

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY CORPORATION,
Petitioner,

v.

OPTIMUM IMAGING TECHNOLOGIES, LLC,
Patent Owner.

Case No. IPR2024-00924
Patent No. 7,612,805

**PETITION FOR INTER PARTES REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.1 et seq**

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	STANDING CERTIFICATION.....	2
III.	UNPATENTABILITY GROUNDS.....	2
IV.	'805 PATENT.....	3
	A. Prosecution History	4
	B. Canon IPRs	5
	C. POSITA	5
V.	CLAIM INTERPRETATION	5
	A. Infringement Contentions.....	6
	1. “wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations.”	6
	B. Prior Canon Litigation.....	6
	1. “using”	6
	2. “succession”	7
	C. Ordinary Meaning	7
VI.	GROUND 1: WATANABE RENDERS OBVIOUS CLAIMS 9 AND 24.....	7
	A. Watanabe	7
	B. Claim 9	9
	1. Limitation [9.PRE]	9
	2. Limitation [9.a].....	9
	a. “digital camera mechanism”	9
	b. “optical lens mechanism”.....	10
	c. “digital sensor”	10
	d. “a microprocessor, a [DSP], an [ASIC]”	10
	i. Known interchangeability of a microprocessor, a [DSP], an [ASIC]......	11
	e. “system software”	14

f. “a [DBMS]”	15
g. “memory storage sub-system”	16
3. Limitation [9.b]	17
4. Limitation [9.c]	18
5. Limitation [9.d]	20
6. Limitation [9.e]	21
7. Limitation [9.f]	22
8. Limitation [9.g]	23
9. Limitation [9.h]	24
10. Limitation [9.i]	25
11. Limitation [9.j]	27
C. Claim 24	28
1. Limitations [24.PRE], [24.a], [24.b], [24.c], [24.e], [24.f], [24.g], [24.i], [24.j], and [24.k]	28
2. Limitation [24.d]	28
3. Limitation [24.h]	29
VII. GROUND 2: WATANABE IN VIEW OF RUSS RENDERS OBVIOUS CLAIMS 1-3, AND 18-20	29
A. Russ	29
B. Watanabe in View of Russ	30
C. Claim 1	33
1. Limitations [1.PRE], [1.a], [1.c], [1.d], [1.e], [1.f], [1.g], and [1.k]	33
2. Limitation [1.b]	33
3. Limitation [1.h]	34
4. Limitation [1.i]	34
5. Limitation [1.j]	37
D. Claim 2	38
E. Claim 3	40
F. Claim 18	41

1. Limitations [18.PRE], [18.a], [18.b], [18.d], [18.e], [18.g], and [18.j]	41
2. Limitation [18.c].....	41
3. Limitation [18.f]	42
4. Limitation [18.h]	42
5. Limitation [18.i]	43
G. Claim 19	44
H. Claim 20	44
VIII. GROUND 3: TAKANE IN VIEW OF WATANABE RENDERS	
OBVIOUS CLAIMS 9 AND 24.....	45
A. Takane in View of Watanabe	45
B. Claim 9	48
1. Limitation [9.PRE]	48
2. Limitation [9.a].....	48
a. “digital camera mechanism”	49
b. “optical lens mechanism”	49
c. “digital sensor”	49
d. “a microprocessor, a [DSP], an [ASIC]”	49
e. “system software”	52
f. “a [DBMS]”	52
g. “memory storage sub-system”	53
3. Limitation [9.b]	53
4. Limitation [9.c].....	54
5. Limitation [9.d]	55
6. Limitation [9.e].....	57
7. Limitation [9.f]	57
8. Limitation [9.g]	60
9. Limitation [9.h]	60
10. Limitation [9.i]	60
11. Limitation [9.j]	62

