and that “[t]he photographer uses a device ... to stage a shot ... and then capturing the image” EX1004, 3:14-20. A POSA would have understood that Anon’s camera components are housed within a single enclosure, as is standard for digital cameras and camera-equipped mobile devices. EX1003, ¶59. As shown in Figure 1 below, Anon’s exemplary camera is a digital camera. *See e.g.*, EX1004, Fig. 1, 3:11-14.

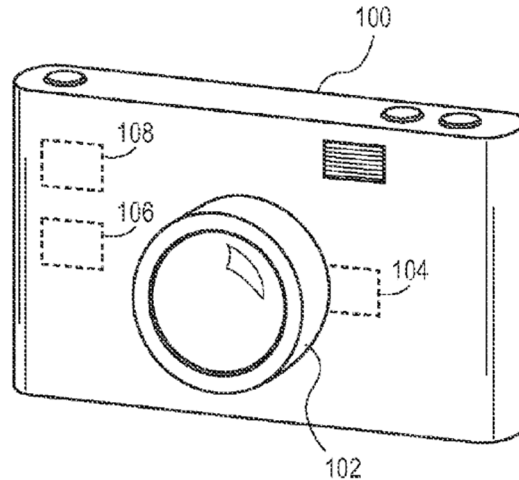


FIG. 1

Anon explains that “[c]amera-specific external inputs might include the camera’s current geographic location, time of day, orientation and the like,” EX1004, 4:24-33, and expressly discloses the use of motion sensors such as an “accelerometer for orientation” as part of the device, *id.*, 4:28-31. *See also, id.*, 7:4-7.

Anon describes an “engine” which is coupled to the image sensor, CCD 104, and other camera components. *Id.*, 5:62-64. Anon further explains that the engine “could be implemented as ... software elements executed on **a processor**” *Id.*, 6:34-41. Figure 3, below, shows that the engine has various inputs including an image, camera settings, and GPS, time, and orientation inputs, illustrating that as implemented on a processor, e.g., processor 106, that processor is coupled to at least one image sensor and to the digital camera for receiving data therefrom. *Id.*, 3:53-60, cl. 9 (“a processor, coupled to the image sensor”). A POSA would have

understood that, to receive an image as an input, the engine comprises a processor coupled to the image sensor and the camera itself and that it performs a method comprising use of at least one value and weight as outlined below. EX1003, ¶61.

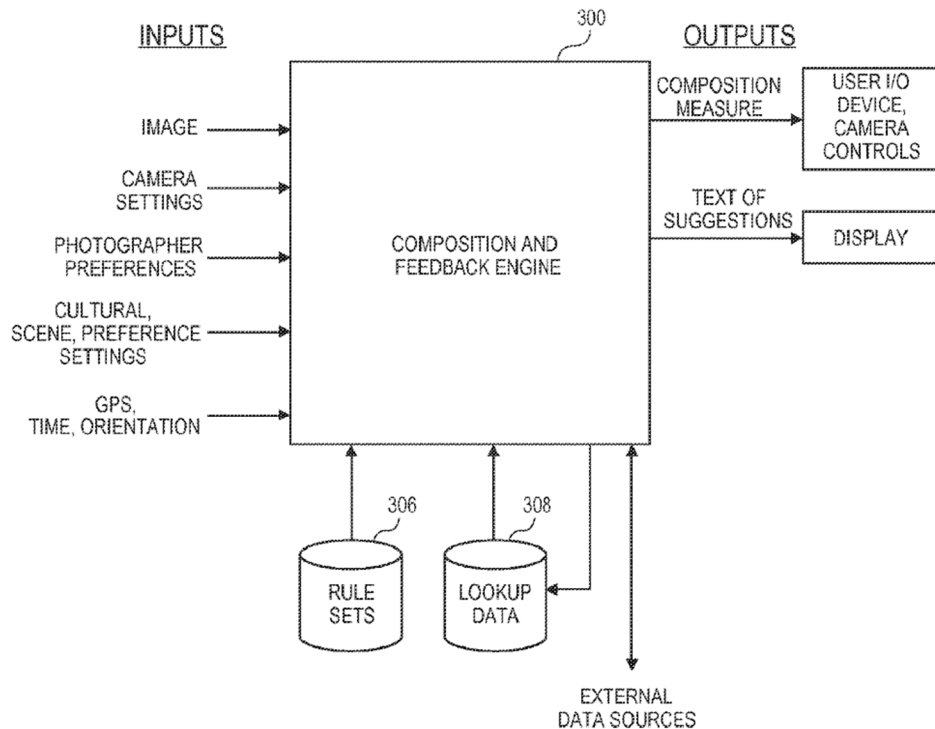


FIG. 3

Anon teaches performing its analysis on at least one image from a “plurality of images,” including judging the quality of images from a body of images or from a video sequence. *See, e.g.*, EX1004, 10:8-26, 3:2-10, cl. 10 (“determining a respective plurality of image-based characteristics using the processor in response to the plurality of images”).

- ii. [11.a] “obtaining a first value (Q11) responsive to

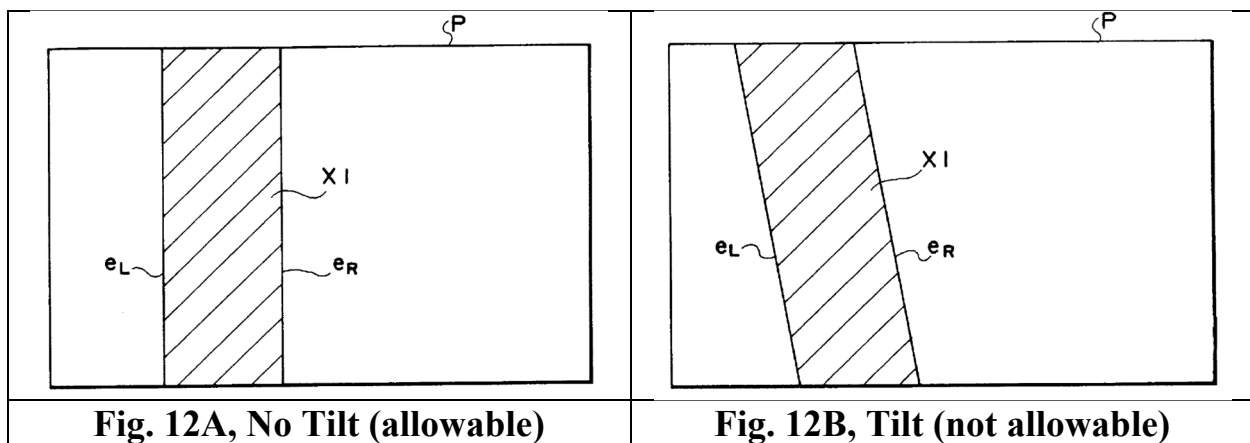
device angle to the horizon”

Anon discloses that inputs to engine 300 include the image itself, camera settings, photographer preferences, cultural preferences, scene preferences, as well as location, time, and ***orientation inputs***. EX1004, 4:24-33, 7:4-7 (“orientation inputs”), 8:27-44, 9:40-46 (“orientation of the camera”). Anon explains that “parameters from the camera may be used to make the judgment, such as the orientation of the camera, where the camera is focused-upon, where within the scene is a face recognized, and the like” (*Id.*, 8:28-31) and that “[c]amera-specific external inputs might include the camera's current geographic location, time of day, orientation and the like.” *See id.*, 4:24-26. Anon also teaches to “check the sky-to-land ratio” (*i.e.*, the horizon) “and if the sky takes up too much of the frame, suggest aiming the camera lower.” *Id.*, 9:35-50. A POSA would understand that the “orientation inputs” would include “a first value (QI1)” responsive to the “horizon line”: “the engine might consider that the mode is set to ‘landscape image’ mode, the focal-length of the lens, and ***the horizon line*** of in the image.” *Id.*, 7:50-54.

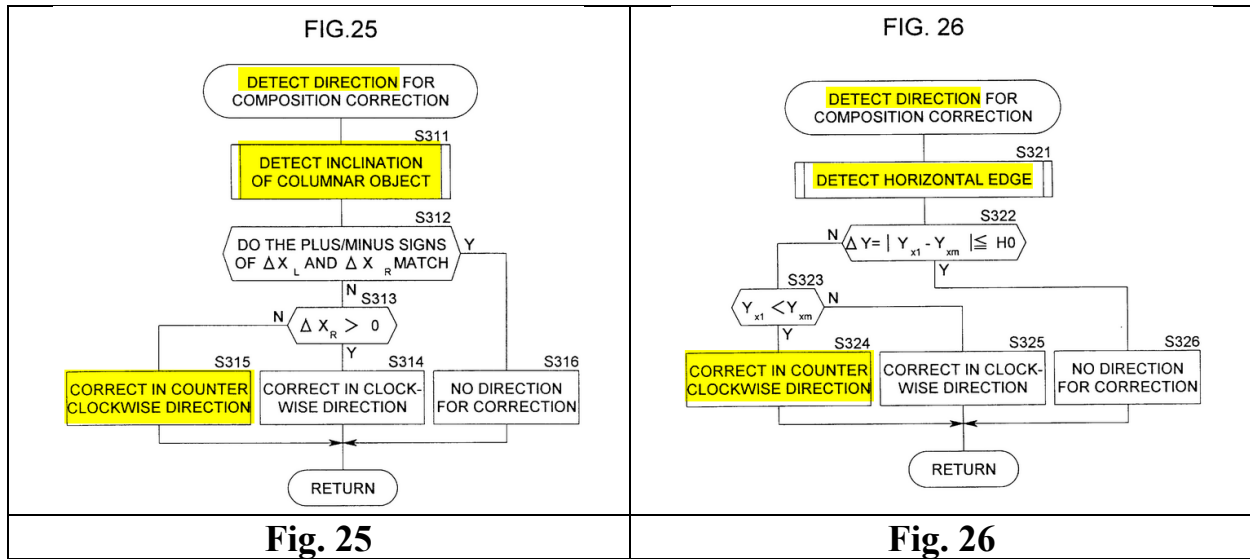
A POSA would have understood that, while Anon does not expressly use the term “angle to the horizon,” “orientation” as determined by an “accelerometer” is, in the context of camera technology, a standard way to obtain a value representing the device’s angle relative to gravity (*i.e.*, the horizon). EX1005 at 1; EX1003, ¶63. As an application note for an Analog Devices accelerometer explains, “an

accelerometer can be used to measure the static angle of tilt or inclination” where “the net acceleration or force on a system over time is gravity” in applications such as “horizon detection in digital cameras.” EX1005 at 1; EX1003, ¶63.