C. Claim 24	63
1. Limitations [24.PRE], [24.a], [24.b], [24.c], [24.e], [24.f], [24.g], [24.i], [24.j], and [24.k]	63
2. Limitation [24.d]	64
3. Limitation [24.h]	64
IX. GROUND 4: TAKANE IN VIEW OF WATANABE IN VIEW OF RUSS RENDERS OBVIOUS CLAIMS 1-3, AND 18-20	65
A. Claim 1	65
1. Limitations [1.PRE], [1.a], [1.c], [1.d], [1.e], [1.f], [1.g], and [1.k]	65
2. Limitation [1.b]	66
3. Limitation [1.h]	66
4. Limitation [1.i]	67
5. Limitation [1.j]	68
B. Claim 2	69
C. Claim 3	70
D. Claim 18	71
1. Limitations [18.PRE], [18.a], [18.b], [18.d], [18.e], [18.g], and [18.j]	71
1. Limitation [18.c]	72
2. Limitation [18.f]	72
3. Limitation [18.h]	72
4. Limitation [18.i]	72
E. Claim 19	73
F. Claim 20	73
X. NO BASIS FOR DISCRETIONARY DENIAL	73
A. <i>Fintiv</i>	73
1. Stay Potential	73
2. Trial Timing	74
3. Litigation Investment	74

4. Issue Overlap.....	74
5. Litigation Defendants.....	74
6. Other Considerations.....	75
7. Compelling Evidence	75
B. Section 325(d) discretionary denial is unwarranted	75
XI. CONCLUSION.....	75
APPENDIX A: U.S. PATENT NO. 7,612,805 CLAIM LIST	77

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<i>Advanced Bionics, LLC v. Med-El Elektromedizinische Gerate GMBH</i> , IPR2019-01469, Paper 6 (Feb. 13, 2020)	75
<i>Apple Inc. v. Fintiv, Inc.</i> , IPR2020-00019, Paper 11 (Mar. 20, 2020)	5, 73, 74
<i>KSR Int'l Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007)	47
<i>Nidec v. Zhongshan</i> , 868 F.3d 1013 (Fed. Cir. 2017)	5
<i>Sand Revolution II v. Continental Intermodal Group–Trucking</i> , IPR2019-01393, Paper 24 (June 16, 2020)	73, 74

Regulations

37 C.F.R. § 42.100(b)	5
37 C.F.R. § 42.104(a)	2

Statutes

35 U.S.C. § 102(a)	3
35 U.S.C. § 102(b)	3
35 U.S.C. § 102(e)	3
35 U.S.C. § 103(a)	2

APPENDIX LISTING OF EXHIBITS

Exhibit	Description
1001	U.S. Patent No. 7,612,805
1002	Prosecution History of U.S. Patent No. 7,612,805
1003	Declaration of Leonard Laub
1004	Curriculum Vitae of Leonard Laub
1005	U.S. Patent Publication No. 2005/0280877 (“Watanabe”)
1006	Certified Translation Of Japanese Patent Application No. JP2004-233872 (“JP-872”)
1007	Certified Translation Of Japanese Patent No. JPA 2004-343358 (“Kishida”)
1008	Certified Translation Of Japanese Patent Application Publication JP 2004-328506A (“Kita”)
1009	U.S. Patent Publication No. 2003/0223007 A1 (“Takane”)
1010	RESERVED
1011	RESERVED
1012	RESERVED
1013	RESERVED
1014	U.S. Patent Publication No. 2006/0132646 (“Komatsu”)
1015	RESERVED
1016	RESERVED
1017	RESERVED
1018	PCT Publication No. WO 2004/093438 A1 (“Dutta”)
1019	Texas Instruments, TMS320C8x System-Level Synopsis (Sep. 1995)
1020	RESERVED
1021	RESERVED
1022	U.S. Patent No. 9,063,982 (“Bestgen”)
1023	U.S. Patent No. 6,920,443 (“Cesare”)
1024	U.S. Patent Publication No. 2006/0268357 A1 (“Vook”)
1025	U.S. Patent No. 5,739,691 (“Hoenninger”)
1026	Prosecution History of U.S. Patent No. 8,451,339
1027	Dkt. No. 88, Claim Construction Memorandum Opinion and Order, <i>Optimum Imaging Technologies LLC v. Canon Inc.</i> , No. 2:19-cv-00246 (E.D. Tex. June 11, 2020)
1028	<i>digital filter</i> , Comprehensive Dictionary of Electrical Engineering (2d ed. CRC Press 2005)