To the extent that PO argues that Anon does not obtain a value responsive to the device angle to the horizon, Suzuki remedies any deficiency. Suzuki analyzes the inclination of a camera by detecting the orientation and then evaluates whether the camera is tilted relative to the expected horizontal or vertical axes. *See* EX1006, Figs. 12A and 12B.



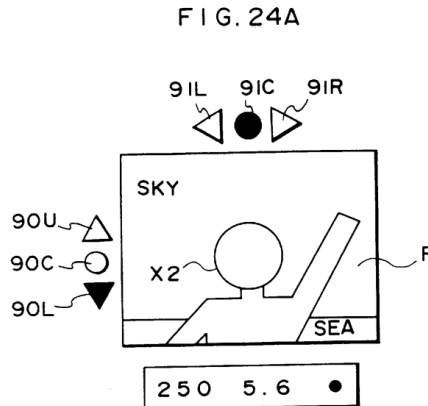
This is accomplished by calculating deviation values (e.g., ΔX_L , ΔX_R , ΔY) to determine if the camera is tilted; and providing feedback to the user to correct the tilt and achieve a leveled position: “If the amount of deviation ΔX_R is a negative value [less than 0], the direction for correction is set to the counter clockwise direction.” *See* EX1006, 21:40-56, Figs. 25-26.



A POSA would have been motivated to modify Anon’s system to use orientation input data for leveling a camera relative to the horizon, as taught by Suzuki, for several well-established technical and practical reasons. A POSA would have known that unintentional tilt or mis-leveling of a camera is a common cause of poor photographic composition. Suzuki explicitly identifies the problem of camera tilt—whether in landscape or portrait orientation—and its negative impact on image aesthetics, such as slanted horizons or vertical objects appearing askew. *See* EX1006, 1:33-39; EX1003, ¶66.

Anon’s system contemplates the use of external characteristics, including “orientation,” “location,” and “horizon” as part of the data available for composition feedback, and Suzuki’s system demonstrates a practical application of such sensors: detecting whether the camera is level relative to the horizon and providing user feedback to correct tilt. EX1003, ¶67.

Furthermore, Anon's system is designed to provide feedback to the user to improve image composition, including suggestions for camera movement, subject placement, and other compositional elements. *See* EX1004, 1:14-17, 7:42-8:13. Integrating orientation input data to detect and correct camera leveling would have been a natural extension of this feedback paradigm. EX1003, ¶68. As Suzuki teaches, providing feedback to the user when the camera is not level helps the user achieve a more aesthetically pleasing and professional-looking photograph. EX1006, Fig. 24A (indicator 90L), Abstract ("warning device that issues a warning when the signal indicating poor composition has been issued"), 1:12-46, 1:49-58, 4:27-33, 6:19-56, 7:34-43, 9:27-47, 19:7-42.



This aligns directly with Anon's goal of assisting users in capturing better-composed images. EX1003, ¶68.

Suzuki provides methods for detecting tilt and issuing corrective feedback, which could be readily implemented in Anon's feedback engine. The combination

would not require undue experimentation or inventive skill, as both systems are designed to process sensor data and provide user guidance. Technically, Anon’s system is already structured to receive and process a variety of sensor inputs, including those related to orientation. EX1004, 4:24-33. Suzuki’s methods for detecting and correcting tilt are compatible with the architecture of Anon’s feedback engine, which is designed to analyze image and sensor data and provide actionable feedback to the user. The modification would have thus been straightforward from an engineering perspective to a POSA. EX1003, ¶70. The proposed combination also represents combining prior art elements (Suzuki’s methods for detecting and correcting tilt with Anon’s composition and feedback engine) according to known methods to yield predictable results, and the use of a known technique (Suzuki’s detection and correction of tilt) to improve similar devices in the same way. EX1003, ¶70.

- iii. *[11.b] “obtaining a second value (QI2) associated with aesthetic quality of image based on composition”*

Anon’s engine receives a proposed image, determines a plurality of image-based characteristics (such as color, focus, brightness, and compositional elements), and then computes a “composition measure” for the proposed image and the given settings. See EX1004, 3:43-4:51, 5:26-30, 6:42-50. This composition measure is a value that depends on, among other inputs, at least two image-based characteristics

of the proposed image, including aesthetic quality. *See id.*, 3:43-4:23. For example, Anon explains an “energy” measure as an input:

It is generally understood that pictures with bright colors are more “energetic” than pictures with muted tones. It is also generally understood that vertical lines are low energy, horizontal lines are higher in energy and diagonal lines convey the most energy, while reds, oranges and yellows are more energetic than greens, blues, browns, etc. Taken alone, there might be an optimal energy measure and certain adjustments might be suggested, such as a suggestion to zoom in to eliminate more low energy background, thereby increasing the energy of the image.

Id., 4:7-16. Anon’s energy value, which Anon notes is an aesthetic indicator, is a “second value (QI2)” as claimed. *Id.*, 4:42-51.

Thus, in Anon, the composition measure is intended to reflect the overall aesthetic quality of the image, particularly as it relates to compositional rules and guidelines. Anon discusses the use of compositional rules such as the “rule of thirds,” balance of luminance, and other aesthetic principles to evaluate the image. *Id.*, 10:41-46. And Anon explains in mathematical terms that each individual characteristic of an image is assigned a value. *Id.*, 5:40-47. Each of these is also “a second value (QI2)” as claimed.

- iv. [11.c] “wherein at least one of the values is below a threshold, to select, at least one appropriate suggestion from a pre-stored table of suggestions of how a user of the system may cause at least one of QI1 or QI2, to be the threshold and to present

the appropriate suggestion to the user.”

As discussed in *supra* Section VI.A.1.iii, Anon describes a camera system that evaluates a plurality of image-based characteristics (such as focus, color, brightness, energy, subject position, and orientation) to compute a composition measure for a proposed image. In particular, Anon uses thresholds to provide feedback, for example: “the camera viewfinder might have three lights (e.g., red, yellow, green) to signal to the photographer a rating of the photograph that would result if a photograph was taken at that time, with those settings, in that location. The photographer might, seeing a red light, move the camera or make other adjustments to see if a yellow or green light could be obtained”. *See* EX1004, 3:27-33. Anon also teaches the use of thresholds based on composition measure to trigger suggestions, *see id.*, 5:64-6:8, and expressly discloses making suggestions based on an individual quality indicator, such as an “energy” value, being below a threshold: “there might be an optimal energy measure and certain adjustments might be suggested, such as a suggestion to zoom in to eliminate more low energy background, thereby increasing the energy of the image.” *Id.*, 4:13-16.

Similarly, Suzuki teaches a camera system that evaluates composition quality based on various factors, including camera leveling, subject position, and presence of distracting elements (e.g., tilted horizons, objects behind heads). *See, e.g.*, EX1006, Fig. 30, 1:24-46, 23:62-24:3, 24:58-67. For example, if the deviation of a

horizontal edge (such as the horizon) from the true horizontal (*e.g.*, ΔY) is greater than a threshold, the system recognizes the horizon as tilted and triggers a recommendation for the user. *See id.*, 22:1-11.

Suzuki further teaches the use of thresholds to evaluate image quality related values and to provide user feedback or recommendations when those factors are suboptimal. *See id.*, Figs. 20, 22, 19:7-15. A POSA would have been motivated to modify Anon to use Suzuki's thresholds in such a manner for several reasons (EX1003, ¶¶73-75):

- both systems are designed to help users improve image quality by alerting them to specific issues and suggesting corrective actions; and
- Anon's system is designed to be extensible and to incorporate new evaluation factors and rules, including those based on threshold comparisons.

A POSA would have known that using a threshold to trigger a recommendation, whether based on an overall image quality measure or individual quality indicators (*e.g.*, energy, EX1004, 4:13-16), is a predictable and well-understood method for providing actionable feedback to users and a POSA would have had a reasonable expectation of success in using the thresholds in Anon to generate recommendations for a user to improve an image. Both Anon and Suzuki teach threshold-based evaluation and user feedback, and their combination would

have been a straightforward, predictable, and technically compatible way to enhance user guidance and image quality in camera systems. EX1003, ¶76.