Exhibit	Description
1029	<i>database management system</i> , Newton’s Telecom Dictionary (CMP Books, 2005)
1030	<i>Canon Inc. v. Optimum Imaging Technologies LLC</i> , IPR2020-1322, Paper 1 (Jul. 20, 2020) (“-01322 Petition”)
1031	<i>Canon Inc. v. Optimum Imaging Technologies LLC</i> , IPR2020-1322, Paper 9 (Mar. 1, 2021) (“-01322 D.I.”)
1032	<i>Canon Inc. v. Optimum Imaging Technologies LLC</i> , IPR2020-1321, Paper 1 (Jul. 20, 2020) (“-01321 Petition”)
1033	<i>Canon Inc. v. Optimum Imaging Technologies LLC</i> , IPR2020-1321, Paper 10 (Mar. 1, 2021) (“-01321 D.I.”)
1034	RESERVED
1035	U.S. Patent Publication No. 2006/0050335 A1 (“Dorrell”)
1036	U.S. Patent Publication No. 2006/0098253 A1 (“Masuno”)
1037	Dkt. No. 1, Complaint, <i>Optimum Imaging Technologies LLC v. Sony Corp.</i> , No. 4:23-cv-00928 (E.D. Tex. Oct. 18, 2023)
1038	Docket report in <i>Optimum Imaging Technologies LLC v. Sony Corp.</i> , No. 4:23-cv-00928 (E.D. Tex. Oct. 18, 2023) as of May 13, 2024
1039	Eastern District of Texas, U.S. District Court—Judicial Caseload Profile, as of May 13, 2024
1040	U.S. Patent No. 7,206,136 (“Labaziewicz”)
1041	U.S. Patent No. 5,444,482 (“Misawa”)
1042	U.S. Patent No. 5,742,806 (“Reiner”)
1043	U.S. Patent No. 7,245,319 (“Enomoto”)
1044	Certified Translation Of Japanese Patent No. JPH (1999)-313250 (“Yamagata”)
1045	U.S. Patent No. 5,905,530 (“Yokota”)
1046	U.S. Pat. App. No. 2004/0150732 (“Yamanaka II”)
1047	GUAN et al., <i>Digital Image Correcting Method for Digital Camera</i> (December 2005) (“Ricoh”)
1048	U.S. Patent No. 5,999,330 (“Goosey”)
1049	U.S. Patent No. 7,738,015 (“Steinberg I”)
1050	U.S. Patent No. 7,590,305 (“Steinberg II”)
1051	Certified Translation Of Japanese Patent No. JPA 2002-190979 (“Kuniba”)
1052	Certified Translation Of Japanese Patent No. JPA 2000-184247 (“Imai”)

Exhibit	Description
1053	GONZALEZ & WOODS, DIGITAL IMAGE PROCESSING, (Prentice Hall, 2d ed. 2002) (“Gonzalez”)
1054	JOHN C. RUSS, THE IMAGE PROCESSING HANDBOOK (CRC Press, 4th ed. 2002) (“Russ”).
1055	U.S. Patent No. 7,609,297 (“Master”)
1056	U.S. Pat. App. No. 2007/0080280 (“Havens”)
1057	U.S. Patent No. 7,936,392 (“Ng”)
1058	PCT Publication No. WO 2002/069214 (“Takae”)
1059	U.S. Patent No. 6,279,004 (“Lee”)
1060	Certified Translation Of Japanese Patent Application Publication No. JP 2001-251546A (“Iida”)
1061	U.S. Patent No. 5,818,524 (“Juen”)
1062	The image processing handbook, Library of Congress Catalog, available at https://lccn.loc.gov/2002073595
1063	U.S. Patent Publication No. 2002/0135688 (“Niikawa”)
1064	U.S. Patent No. 4,903,204 (“Dobbins”)
1065	U.S. Patent No. 5,414,782 (“Carasso”)
1066	Certified Translation of Japanese Patent No. JPA 2006-72660 (“Yamazaki”)
1067	U.S. Patent Publication No. 2003/0095197 (“Wheeler”)
1068	RESERVED
1069	U.S. Patent No. 5,630,153 (“Intrater”)
1070	U.S. Patent No. 5,864,409 (“Kashida-409”)
1071	PCT Publication No. WO 1993-020536 A1 (“Reddig”)
1072	U.S. Patent No. 5,475,420 (“Buchin”)
1073	RESERVED
1074	RESERVED
1075	RESERVED
1076	P. Strumiłło and M. Strzelecki, Fourier Transform of Images, available at http://mstrzel.eletel.p.lodz.pl/mstrzel/pattern_rec/fft_ang.pdf (visited May 10, 2024).
1077	U.S. Patent No. 4,841,322 (“Kawasaki”)
1078	U.S. Patent Publication No. US2007014347 A1 (“Prechtl”)
1079	U.S. Patent No. 7,767,949 (“Perlman”)
1080	U.S. Patent No. 8,009,195 (“Fuji”)
1081	U.S. Patent No. 8,849,964 (“Ralston”)
1082	Taylor & Francis Grp. Customer Serv., Publication Confirmation