Further, the combination of Anon and Suzuki would have motivated the use of a pre-stored table (or database) of suggestions or rules for improving image quality in several ways. Anon explains that, after the engine “compute[s] a composition measure for the proposed image,” it “output[s] an indication of the composition measure to a user, in the form of simple indicators, more complex indicators/displays, and/or *provide suggestions for altering at least one characteristic of the proposed image.*” EX1004, Abstract; *see also id.*, 1:59-2:4. To determine the suggestions that should be made based on compositional measures, Anon discloses the use of rule sets 306. These rule sets are data structures that contain user suggestions for improving photographs. As Anon explains, the engine “can also take into account rule sets stored in rule set storage 306 and lookup data stored in lookup data storage 308. Examples of rules are used throughout this disclosure, and it should be understood that engine 300 operates on data structures that represent those rules, possibly in combination with lookup data 308 that may be relevant to a particular rule.” *Id.*, 7:15-24. Anon goes on to provide the following example: “a rule in rule set storage 306 might indicate that for landscape images of large bodies of water, adjust the camera settings so that a pleasing amount of light would come from the water relative to the sky, and another rule in *rule set storage*

306 might indicate that when standing close to a famous monument, suggest to the photographer where good viewing locations are, and the lookup data 308 might include data for some commonly widely photographed monuments.” *Id.*, 7:21-29. Anon provides other examples as well: “a camera image type setting might be set to a ‘portrait image’ mode, an image capture device (or the engine itself) might identify the head and/or eyes of the subject to be photographed, the engine would then consider the image type setting, the current lens aperture, etc. and ***suggest movement or recomposition based on one or more rules from the rule set.***” *Id.*, 7:44-50. In another example, “the engine might consider that the mode is set to ‘landscape image’ mode, the focal-length of the lens, and the horizon line of in the image itself ***and, based on one or more rules, suggest changes.***” *Id.*, 7:50-54.

Anon does not specifically disclose that its rules are organized as “tables,” but does disclose that its rules are organized in “data structures.” *Id.*, 7:15-21. A POSA would have understood and found obvious that a table, which is comprised of rows and columns, was the most common and easily implemented data structure that facilitated efficient storage, retrieval, and manipulation of data. Indeed, Garcia-Molina, a leading textbook on database design from 2009, confirms that the two-dimensional table is “the most important model of data.” EX1015, 17; *see generally* EX1015, Chapter 2. Thus, it would have at least been obvious to store Anon’s rule sets in table form, as it would have been use of a known technique to improve similar

devices in the same way and applying a known technique to a known device ready for improvement to yield predictable results. EX1003, ¶77.

2. Claim 12

Claim 12 depends from claim 11 and further recites “wherein the suggestion may suggest to the user to move to another location.” Anon explicitly describes scenarios in which the system may suggest that the user move to another location to improve the composition and overall aesthetic quality of an image. *See, e.g.*, EX1004, 9:29-32 (“For example, the engine might optimize a suggestion ***for changing a camera location*** to one where the color mix is less desirable, but where the composition is better.”). For example, Anon’s engine analyzes not only the current image and camera settings but also external context such as geographic location, orientation, and scene type. *Id.*, 2:16-27, 4:24-34, 4:56-5:25, 7:4-14, Fig. 3. The system is designed to provide real-time feedback and suggestions to the user, which can include recommendations to change the camera’s position or location. *See id.*, 7:55-63 (“the feedback can be a simple visual, audio or vibratory indication ... but might also include suggestions for improvement, in the form of arrows, icons, text, etc.”), 9:29-32.

3. Claim 13

Claim 13 depends from claim 11 and further requires “calculating a total image quality according to, or based on, the total value, and wherein the total value

is calculated based on, QI1 and QI2, and when the total quality is above or below the threshold, give the user feedback or save image to a user storage.” Anon teaches that input parameters can be weighted and combined, explaining that “these parameters may be input into a fuzzy logic set, or the like, and an evaluation, e.g. weighted, combination of parameters may be performed by the composition and feedback engine.” EX1004, 8:32-35.

Anon further teaches that the calculated composition measure (*i.e.*, combined value) represents the total image quality—“a composition measure...provides ***rating of the composition*** of the image that is a ‘proposed’ image,” EX1004, 6:42-45—and can be compared to a threshold to determine subsequent actions such as user feedback. Anon explains that “[t]he camera might provide more detailed feedback” such as “suggestions for changes to settings ... to improve the composition measure, or an overriding of camera controls based on composition measure (*e.g.*, ***if the composition measure is below a threshold***, the camera might lock the shutter button to prevent a photograph from being taken). *Id.* at 3:33-42, 5:64-6:8.

4. Claims 17, 18, and 19

Claims 17, 18, and 19 depend from claims 11, 12, and 13, respectively, and further require “analyzing the captured image for detecting or recognizing one or more objects in the image, wherein the second value (QI2) associated with the aesthetic quality is partially based on detected objects.” Anon’s system analyzes

images in real-time to detect or recognize one or more objects (such as faces, people, or other subjects), and the value associated with aesthetic quality is at least partially based on the detected objects and their properties within the image. EX1004, 3:53-60, 8:15-31, 8:65-9:25, cl. 6 (“classification of the subject is one of a person's face, an animal, a landscape object, a primary object of interest, a building or a landmark”). For example, Anon explains that the system may judge a “good” image as one where the subject (*e.g.*, a person) is in focus, the subject’s eyes are open, and the subject is not obscured by background objects. *See id.*, 8:19-23 (“if a photographer is taking a picture of a person in front of an object, such as the Eiffel Tower, a ‘good’ shot is typically judged when the Eiffel Tower is positioned to not be directly behind the subject’s head”), 8:14-35.

B. Ground IB: Claim 14 is Obvious in View of Anon, Suzuki, Garcia-Molina and Ramesh

1. Claim 14

Claim 14 depends from claim 11 and further recites “wherein the first, or second value is respectively associated with an estimated error in the first or second values.” Anon does not expressly disclose associating an error with a first value (QI1) responsive to the device angle to the horizon or a second value (QI2) associated with an aesthetic quality of image based on the composition. Ramesh, however, describes a computer vision system for detecting and tracking multiple

objects (*e.g.*, people in crowds) using a probabilistic framework. EX1009, Abstract, Fig. 1, ¶[0039]. Ramesh estimates the number of a people in a scene by using a “weighted sum of partial evidences.” *Id.*, ¶[0034]. An “objects location and attributes are updated using online uncertainty estimation 110.” *Id.*, ¶[0025]. Ramesh teaches that “less certain guesses” (*i.e.*, guesses with greater error) “are weighted less.” *Id.*, ¶[0030].

A POSA would understand that in Anon’s real-time image evaluation, the reliability of different features (such as orientation/tilt or aesthetic quality) can vary due to noise, ambiguous scenes, or changing conditions. EX1003 ¶87. Further, Anon teaches that “what characteristics are used to determine what is a ‘good’ image are very flexible and can be enhanced or changed completely over time.” EX1004, 10:47-50. A POSA would thus understand that Anon’s composition engine is meant to be modified and improved. EX1003, ¶87. Ramesh’s probabilistic approach provides a principled way to quantify and propagate uncertainty (error) in such situations. Associating an estimated error (*e.g.*, standard deviation, confidence interval) with each weight would have allowed Anon’s system to adaptively adjust the weight of each characteristic based on its reliability and combine output values from multiple sources in a statistically optimal way. A POSA would understand weighing characteristics with higher estimated error less than characters with greater certainty increases the accuracy of image quality assessment. EX1009, ¶[0030];

EX1003, ¶87. The combination of Anon and Ramesh is thus the application of a known technique (weighting parameters with error / uncertainly relatively less, as disclosed by Ramesh) to a known device (Anon) ready for improvement to yield predictable results (an optimized composition engine). EX1003, ¶87.

**C. Ground IC: Claims 15 and 16 are Obvious in View of Anon,
Suzuki, Garcia-Molina and Jasinski**

1. Claims 15 and 16

Claims 15 and 16 depend from claim 11 and 13, respectively, and further recite “wherein at least one of the values are defined at least partially over a time-dependent confidence level defined over at least one of the values QI1, QI2.” Anon does not expressly teach this limitation. Jasinski, however, teaches that the reliability of motion estimates can fluctuate over time due to changes in scene content, lighting, camera movement, or subject motion. By capturing a sequence of images at different times and computing motion estimates for each, the system can observe how confidence in those estimates evolves. *See* EX1010, ¶¶[0030], [0088], [0122]. Jasinski teaches weighting coefficients relative to its confidence level. *Id.*, ¶[0122] (“Another factor that determine the weighting coefficients w_i is a relative confidence level associated with the local motion velocity 375.”).

A POSA would have understood that the use of a time-dependent confidence level (as taught by Jasinski) as part of a weighted combination of parameters (as

taught by Anon) would allow for accounting of changes in the reliability, relevance, or certainty of the parameters over time. In other words, a POSA would have appreciated that weighting Anon's estimates according to their time-dependent confidence would have allowed the system to adapt to the most current and relevant scene conditions, rather than relying on outdated or less reliable data. The result is a more accurate assessment of image quality. EX1003, ¶90. The combination of Anon and Jasinski is the use of a known technique (Jasinski's time-dependent confidence level) to improve similar devices in the same way. For these reasons, a POSA would have been motivated to combine the complementary teachings of Anon and Jasinski with a reasonable expectation of success. EX1003, ¶90.