MANDATORY NOTICES

A. Real Party-In-Interest

Sony Corporation (“Sony” or “Petitioner”) is the Real Party-in-Interest.

B. Related Matters

A decision in this proceeding could affect or be affected by the following:

1. United States Patent & Trademark Office

The application from which U.S. Patent No. 7,612,805 issued claims priority from provisional application 60/807,065.

The following U.S. patent applications claim the benefit of priority to U.S. Patent No. 7,612,805:

(i) U.S. Patent Application No. 12/586,221 (U.S. Patent No. 8,451,339), filed September, 18, 2009; (ii) U.S. Patent Application No. 13/691,805 (U.S. Patent No. 10,873,685), filed December 2, 2012; (iii) U.S. Patent Application No. 16/692,939 (U.S. Patent No. 11,106,032), filed November 22, 2019; (iv) U.S. Patent Application No. 16/692,972 (U.S. Patent No. 10,877,266), filed November 22, 2019; (v) U.S. Patent Application No. 16/694,850 (U.S. Patent No. 10,877,267), filed November 25, 2019; (vi) U.S. Patent Application No. 16/694,838, filed November 25, 2019; (vii) U.S. Patent Application No. 17/383,602 (U.S. Patent No. 11,774,751), July 23, 2021; (viii) U.S. Patent Application No. 18/454,196, filed August 23, 2023.

2. U.S. District Court for the Eastern District of Texas

The following district court actions involve the '805 patent.

(i) *Optimum Imaging Technologies LLC v. FUJIFILM Corporation*, Case No. 4-23-cv-00922; (ii) *Optimum Imaging Technologies LLC v. Nikon Corporation*, Case No. 4-23-cv-00923; (iii) *Optimum Imaging Technologies LLC v. Olympus Corporation, et al.*, Case No. 4-23-cv-00924; (iv) *Optimum Imaging Technologies LLC v. Panasonic Corporation*, Case No. 4-23-cv-00926; (v) *Optimum Imaging Technologies LLC v. Sony Corporation*, Case No. 4-23-cv-00928 (“the Litigation”).

3. U.S. District Court for the Western District of Texas

Canon Inc. v. Optimum Imaging Technologies LLC, Case No. 1-20-cv-01238 (Terminated April 28, 2021).

C. Counsel and Service Information - § 42.8(b)(3) and (4)

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A power of attorney is submitted with the Petition. Counsel for Petitioner consents to service of all documents via electronic mail.

I. INTRODUCTION

The '805 (EX1001) patent is directed to automated correction of imaging distortions in digital camera systems. The distortions are classified as “optical aberrations” from the physical optics components or “digital aberrations” from other imaging components or processes. A processing platform of the camera system identifies a corresponding one of a plurality of optical image aberration corrections in a database for correcting aberrations of a given lens, component, or process prior to final storage of the captured image in memory. (EX1001, 7:21-28; 8:3-8)

But it was well-known at the time of filing the '805 patent to automate the correction of digitally captured image data to account for optical and digital aberrations prior to final storage of the captured image data.

For example, Watanabe is a 2005 patent publication assigned to Ricoh, which manufactures digital cameras. **Ground 1** shows that Watanabe renders obvious independent claims 9 and 24. **Ground 2** shows that Watanabe, in view of Russ, describing implementation techniques using a Fast Fourier Transform (FFT), renders obvious independent claims 1 and 18, as well as dependent claims 19 and 20.

Additionally, Takane is a 2003 patent publication assigned to Fuji Photo Film, which manufactures digital cameras (EX1009). **Ground 3** shows that

Takane, using Watanabe's teaching of a database and software accessing a database, renders obvious independent claims 9 and 24. **Ground 4** shows that Takane in view of Watanabe and Russ, renders obvious independent claims 1 and 18, and dependent claims.

Accordingly, Petitioner respectfully requests that inter partes review of the '805 patent be ordered and claims 1-3, 9, 18-20 and 24 be cancelled.

II. STANDING CERTIFICATION

The '805 patent is available for IPR. Sony is neither barred nor estopped from requesting IPR. 37 C.F.R. § 42.104(a).

III. UNPATENTABILITY GROUNDS

Pre-AIA law applies because the '805 patent was filed before March 16, 2013.

Ground	Reference(s)	Claim(s)	Basis
1	Watanabe	9, 24	§103(a)
2	Watanabe+Russ	1-3, 18-20	§103(a)
3	Takane+Watanabe	9, 24	§103(a)
4	Takane+Watanabe+Russ	1-3, 18-20	§103(a)

The '805 patent issued from an application filed July 6, 2007. The identified references are pre-AIA prior art to every Challenged Claim based on their priority and publication dates:

Reference	Priority	Publication	Basis
Watanabe (EX1005)	2005-06-07	2005-12-22	§§102(a), (b), (e)
Russ (EX1054)		2002-07-26	§ 102(b)
Takane (EX1009)	2003-06-03	2003-12-04	§§102(a), (b), (e)

IV. '805 PATENT

The '805 patent is directed to systems and methods for correcting well-known optical aberrations in digital images using a database with lens-specific aberration correction information. “The invention applies to any imaging system that includes interactions between optics, digital image sensors, post-capture integrated circuits [“ICs”] and digital storage components.” 1:21-24. The specification describes well-known optical aberrations (3:40-43) and “optical vignetting” that affects “peripheral illumination” (3:45-54) that are “characterized by lens type” (3:25-27). The '805 patent replaces optical filters correcting these lens aberrations with “in-camera digital filters” that correct aberrations using “in-camera digital filtration,” e.g., digital signal processing. 7:21-28; 8:3-8.

The imaging system connects a sensor to an application specific integrated circuit (“ASIC”), a digital signal processor (“DSP”), a database, and a microprocessor. 29:52-30:1, Fig. 1. The image sensors are photoelectric sensors including a charge coupled device (“CCD”) or CMOS focal plane array. 2:37-50, 17:51-18:9, Fig. 17. The system identifies a specific lens type associated with an optical aberration and applies a digital filter to the correct the aberration. 30:44-50,

The diagram illustrates a system for detecting object data changes. It includes an **Object Data (Changes)** block (100) and a **Light (Flash)** block (120). A **Sensor** block (130) is connected to the system. The core of the system is a **Camera** (140), which contains a **Lens** (110), a **Filter** (160), a **Shutter** (150), and a **Mirror** (170). The camera is connected to a **DBMS** (190) and a **Multifunctional Analysis Engine (ASIC)** (195). The ASIC is further connected to a **Microprocessor** (193) and a **Storage** block (197). The system also includes a **DSP** (195) and a **Sensors** block (180).

The '805 patent issued from Application No. 11/825,521.

The Examiner then entered an Examiner's amendment and allowed the claims without meaningful explanation. EX1002, 207-226.

B. Canon IPRs

The '805 patent was challenged in IPR2020-01321 (EX1032) as was the related '339 patent in IPR2020-01322 (EX1030). The Board discretionarily denied both petitions under *Fintiv*. EX1033, 12 (-01321 denial); EX1031, 12 (-01322 denial). The Board never considered the merits of any ground in either petition and performed no compelling merits assessment per current 314(a) practices.

C. POSITA

A POSITA would have had a Bachelor's degree in electrical engineering, physics, or a related field, with at least two years of industry experience and/or research, both concerning digital camera system design and image processing. Laub, ¶¶49-58.