**D. Ground ID: Claim 20 is Obvious in View of Anon, Suzuki,
Garcia-Molina, Jasinski, and Liu**

1. Claim 20

Claim 20 depends from claim 16 and further recites "wherein the analyzing of the captured image comprises applying multiple algorithms selected from a group consisting of an aesthetic algorithm, an artificial neural network employing deep learning algorithm, a corner detection algorithm, a blur detecting algorithm, and Peak Signal-to-Noise Ratio (PSNR) calculation, and the method further comprising obtaining a respective second value (QI2i) associated with each of multiple algorithms, and calculating or estimating the third [sic] value (QI2) based on the

multiple third [sic] values (QI2i) from the multiple algorithms.” As discussed above in Section VI.A.1.iii, Anon’s composition measure is intended to reflect the aesthetic quality of the image, particularly as it relates to compositional rules and guidelines and is based on at least one input—QI2—associated with an aesthetic quality, e.g., “energy” of the image. For example, Anon discloses determining “a measure of an aesthetic based on Japanese aesthetics, Chinese aesthetics, maritime aesthetics, mountaineering aesthetics, children aesthetics, urban aesthetics, etc.” EX1004, 7:7-14. Anon further explains that “there might be some cultures for which different colors have different meanings and some color combinations conflict, whereas in other cultures, the colors combinations are seen as harmonious. In such cases, the engine might send a signal or a message when the processing performed by the engine suggests that the colors seen in the potential photograph are too “energetic” when it takes into account that there are also many lines in the image and takes into account a set of cultural-specific external inputs.” *Id.*, 7:7-14, 4:42-51. Thus, Anon discloses the use of an “aesthetic algorithm” as claimed to evaluate an image.

Anon, however, does not appear to discuss using the results of multiple algorithms to arrive at a single quality indicator as an input. But that would have been obvious in view of Liu. Liu teaches that “[various] image quality assessment methods have been developed to reflect human visual quality experience” and describes many types of aesthetic quality algorithms, which are listed in Table 1 of

Liu. EX1012, 1793. Each algorithm in Table 1 is an example of a claimed “aesthetic algorithm.” Liu also discloses that one of the algorithms is the “Peak Signal-to-Noise Ratio” (*i.e.*, the claimed “Peak Signal-to-Noise Ratio (PSNR) calculation”). Liu teaches that it is “possible to achieve significantly better performance by fusing multiple methods.” *Id.* For example, Liu describes its Multi-Method Function approach:

To achieve MMF, we adopt a regression approach (e.g., support vector regression (SVR)). First, **we collect a number of image quality evaluation methods.** Then, **we set the new MMF score to be the nonlinear combination of scores from multiple methods with suitable weighting coefficients.** Clearly, these weights can be obtained by the regression approach.

Id., 1793. A POSA would understand that the “number of image quality evaluation methods” are the claimed “respective second value[s] (QI2i) associated with each of multiple algorithms” and that the “MMF score” is the claimed “QI2” that is based on the multiple (QI2i) values from the multiple algorithms.

A POSA would be motivated to use Liu’s MMF method with the Anon-Suzuki-Jasinski system for several reasons. For example, Liu teaches the benefits of a multi-method fusion approach—“there is not a single quality index that significantly outperforms others” and that “[s]ome method may be superior for one image distortion type but inferior for others.” EX1012, 1793. As a result, “the idea of multi-method fusion (MMF) *arises naturally.*” *Id.* Liu also explains that a single method is challenging, but “it is possible to achieve significantly better performance

by fusing multiple methods.” *Id.* A POSA would recognize these benefits based on Liu’s teachings and be motivated to achieve them in the Anon-Suzuki-Jasinski system by using Liu’s multi-factor fusion approach to aesthetic quality algorithms. Anon teaches that “what characteristics are used to determine what is a ‘good’ image are very flexible and can be enhanced or changed completely over time.” EX1004, 10:47-50. A POSA would thus understand that Anon’s composition engine is meant to be modified and improved and would look to Liu for such an improvement. EX1003, ¶94. The combination is the use of a known technique (Liu’s multi-algorithm MMF approach) to improve similar devices in the same way. For these reasons, a POSA would have been motivated to combine the complementary teachings of Anon and Liu with a reasonable expectation of success. EX1003, ¶94.

E. Ground 2A: Claims 1-3, 5, and 7-10 are Obvious in View of Anon, Walker, Kosaka, Jasinski and Garcia-Molina

1. Independent Claim 1

- i. *[1.pre.] “A method for estimating quality of at least one image from a stream of images, for use with a device that comprises in a single enclosure a digital camera module or functionality that comprises at least one optical lens for focusing received light from a scene and an image sensor coupled to at least one optical lens for capturing an image of the scene; a motion or location sensor for sensing the device motion; and a processor coupled to the image sensor and to the digital camera for receiving data therefrom, the method by the processor comprising use of at least one*

value from the following QI1 to QI4”

To the extent that the preamble is limiting, Anon discloses a method for estimating image quality of at least one image from a stream of images. Anon explains that, “unless otherwise indicated, what is explained about a photographer using a camera to capture a photograph can equally apply, unless otherwise indicated, to a videographer using a video camera to capture a video sequence....” EX1004, 3:2-10. A POSA would understand that video is a stream of images. EX1003, ¶96. Anon analyzes multiple image-based characteristics, computing a composition measure (informed by external and contextual data), and providing real-time feedback and suggestions to the user. *See* EX1004, 2:9-14, 2:16-28, 2:33-38, 3:14-26.

As set forth in *supra* Section VI.A.1.i, Anon discloses (1) a camera device that comprises at least one optical lens for focusing received light from a scene and an image sensor (*e.g.*, CCD) coupled to the lens for capturing an image of the scene; and (2) that the camera components are housed within a single enclosure, as is standard for digital cameras and camera-equipped mobile devices.

Anon explains that “[c]amera-specific external inputs might include the camera's current geographic location, time of day, orientation and the like.” EX1004, 4:24-33. Anon expressly discloses the use of motion sensors such as “a GPS receiver that receives GPS satellite signals in order to determine a location” and “an

accelerometer for orientation” as part of the device, *id.*, 4:29-31. *See also id.*, 7:4-7. Anon also teaches a “motion sensor that can provide the engine with inputs as to how the camera is moving.” *Id.*, 10:27-46, 2:64-10.

As described in *supra* Section VI.A.1.i, Anon describes an “engine” executing on a processor where the processor is coupled to the image sensor and the camera itself for performing a method comprising use of at least one value and weight as outlined below. EX1003, ¶96.

- ii. [1.a] “obtaining a first value (*Q11*) responsive to the device motion from at least one motion or location sensor”

Anon discloses that inputs to engine 300 include the image itself, camera settings, photographer preferences, various settings for cultural preferences, scene preferences and the like, as well as **location**, time, and **orientation** inputs. EX1004, Fig. 3, 4:24-34, 7:4-29. Anon explains that “parameters from the camera may be used to make the judgment, such as the orientation of the camera, where the camera is focused-upon, where within the scene is a face recognized, and the like” (*Id.*, 8:27-31) and that “[c]amera-specific external inputs might include the camera's current geographic location, time of day, orientation and the like.” *See id.*, 4:24-26. For example, Anon explains that “if the engine is aware of the camera location and has access to a data set of rules (*e.g.*, ‘when located at the GPS coordinates of the front of Cinderella's Castle™ in Disneyland, suggest centering on the castle rather than

rule of thirds’).” *Id.*, 5:3-7. A POSA would have understood that GPS coordinates constitute a value, *i.e.*, “a first value (QI1),” because they comprise at least a longitude coordinate and a latitude coordinate. EX1003, ¶97.

Anon also discusses the use of motion sensors “that can provide the engine with inputs as to how the camera is moving.” *Id.* at 10:26-35. The motion sensor input is a “first value (QI1)” as claimed. Anon explains, for example, that “it might be a preference when a subject is moving quickly in a scene to frame more of the scene in front of the subject than in back of the subject and this could be suggested by the engine to a videographer.” *Id.*, 10:31-35.

- iii. [1.b] “obtaining a second value (QI2), where value is a measurement of under or over exposure of at least one of a part of image or face exposure”

Anon does not expressly disclose obtaining a measurement value indicating whether an image is under or over exposed. Walker, however, explicitly uses “exposure of specific portions of an image” including “whether a person's face in an image is correctly exposed” in its image quality evaluation. EX1007, ¶¶[0275]-[0277], [0280]; *see also id.*, ¶¶[0023], [0151]-[0152], [0157], [0174]-[0181], [0262], [0276], [0290], [0294], [0295], [0321], [0326], [0430]. Walker teaches “a camera [that] may determine whether to store and/or how to store an image based on the image . . . by evaluating the quality of the image or one or more characteristics of the image.” *Id.*, ¶[0275]. Walker teaches that “[i]f the image is high quality (*e.g.*,

well-exposed ...), then the image may be stored by the camera in secondary memory, [but i]f the image is low quality (e.g., underexposed, ...), then the image may be compressed and stored or just deleted or overwritten.” *Id.* Walker explains that “‘quality’ . . . may be used to refer to a variety of different factors that affect whether an image is (or is likely to be) desirable to a user.” *Id.*, ¶[0276]. Exposure of the image is one of the expressly disclosed characteristics used for determining image quality:

exposure of the image—For example, the camera may determine if an image is exposed correctly. Images that are exposed correctly may be considered higher quality, whereas images that are over-exposed or under-exposed may be deemed to be of lower quality. In a second example, **the camera may determine the exposure of specific portions of an image**. For example, the quality of an image may depend on **whether a person's face in an image is correctly exposed**.

Id., ¶[0280]. Walker’s exposure rating is “a second value (QI2)” as claimed. *Id.*, ¶¶[0151]-[0152], [0176]-[0177], [0280].

Both Anon and Walker are directed to the problem of evaluating and improving the quality of digital images, albeit with different emphases. Walker’s system provides a comprehensive evaluation of image quality, including explicit detection and quantification of overexposure and underexposure. *See, e.g.*, EX1007, ¶¶[0275]-[0290]. Anon’s system, on the other hand, is focused on real-time feedback regarding image composition and overall quality, using a variety of image-based

characteristics (such as color, focus, brightness, and energy) to compute a “composition measure.” *See* EX1004, 1:59-2:8.

A POSA would have recognized that exposure quality—specifically, the presence of overexposed or underexposed regions in part of image, such as the face—is a fundamental aspect of overall image quality based on Walker’s teachings. *See* EX1007, ¶¶[0151]-[0152], [0176]-[0177] (“An exposure rating 910 preferably indicates the relative quality of the exposure of an acquired image”), ¶[0280]; EX1003, ¶99. Poor exposure can result in loss of detail, which directly impacts the aesthetic and technical value of a photograph. EX1003, ¶99. Anon’s system is designed to provide feedback and suggestions to improve image quality, and explicitly contemplates using multiple image-based characteristics, including brightness, as part of its composition measure. EX1004, 2:9-15. A POSA would have been motivated to combine Walker’s exposure determination with Anon’s composition feedback system for several reasons (EX1003, ¶100):

- Anon’s system seeks to provide a holistic evaluation of image quality, and Walker’s exposure analysis offers a robust, quantitative method for detecting and scoring exposure problems. Integrating this would have filled a clear need in Anon’s framework for a reliable exposure input.
- Anon’s teaches that different types of characteristics can be used to judge an image with its system. EX1004, 8:14-35, 10:48-50.

- It was well-established in the field of digital imaging that exposure is a key determinant of image quality. A POSA would have been aware of many prior art systems which analyze exposure as part of their quality assessment. *See e.g.*, EX1013, U.S. Pat. App. Pub. No. 2010/0246939 to Aisaka and EX1014, U.S. Pat. App. Pub. No. 2005/0270381 to Owens. Thus, a POSA would have naturally considered exposure analysis as a potential input for any comprehensive image quality or composition evaluation system.

A POSA would have a reasonable expectation of success in implementing Walker's exposure determination as an input to Anon's system for several reasons (EX1003, ¶101.):

- Walker's exposure evaluation produces quantitative results (*e.g.*, "exposure rating" for overexposure/underexposure (EX1007, ¶¶[0176]-[0177], [0174], [0181], [0294]) that are readily usable as input features in Anon's composition measure, which is designed to aggregate multiple image-based characteristics.

- Both references describe modular systems where different evaluation units (*e.g.*, for exposure, focus, color, etc.) contribute to an overall image score. Integrating an additional input, such as exposure, would have been a straightforward extension of Anon.

iv. [1.c] "*analyzing the captured image for detecting or recognizing zero or more faces in the picture,*

calculates properties of at least one of said faces if exist, where said properties are at least one of: looking at camera, smiling, crying, face detection quality, face exposure or subject movement to obtain a third value (QI3)”

Anon explicitly discloses the detection and recognition of faces within the image. For example, Anon discloses:

Other inputs might include an indication of where in the image the subject is (e.g., **find faces and draw a rectangle around the most prominent face in the image**, find an object with a defined border that has a color distribution that is wildly different from the histogram of the rest of the image, as might be the case when photographing a red and yellow bird with a background of green and brown of the surrounding trees).

EX1004, 3:62-4:3. A POSA would have understood this passage to mean that Anon detects and recognizes specific faces within the image. Anon also teaches that “[s]ome cameras can even **detect smiles** (or more precisely, the lack of smiles) and **closed eyes** to control when to take a photograph.” EX1004, 1:47-55. A POSA would understand that the detection of smiles or closed eyelids is the type of image input characteristics that Anon teaches to use as an input into its engine. *Id.*, 3:53-4:3, 7:4-7, Fig. 3.

To the extent Patent Owner argues that Anon does not expressly disclose using the properties of “looking at camera” or “smiling” to obtain a third value, that limitation is obvious in view of Anon’s teachings. EX1004, 1:47-55; 3:53-4:3;

EX1003, ¶102. Anon teaches that “what characteristics are used to determine what is a ‘good’ image are very flexible and can be enhanced or changed completely over time.” EX1004, 10:47-50. A POSA would thus understand that Anon’s composition engine is meant to be modified and improved. And as discussed above, Anon teaches that state of the art camera’s commonly had the capability of detecting when a subject is looking at the camera or smiling. *Id.*, 1:47-55.

The combination of Anon and Walker also teaches this limitation. Like Anon, Walker uses object detection as part of its image quality evaluation process. For example, Walker’s system “may use face recognition software to identify a person in an image.” EX1007, ¶[0286]; *see also id.*, ¶¶[0096] (“may use the user’s personalized database of images for reference in identifying people, objects, and/or scenes in an image captured by the user”), [0186], cl. 30 (“wherein the characteristic of the image comprises at least one of . . . subject of the image [or] face recognition.”). Walker also teaches that the facial recognition software on its “camera may determine whether anybody . . . **looked away** (i.e., somebody is not looking at the camera),” which causes the camera to “determine that the image is lower quality.” EX1007, ¶¶[0275]-[0286]. Walker expressly discloses that the facial recognition of the subject of the image is one of the “characteristics of an image that may be indicative of the quality of an image” and thus is used by its system for that purpose. *Id.*, ¶¶[0275]-[0278], [0284]-[0286]. This facial recognition is “a third

value (QI3)” as claimed. Walker’s system calculates an “overall rating,” which “indicates a quality of the image,” and is “based on one or more of a plurality of ratings.” *Id.* ¶¶[0171]-[0172], [0296], Figs. 8-9. Walker teaches that “the overall rating of an image may be determined as the weighted average of the image’s categorical ratings.” *Id.*, ¶[0296].

↖ 900

IMAGE IDENTIFIER 905	EXPOSURE RATING 910	SHARPNESS RATING 915	COMPOSITION RATING 920	SUBJECT RATING 925	OVERALL RATING 930
WEDDING-01	8.5	7.2	7.1	8.0	7.7
WEDDING-02	6.0	7.5	7.2	N/A	6.9
WEDDING-03	2.1	5.1	1.4	5.0	3.4
WEDDING-04	5.2	6.0	5.5	5.7	5.6
BEACHTRIP-05	4.5	7.0	3.2	4.1	4.7
BEACHTRIP-06	4.1	7.4	7.5	N/A	6.3
BEACHTRIP-07	6.3	7.9	6.9	7.1	7.1
YOSEMITE-08	7.2	4.5	7.4	N/A	6.4
YOSEMITE-09	4.0	5.5	3.9	2.3	3.9
YOSEMITE-10	7.7	7.3	6.3	5.9	6.8

FIG. 9

EX1007, Fig. 9.

A POSA would have been motivated to use Walker’s face detection system (including its looking-away detection) as an input to Anon’s quality estimation engine for several reasons (EX1003, ¶104):

- Anon explicitly acknowledges that a “good” image is often defined by the subject being in focus, well-exposed, and well-composed. Anon also

teaches that “[s]ome cameras can even **detect smiles** (or more precisely, the lack of smiles) and **closed eyes** to control when to take a photograph.” EX1004, 1:47-55. Walker’s system identifies a detected face and determines whether the subject makes an image “high quality” based on whether the subject is looking at the camera. *See e.g.*, EX1007, ¶¶[0284]-[0286].

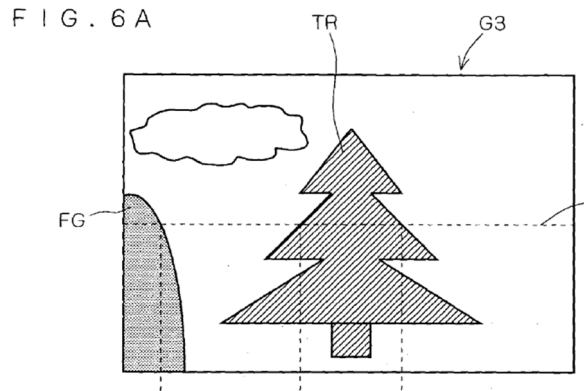
- Anon’s system is designed to automate the process of evaluating images, and it is explicitly open to using a variety of “image-based characteristics” as inputs to its composition/quality measure. *See* EX1004, 3:53-59 (“the engine has to work with... higher-level aspects of the image being sensed (*e.g.*, the lack of sharp edges that might indicate a lack of appropriate focus) as well as camera settings”). Similarly, Walker’s “overall rating” system is a high-level input that encapsulates multiple technical quality factors (including a subject rating that uses face recognition) in a single, objective score. EX1007, ¶¶[0171]-[0172], [0275]-[0278], [0284]-[0286], [0296].

By leveraging Walker’s subject-based scoring, Anon’s system would more efficiently and accurately identify images where the main subject is well-captured (*e.g.*, looking at the camera), reducing the need for manual review and improving the user experience—an explicit goal of both systems. EX1003, ¶105.

v. [1.d] “obtaining a forth value (QI4) responsive to

obstruction of at least one optical lens”

Anon does not expressly teach obtaining a value responsive to obstruction of at least one optical lens. Kosaka, however, discloses a digital camera system that is designed to detect whether a user's finger is unintentionally obstructing the lens before an image is captured. *See e.g.*, EX1008, Fig. 6A.