V. CLAIM INTERPRETATION

The Board construes claim terms using ordinary meaning in light of the specification and prosecution history. 37 C.F.R. § 42.100(b). The Board need only construe terms to the extent needed to resolve disputes. *Nidec v. Zhongshan*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

A. Infringement Contentions

- 1. “wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations.”**

All claims recite a version of an “wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations.”

In the Litigation, PO contends that [9.d] is met by software that “*automatically corrects aberrations... based on the focal length chosen when using the zoom lens*”). EX1037 ¶29.

Thus, as PO urges applying the claim language in litigation, “using software to identify an optical image aberration” is met by using software that corrects an optical aberration based on information about the optical system like the lens or focal length.

B. Prior Canon Litigation

- 1. “using”**

Various claims recite performing steps “using” components.

PO’s proposed construction of “using the application specific integrated circuit and the digital signal processor” is its plain meaning. Ex. 1027, 37-39. In adopting PO’s construction, the district court found that “the claims include only the requirement that each [of the ASIC and DSP] play a role, and the details of how responsibilities are assigned are not part of the claim limitation.” Id., 38.

2. “succession”

In prior litigation, PO adopts a meaning of “succession of steps” as meaning that a zoom lens “successively move[s] through each zoom setting/position.” EX1032, 21-22 (citing Plaintiff’s Patent Local Rule 3-1 and 3-2 Disclosures, No. 2:19-cv-00246-JRG (E.D. Tex. Oct. 1, 2019), 118-19, 239).

PO further adopts the construction that “succession of data files” refers to “multiple files that are created when the system captures multiple images from multiple focal lengths consistently with the claim element above in which ‘succession of steps’ appears.” Ex. 1027, 49 (citing to Dkt. No. 69 at 19.)

C. Ordinary Meaning

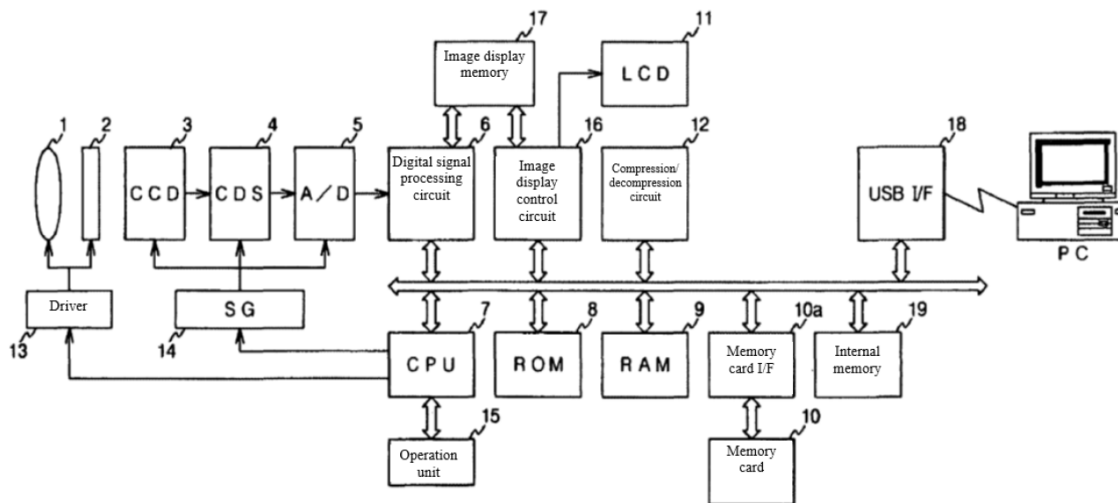
All other terms should be given their ordinary meaning to a POSITA.

VI. GROUND 1: WATANABE RENDERS OBVIOUS CLAIMS 9 AND 24

A. Watanabe

Watanabe, a U.S. Patent Publication entitled “Image Recording Apparatus and Image Processing System,” incorporates JP2004-233872 (EX1006, “JP-872”). Watanabe, [0015].

Watanabe describes an image processing system for a digital camera that uses CCD sensors to capture images as well as video (through its incorporation of JP-872). JP-872, [0006]-[0007], Fig. 1; Watanabe, [0035] (digital camera 100 with CCD 53); Laub, ¶¶117-124 and ¶¶130-131.



JP-872, Fig. 1.

Watanabe adds “information related to lens characteristics” including “lens type... focal length at the time of shooting... and the zoom position” to image data and identifies “distortion aberration correction” and “peripheral light intensity corrections” based on “focal length and zoom position for each lens.” JP-872, [0007]; Watanabe, [0046]-[0047]; Laub, ¶¶125-129.

A “digital signal processing circuit 6... performs various processing” and “correction” to images that have been digitized by A/D converter 5. JP-872, [0006]; *see also* Watanabe, [0038] (“digital signal processing circuit 56... executes various processes” and “correction” to digitized images). Watanabe identifies distortion aberration and peripheral light intensity corrections (JP-872, [0007]; Watanabe, [0047]) and processes the digitized images to apply the corrections (JP-872, [0006]-[0008]; Watanabe, [0032], [0048]-[0064]). Laub, ¶124.

B. Claim 9

1. Limitation [9.PRE]

9.PRE	A digital imaging system for image filtration comprising:
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If [9.PRE] is limiting Watanabe meets it by describing a digital imaging system. JP-872, [0006]-[0008]; Watanabe, [0002] (describing “an image recording apparatus and an image processing system” that performs “distortion aberration correction”), [0032], [0035]. Watanabe applies image filtration by correcting optical image aberrations in digital images as explained *infra* §§VI.B.2-VI.B.11 (limitations [9.a]-[9.j]). Laub, ¶¶75-101 and 132-135.

2. Limitation [9.a]

9.a	a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a [DSP], an [ASIC], system software, a database management system and a memory storage sub-system;
-----	---

a. “digital camera mechanism”

Watanabe describes a “digital camera” (JP-872, [0006], Fig. 1; Watanabe, [0035], Figs. 1A-1B. Watanabe discloses a CCD that captures images, which are digitized. JP-872, [0006] (CCD 3, A/D converter 5), Fig. 1; Watanabe, [0035] (CCD 53, A/D converter 55), [0037] (“A/D converter converts analogue image data... to digital image data”), Fig. 1A; Laub, ¶¶110-114 and ¶¶136-137.

b. “optical lens mechanism”

Watanabe discloses a lens and a lens mechanism because it describes “zoom position” and correcting distortion “based on... zoom position for each lens.” JP-872, [0007]; Watanabe, [0047], [0049], Fig. 3; Laub, ¶¶127-129 and 119-120. A “mechanical mechanism including an autofocus” moves the lens. JP-872, [0006], Fig. 1 (lens 1, “mechanical mechanism 2”); Watanabe, [0035] (“lens 51” and “mechanical structure 52” with autofocus), [0036] (lens unit), Fig. 1A (51, 52); Laub, ¶¶138-139.