The system operates by analyzing a series of live view images (or images for autofocus) in real time, prior to the actual image capture. *Id.* at Abstract, Figs. 9, 24, ¶¶ [0047], [0098]. The determination part of the camera examines changes over time in the position of low-brightness areas within these images. *Id.* at Abstract, ¶¶ [0089], [0141]. If a low-brightness area remains stationary while other areas shift due to camera shake or reframing, the system identifies this stationary area—especially if it is located at the periphery of the image—as a potential finger obstruction (*i.e.*, a lens obstruction). *See, e.g., id.*, Figs. 4A-8 and ¶¶ [0074], [0075]. A POSA would understand that this analysis generates “a forth value (QI4) responsive to obstruction” of the camera lens as claimed. EX1003, ¶106.

Kosaka further explains that the camera can notify the user of such an obstruction before the image is taken, allowing the user to correct the issue and avoid capturing an image with a finger or other object blocking the lens. *Id.*, ¶¶[0089], [0099]. In some embodiments, the system can even generate a corrected image by deleting the obstructed area or prevent the image from being recorded if an obstruction is detected. *See id.*, Figs. 9-10, 23-25, ¶[0089] (“Examples of the notifying operation are, concretely, indication of a note by characters of ‘Note: finger is in’ on the display 7 or a predetermined figure and output of sound of a note from a speaker or voice”).

According to Kosaka, the system analyzes the brightness (luminance) of pixels along a line or within an area of the image. A “low-brightness area” is defined as a region where the pixel value is lower than a predetermined threshold (referred to as “TH1” by Kosaka). *Id.*, ¶[0069]. For example, in the description of FIG. 4B, the system identifies areas where the brightness is below threshold TH1 as potential obstructions (such as a finger or a tree). *Id.*, ¶¶[0068]-[0069]; *see also id.*, ¶¶[0071]-[0079].

Anon, Walker, and Kosaka are each concerned with improving the quality of captured images and automating the process of identifying and selecting “good” photographs. Kosaka’s finger obstruction detection is a well-defined image defect that directly impacts perceived image quality. Anon’s system is designed to accept

a wide range of image-based characteristics as inputs to its quality/composition measure, and Walker’s system provides a subject-aware (i.e., object detection) evaluation. These approaches are complementary: Kosaka detects a specific, common image flaw; Walker provides a robust technical and subject-aware score; and Anon offers a flexible, extensible framework for integrating such inputs into a comprehensive quality assessment. EX1003, ¶107.

A POSA would have been motivated to use Kosaka’s finger obstruction determination as an input to Anon’s image quality estimation engine, especially in combination with Walker, for several reasons (EX1003, ¶108):

- Kosaka teaches that finger obstruction is a significant and common cause of poor image quality, especially in small digital cameras. *See* EX1008, ¶¶[0006], [0007]. Anon’s system is designed to identify images with technical or compositional flaws. *See, e.g.*, EX1004, 2:64–3:1. Integrating a finger obstruction detection signal from Kosaka would allow Anon’s system to recommend to users to correct this defect, improving the quality of images.

- Anon’s system is designed to accept a variety of image-based characteristics as inputs to its quality/composition measure, including “higher-level aspects of the image being sensed” and “image-based characteristics.” *See* EX1004, 2:9-15, 3:53-57. Kosaka’s output—a

determination of whether a finger is obstructing the image—fits naturally as a binary or weighted input to Anon’s quality scoring engine.

- Walker’s system evaluates technical and subject-centric aspects (sharpness, exposure, etc.), but does not specifically address finger obstruction. EX1007, ¶¶[0275]-[0286]. By combining Walker’s object/subject-based scoring with Kosaka’s finger obstruction detection, Anon’s system would provide a more comprehensive and robust assessment of image quality, covering both general technical quality and specific, high-impact defects.

A POSA would have had a reasonable expectation of success in implementing this combination for several reasons. First, Anon’s system is designed to accept and combine multiple, diverse image-based inputs using weighted combinations. Kosaka’s output is simply another input to be weighted alongside other quality factors (focus, exposure, subject detection, etc.). Both Anon and Walker discuss combining multiple evaluation metrics to arrive at a final quality score. The addition of Kosaka’s finger obstruction detection would have been a straightforward extension of this approach, and would have been expected to yield predictable, desirable results (*i.e.*, making recommendations to a user how to improve an image). EX1003, ¶109.

vi. [1.e] “*estimating a forth weight (c4) associated*

with the forth value.”

Anon’s engine can take into account both intrinsic image characteristics (such as color, focus, brightness, and energy) and external characteristics (such as geographic location, time of day, user preferences, and cultural rules), and specifically indicates that “[a] typical composition and feedback engine, according to embodiments of the present invention, will consider more than one independent value for some characteristic of an image and provide recommendations that might not be optimal for one characteristic versus another characteristic.” EX1004, 5:26-30. This would have indicated to a POSA that the system weighs different characteristics, sometimes even trading off optimality in one for a better overall composition measure. EX1003, ¶111.

Anon expressly discloses assigning a weight to each of the inputs into the engine: “In various embodiments, these parameters may be input into a fuzzy logic set, or the like, and an evaluation, *e.g. weighted, combination of parameters* may be performed by the composition and feedback engine.” EX1004, 8:32-35 (emphasis added). Thus, a POSA would understand that Anon’s engine “estimat[es] a first weight (c1) associated with the first value” as claimed. EX1003, ¶111.

Similarly, Walker teaches that its “overall rating of an image may be determined as the weighted average of the image's categorical ratings (*e.g.*, exposure may be weighted more than subject).” EX1007, ¶[0296]. As discussed in *supra*

Section VI.E.1.v, a POSA would have been motivated to use Kosaka's finger obstruction determination as a weighted input to Anon's image quality estimation engine with a reasonable expectation of success, especially in combination with Walker.

To the extent PO contends that "estimating" should be narrowly construed to require a real-time, context-dependent determination of the claimed "weight," Anon discloses this. In particular, Anon expressly teaches that an input into the composition and feedback engine, (e.g., object detection, location, and characteristics) influences the determination—estimation—of the ***weights*** attached to other characteristics.

Other inputs might include an indication of where in the image the subject is (e.g., find faces and draw a rectangle around the most prominent face in the image, find an object with a defined border that has a color distribution that is wildly different from the histogram of the rest of the image, as might be the case when photographing a red and yellow bird with a background of green and brown of the surrounding trees). This input can be used to influence how various characteristics are weighted.

EX1004, 3:53-4:3.

To the extent that Anon is argued to not disclose dynamic estimation of weights for various quality indicators, Jasinski remedies any deficiency. For each

new set of images, Jasinski describes computing weights for each image region dynamically, based on the current image data. *See, e.g.*, EX1010, ¶¶[0120]-[0122]. These weights are not fixed or pre-trained but are recalculated for every image or sequence, enabling the system to adapt instantly to changing scene conditions. *Id.*, ¶¶[0119]-[0122]. As Jasinski explains: “[t]he weighting coefficients w_i can be determined using any method known in the art. In a preferred embodiment, the weighting coefficients w_i are determined to be representative of the estimated relative importance of the image regions to a user.” *Id.*, ¶[0120]. Jasinski discloses several attributes that can be considered in the determination of the relative importance, *id.*, ¶[0120], including:

- Image detail: "image regions 365 with high levels of image detail can be weighted more highly than image regions 365 with lower levels of image detail," *id.*, ¶[0121].
- Scene brightness: "local scene brightness level can also be an indication of the suitability of an image region... the choice of image regions with a higher local brightness level avoids areas where low signal-to-noise can interfere with the calculation of accurate motion velocities," *id.*, ¶[0114].
- Region position or presence of important features: "image regions 365 in a face zone or an autofocus zone can be weighted more heavily than

other image regions 365 because they are more likely to be a main subject ... Likewise, image regions 365 located in the periphery ... can be deemed to be of lower relative importance than those which are centrally located," *id.*, ¶[0120].

- Confidence in the measurement: "the shape of the fitting function 475 can provide an indication of the relative confidence level," *id.*, ¶[0122]

Jasinski's dynamic weighting is not limited to motion estimation, but rather can be more broadly applied to determining image capture settings. *See id.*, ¶[0031].

A POSA would have understood that using dynamic estimation of weights (as taught by Jasinski) as part of a weighted combination of parameters (as taught by Anon) would allow for accounting of changes in the reliability, relevance, importance parameters over different regions of the image or over time. EX1003, ¶113. In other words, a POSA would have appreciated that dynamically weighting Anon's composition inputs as taught by Jasinski would have allowed the system to adapt to the most current and relevant scene conditions, thereby providing a more accurate assessment of image quality. Jasinski's region-based weighting fits naturally with Anon's teaching that object and region detection influences the weights of other quality characteristics. This combination of Anon and Jasinski is the use of a known technique (Jasinski's dynamic weights) to improve similar devices in the same way. For these reasons, a POSA would have been motivated to

combine the complementary teachings of Anon and Jasinski with a reasonable expectation of success. EX1003, ¶114.

- vii. [1.f] “to select, based on values QI1, QI2, QI3, QI4, at least one appropriate suggestion from a pre-stored table of suggestions of how a user of the system may cause at least on said value to be above or below a threshold and to present said appropriate suggestion to the user.”

As discussed above in *supra* Section VI.A.1.iv, Anon describes a camera system that evaluates a plurality of image-based characteristics, computes a composition measure for a proposed image, and makes suggestions to a user to improve an image. The suggestions are based on an overall composition measure being below a threshold or, alternatively, on an individual quality indicator being below a threshold. *See supra* Section VI.A.1.iv; EX1004, 4:13-16. Further, the combination of Anon and Garcia-Molina would have suggested the use of a pre-stored table (or database) of suggestions or rules for improving image quality as set forth in *supra* Section VI.A.1.iv. The combination of Anon, Walker, Kosaka, Jasinski, and Garcia-Molina would therefore result in a system that monitors various image and camera parameters, compare them to thresholds, and provide feedback or suggestions to the user. A POSA would have selected at least one appropriate suggestion from a pre-stored table and presented it to the user for the following reasons (EX1003, ¶118):

- Anon describes computing a composition measure based on multiple image-based characteristics and external context, and outputting indications or suggestions (e.g., “red[/]yellow[/]green” lights, arrows, or text suggestions). *See* EX1004, 5:26-51. Anon also teaches the use of thresholds based on composition measure, and individual characteristics, to trigger suggestions. *See id.*, 4:13-16, 5:64-6:8.

- Walker teaches evaluating images using multiple methods and assigning scores to estimate image quality using a “overall rating.” *See e.g.*, EX1007, ¶¶[0275], [0286], Figs. 8-9. Walker further teaches that its rating is compared to a threshold to determine if image has high quality. *Id.*, ¶¶[0030]-[0031] (“Evaluating may comprise determining if an image is of a predetermined quality (e.g., ‘high’ quality, or the image has an **associated rating greater than a threshold value**)”), [0188], [0313] (“images that receive ratings of higher than a threshold value may be stored in the camera's secondary memory”), [0319]-[0320] (“a camera may compare a rating of an image to a threshold value (e.g., to determine if the rating is better or worse than the threshold value)”).

- Kosaka teaches detecting finger obstruction and issuing warnings or corrective actions when obstruction is detected (*i.e.*, when a value exceeds a threshold). *See* EX1008, ¶¶[0008], [0098].

When a monitored value (e.g., motion, exposure, face recognition analysis, finger obstruction) is above or below a threshold, the system would consult the pre-

stored table and selects the corresponding suggestion to present to the user. A POSA would have known that this is a predictable, modular approach that is explicitly taught and widely used in the art. EX1003, ¶119.

2. Claim 2

Claim 2 depends from claim 1 and further recites “where suggestions to the user can be “blurred image due to camera shake”, or “blurred subject due to subject movement”, or “Image dynamic range is beyond the sensor dynamic abilities—choose area of interest, or take a high dynamic range (HDR) shot.” Anon does not disclose the express text of these user suggestions as claimed. Anon does disclose, however, making textual suggestions to the user and that the lack of sharp edges in an image might indicate a lack of appropriate focus and further teaches that “[s]uggestions might be presented in a viewfinder display” for taking corrective action. EX1004, 3:53-57, 6:4-8. Thus, it would have been a matter of design choice to make the suggestion using the express textual suggestions recited in claim 2.

3. Claim 3

Claim 3 depends from claim 1 and further requires “grading the image quality according to, or based on, the total value, and wherein the total value is calculated based on at least one of QI1, QI2, QI3, QI4.” Anon teaches that input parameters can be weighted and combined, explaining that the overall composition measure may be generated where “these [individual] parameters may be input into a fuzzy logic

set, or the like, and an evaluation, e.g. weighted, combination of parameters may be performed by the composition and feedback engine.” EX1004, 8:32-35. Further, the resulting “composition measure,” which provides *rating of the composition of an image* that is a ‘proposed’ image not yet captured,” *id.*, 6:42-45, is a measure “grading the image quality” as claimed. *See also id.*, 8:16 (“judge a properly composed image”); *see generally id.*, 8:14-35.

4. Claim 5

Claim 5 depends from claim 1 and further recites “wherein QI1 is estimated according to, or based on, the detection value of at least one face detection.” This limitation is met for the same reasons discussed above for limitation 1.c, *see supra* Section VI.E.1.iv, namely, both Anon and Walker disclose estimating image quality by detecting at least one face. *See, e.g.,* EX1004, 3:62-4:3; EX1007, ¶¶[0096], [0186], [0286], cl. 30.

As discussed above, both Anon and Walker teach combining parameters to determine image quality. For example, Anon teaches that input parameters can be weighted and combined, explaining that “these parameters may be input into a fuzzy logic set, or the like, and an evaluation, e.g. weighted, combination of parameters may be performed by the composition and feedback engine.” EX1004, 8:32-35. And Walker teaches an overall rating that is the weighted average of the image's categorical ratings. *See e.g.,* EX1007, ¶[0296]. Accordingly, it would have been

obvious to a POSA at the time of the alleged invention that first value QI1 is both “responsive to the device motion from at least one motion or location sensor” as recited in claim 1 and “is estimated according to, or based on, the detection value of at least one face detection,” as recited by claim 5. EX1003, ¶122.

5. Claim 7

Claim 7 depends from claim 1 and further recites “wherein at least one of said weights are defined at least partially over a time-dependent confidence level defined over at least one of said values QI1, QI2, QI3, QI4.” Anon does not expressly teach this limitation. Jasinski, however, teaches that the reliability of motion estimates can fluctuate over time due to changes in scene content, lighting, camera movement, or subject motion. *See* EX1010, ¶¶[0007], [0017]. By capturing a sequence of images at different times and computing motion estimates for each, the system can observe how confidence in those estimates evolves. *See id.*, ¶¶[0030], [0088], [0122]. Jasinski teaches weighting coefficients relative to its confidence level. *Id.*, ¶[0122] (“Another factor that determine the weighting coefficients w_i is a relative confidence level associated with the local motion velocity 375.”). A POSA would have appreciated that weighting Anon’s estimates according to their time-dependent confidence would have allowed the system to adapt to the most current and relevant scene conditions, rather than relying on outdated or less reliable data. EX1003, ¶123.

As discussed in *supra* Section VI.C.1, a POSA would have been motivated to combining Anon and Jasinski with a reasonable expectation of success.

6. Claim 8

Claim 8 depends from claim 1 and further recites “where second value (QI2) is further based on object recognition done for third value (QI3), where object recognition can change importance of certain areas in image for the purpose calculation of said second value (QI2): over or under exposure value.” This limitation is obvious in view of Anon, Walker, and Kosaka for the reasons discussed above for limitations 1b and 1c. *See supra* Sections VI.E.1.iii-iv. Walker teaches identifying a subject’s face in an image (*i.e.*, object recognition done for third value (QI3)), as discussed above. EX1007, ¶¶[0284], [0286]. Walker further teaches that its camera performs over or under exposure analysis for a “person’s face” (*i.e.*, the claimed “certain area” of importance) as part of determining image quality:

exposure of the image—For example, the camera may determine if an image is exposed correctly. Images that are exposed correctly may be considered higher quality, whereas images that are over-exposed or under-exposed may be deemed to be of lower quality. In a second example, **the camera may determine the exposure of specific portions of an image**. For example, the quality of an image may depend on **whether a person's face in an image is correctly exposed**.

Id., ¶[0280]. Walker expressly discloses that the exposure of the “person’s face” is a “characteristics of an image that may be indicative of the quality of an image” and thus are used by its system for that purpose. *Id.*, ¶¶[0275]-[0278], [0284]-[0286].

7. **Claim 9**

Claim 9 depends from claim 1 and further recites “wherein at least one of the values (QI1, QI2, QI3, QI4, total value) causes change of one of focus point, ISO or aperture of at least of lens module.” Anon discloses that an image capturing device can use inputs such as geographic location, time of day, camera orientation (*i.e.*, location sensor output), and image-based characteristics (including object detection) to influence camera settings and composition recommendations. *See, e.g.*, EX1004, 4:24-33. Anon's composition and feedback engine can automatically adjust or suggest changes to camera parameters such as focus, aperture, and exposure (which includes ISO), based on overall composition measure—the claimed “total value,” which is based on the claimed QI1-QI4. *Id.*, 2:16-41 (“the image capturing device will ***automatically make the change***”), 6:42-47 (“[t]he [composition] measure is provided to user input output devices or elements, as explained elsewhere herein or ***to camera controls as appropriate***”). For example, the engine may recommend or directly change the focus point if a subject is detected in a particular area, adjust ISO or aperture in response to external conditions like location or lighting, and optimize settings to improve image quality according to contextual and sensor data before capturing an image. *See* EX1004, 8:36-43, 2:29-36, 1:42-49.

8. Claim 10

Claim 20 depends from claim 13 and further recites “wherein the total value is above threshold, an image is saved into user persistent memory.” Anon teaches that input parameters can be weighted and combined, explaining that “these parameters may be input into a fuzzy logic set, or the like, and an evaluation, e.g. weighted, combination of parameters may be performed by the composition and feedback engine.” EX1004, 8:32-35.

Anon teaches that the calculated composition measure (*i.e.*, combined value) can be compared to a threshold to determine subsequent actions such as user feedback. *See, e.g., id.*, 5:64-6:8. Anon also discloses a “post-processing” engine that selects images to be stored in an album (*i.e.*, user persistent memory) because on Anon’s “composition judging techniques.” *Id.*, 10:1-25. A POSA would have understood that, in Anon, an image is saved in memory if it is deemed to be a quality image because the system uses its composition and feedback engine to evaluate an image in real-time based on multiple characteristics and outputs an indication of the composition measure to the user. If the user responds to this indication by capturing the image, the device receives the captured image and stores it in memory. *See id.*, 2:6-8, 3:10-12. This process ensures that only images meeting certain quality criteria, as determined by the engine, are saved.

To the extent that PO argues that Anon does not teach this limitation, Walker remedies any deficiency. Walker teaches that “images that receive ratings of higher than a threshold value may be stored in the camera's secondary memory” and that “an image that receives a rating of less than a threshold value may be deleted from the camera’s memory.” EX1007, ¶[0313]; *see also id.*, ¶¶[0319]-[0320], [0323]-[0327], [0373]-[0374], [0428], [0030]-[0031], [0188], [0068] (“secondary memory will typically refer herein to memory that is non-volatile”), [0122].

A POSA considering the teachings of Anon, Walker, and Kosaka would have been motivated to save an image into user persistent memory when the total value is above threshold, with a reasonable expectation of success. Walker teaches that an image quality threshold can be used to distinguish between high- and low-quality images so that only high-quality images are stored in secondary memory. EX1007, ¶[0313]. Walker also recognizes that running on space in memory is a problem faced by state-of-the-art cameras. *Id.*, ¶[0322]. A POSA would understand storing high quality images (determined by a threshold) in persistent memory (and deleting low quality pictures) would be a more efficient and beneficial use of the limited storage space in secondary memory. EX1003, ¶130.

F. Ground 2B: Claim 6 is Obvious in View of Anon, Walker,

Kosaka, Jasinski, Garcia-Molina and Cheatle

1. Claim 4

Claim 4 depends from claim 1 and further requires “wherein the first value QI1 is estimated according to, or based on, the recognition value of at least one of said faces as a known face or unknown face, based on a pre-stored list of configured faces.” As discussed above in *supra* Section VI.E.1.iv, Anon discloses facial recognition. But Anon does not expressly disclose recognition “based on a pre-stored list of configured faces.” Walker, however, teaches “the camera may use face recognition software to identify a person in an image (e.g., ‘Alice’).” EX1007, ¶[0286]. A POSA would have understood that recognition of the subject (e.g., “Alice”) is based on a pre-stored list of configured faces because the camera is able to determine whether the subject is “Alice” or “Bob” without prompting the user. *Id.*, ¶¶[0284]-[0286]. As discussed above, a POSA would have been motivated to combine Walker’s facial recognition feature with Anon’s system. *See* Section VI.E.1.iv.

As discussed above, both Anon and Walker teach combining parameters to determine image quality. For example, Anon teaches that input parameters can be weighted and combined, explaining that “these parameters may be input into a fuzzy logic set, or the like, and an evaluation, e.g. weighted, combination of parameters may be performed by the composition and feedback engine.” EX1004, 8:32-35. And

Walker teaches an overall rating that is the weighted average of the image's categorical ratings. *See e.g.*, EX1007, ¶[0296]. Accordingly, it would have been obvious to a POSA at the time of the alleged invention that first value QI1 is both “responsive to the device motion from at least one motion or location sensor” as recited in claim 1 and “estimated according to, or based on, the recognition value of at least one of said faces as a known face or unknown face, based on a pre-stored list of configured faces,” as recited by claim 4. EX1003, ¶132.

To the extent PO argues this limitation is not rendered obvious by Anon in view of Walker, it is also obvious in further view of Cheatle. As discussed above, Walker discloses subject face recognition that matches a face to a known person (*e.g.*, Alice). Cheatle provides additional implementation details for how to achieve that type of facial recognition. For example, Cheatle discloses “analysis tests” that are “customized to deal with faces.” EX1011, ¶[0042]. Like Walker, Cheatle teaches that “images where the face is known to the user might be preferred.” *Id.* Cheatle teaches a “pre-stored list of configured faces” as claimed: “keep[] a database of facial features [so] a comparison could be made with the subject area of the captured key frame.” *Id.* A POSA would be motivated to use Cheatle’s “database of facial features” (*i.e.*, a pre-stored list of configured faces) to implement Walker’s facial recognition feature with a reasonable expectation of success. A POSA would be motivated to use Cheatle’s “database of facial features” because it is a known

technique used to improve similar devices (Cheatle and Walker’s facial recognition feature) in the same way (identifying the face of a subject). It is also a simple substitution of one known element (Cheatle’s facial recognition feature) for another (Walker’s facial recognition feature) to obtain predictable results (a camera that using facial recognition using a pre-stored list of configured faces). EX1003, ¶133.

G. Ground 2C: Claim 6 is Obvious in View of Anon, Walker, Kosaka, Jasinski, Garcia-Molina and Ramesh

1. Claim 6

Claim 6 depends from claim 1 and further recites “wherein the third value is estimated according to, or based on, the estimated error in the analyzing the captured image for detecting or recognizing objects in the image.” Anon does not expressly disclose this limitation. As discussed in supra Section VI.B.1, Ramesh, however, describes a computer vision system for detecting and tracking multiple objects (*e.g.*, people in crowds) using a probabilistic framework. EX1009, Abstract, Fig. 1, ¶[0039]. A POSA would recognize that Anon’s real-time image evaluation uses different characteristics and features (such as face and object recognition) that can vary due to noise, ambiguous scenes, or changing conditions. EX1003, ¶¶87, 137. Further, Anon teaches that “what characteristics are used to determine what is a ‘good’ image are very flexible and can be enhanced or changed completely over time.” EX1004, 10:47-50. A POSA would thus understand that Anon’s composition

engine is meant to be modified and improved. EX1003, ¶¶87, 137. Ramesh's probabilistic approach provides a principled way to quantify and propagate uncertainty (error) for image characteristics that have changing reliability. Associating an estimated error (*e.g.*, standard deviation, confidence interval) with each weight would have allowed Anon's system to adaptively adjust the weight of each characteristic based on its reliability and combine output values from multiple sources in a statistically optimal way, as taught by Ramesh. EX1009, ¶[0030]. In other words, less certain quality indicators would be weighed less than more certain quality indicators. A POSA would understand this results in a more accurate image quality assessment. EX1003, ¶¶87, 137. The combination of Anon and Ramesh is thus the application of a known technique (weighting parameters with error / uncertainty relatively less, as disclosed by Ramesh) to a known device (Anon) ready for improvement to yield predictable results (an optimized composition engine). *Id.*, ¶¶87, 137.

VII. SECONDARY CONSIDERATIONS

Petitioner is unaware of any evidence of alleged secondary indicia that would support non-obviousness of the '702 Patent. To the extent Patent Owner subsequently presents such evidence, Petitioner respectfully requests the right to respond.

VIII. MANDATORY NOTICES

As set forth below and pursuant to 37 C.F.R. § 42.8(a)(1), the following mandatory notices are provided.

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

Samsung Electronics Co., Ltd., Samsung Electronics America, Inc.

B. Related Matters

SnapAid, Ltd. v. Samsung Electronics Co., Ltd. et al., No. 2-25-cv-00378 (E.D. Tex.) (alleging infringement of the '702 patent).

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

Lead Counsel	Back-Up Counsel
Robert A. Appleby (Reg. No. 40,897) Kirkland & Ellis LLP, 601 Lexington Avenue, New York, NY 10022, Telephone: 212.446.4800 Facsimile: 212.446.4900	W. Todd Baker (Reg. No. 45,265) Kirkland & Ellis LLP, 1301 Pennsylvania Avenue, N.W., Washington, D.C. 20004 Telephone: 202.389.3135 Facsimile: 202.389.5200

D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Petitioner concurrently submits a Power of Attorney, 37 C.F.R. § 42.10(b), and consents to electronic service by email at Samsung-IPR-SnapAid@kirkland.com.

IX. PAYMENT OF FEES UNDER 37 C.F.R. § 42.103

The undersigned authorizes the Office to charge the fee set forth in 37 C.F.R. § 42.15(a)(1) for this Petition to Deposit Account No. 506092, consistent with the requested review of twenty claims, and any additional fees that may be due in connection with this Petition to be charged to the above-referenced deposit account.

X. GROUNDS FOR STANDING UNDER 37 C.F.R. § 42.104(A)

Petitioner certifies pursuant to 37 C.F.R. §42.104(a) that the '702 patent is available for IPR and that Petitioner is not barred or estopped from requesting an IPR of the Challenged Claims on the grounds identified herein.

XI. CONCLUSION

Petitioner requests institution of IPR and cancellation of the challenged claims.

Dated: September 5, 2025

Respectfully submitted,

/Robert A. Appleby/

**Robert A. Appleby
Counsel For Petitioner
Reg. No. 40,897**

CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. § 42.24, totaling 13,609 words. Counsel has relied upon the word count feature provided by Microsoft Word.

/Robert A. Appleby/

Robert A. Appleby (Reg. No. 40,897)

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing document with accompanying exhibits was served on September 5, 2025, via overnight delivery directed to Patent Owners, SnapAid, Ltd., at the following address:

May Patents Ltd.
c/o Dorit Shem-Tov (131926)
P.O.B. 7230
Ramat-Gan 5217102
Israel

A copy was also served via electronic mail on the attorneys of record listed below for the following related matters:

SnapAid, Ltd. v. Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc. (Case 2:25-cv-00378-RWS-RSP, E.D. Tex)

James R. Nuttall
jnuttall@steptoe.com
James Winn
jwinn@steptoe.com
Jacob Michalakes
jmichalakes@steptoe.com
STEPTOE LLP
227 West Monroe Street
Suite 4700
Chicago, IL 60606
Telephone: (312) 577-1300

/Robert A. Appleby/
Robert A. Appleby (Reg. No. 40,897)