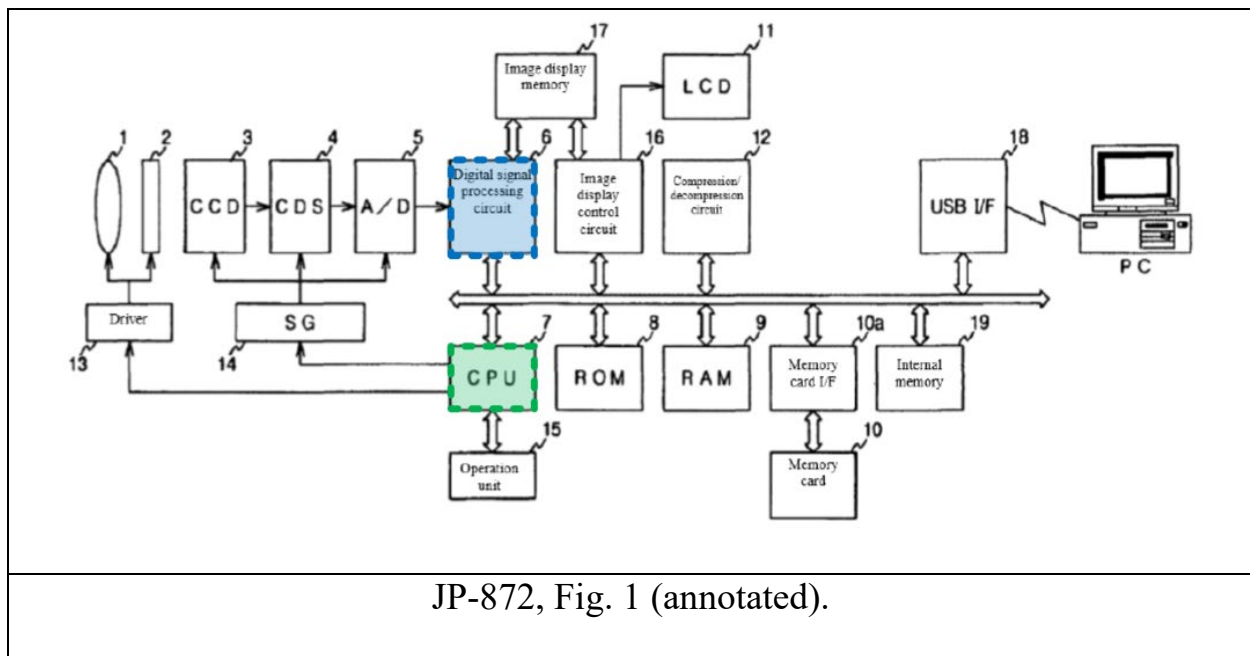
c. “digital sensor”

Notwithstanding that a CCD provides an analog signal that requires digitization, the ’805 specification identifies a CCD as a “**digital** sensor[]” in which “photons are recorded by electrically charged pixels.” EX1001, 13:63-15:4; *id.*, 2:41-50, 17:51-54 ; see also *id.*, 30:23-25 (analog-to-digital converter (“ADC”) 210 digitizes analog signal from CCD), 8:42 (describing analog-to-digital (“A/D”) conversion process), Fig. 2 (ADC 210). Watanabe discloses a CCD that captures digital images. JP-872, [0006] (CCD 3, A/D converter 5), Fig. 1; Watanabe, [0035] (CCD 53, A/D converter 55), [0037] (“A/D converter converts analogue image data... to digital image data”), Fig. 1A; *supra* §VI.B.2.a; Laub, ¶140.

d. “a microprocessor, a [DSP], an [ASIC]”

Watanabe’s digital camera includes a CPU and digital signal processing circuit. JP-872, [0006] (CPU 7, circuit 6), Fig. 1; *see also* Watanabe, [0035],

[0038], Fig. 1B (CPU 57, circuit 56). As discussed *supra* §IV.B, PO concedes that it is known that “a microprocessor is a CPU that controls the computing functions of the camera.” EX1026, 154-155. Watanabe describes a CPU that controls computing functions of its camera. See Watanabe, [0042] (“CPU 57 controls operation of each part of the digital still camera”). Therefore, Watanabe describes a microprocessor. Furthermore, a microprocessor is an obvious implementation of a CPU. Laub, ¶¶141, 147. A DSP is a digital signal processing circuit. EX1026, 16; Laub, ¶¶142-147.



i. Known interchangeability of a microprocessor, a [DSP], an [ASIC].

A POSITA would be well familiar with processing platform design options. These options were known to include ASIC and their well-known implementation

benefits for repetitive and labor-intensive digital filtration operations. EX1055, 1:65-2:4. That is, while the general processing function of the CPU/microprocessor enables overall control of a system, a DSP provides known advantages where a programmable upgrade in processing function (such as image optimization) may be desirable. While the ASIC is known to offload labor-intensive operations of a system whereby its higher speed hardware switching operation may be leveraged for repetitive tasks such as aberration correction. For example, as shown in EX1079, 6:58-62, 21:54-57, 25:7-13, DSPs, processors, and ASICS were known for implementing FFT operations such as those of the '805 patent. DSPs provide upgrade benefits as compared to ASICs based on software programming while the dedicated hardware of ASICs is better suited to repetitive labor-intensive tasks to consume less power. EX1081, 7:48-8:23. For these reasons, ASICs were known image processing component of correction schemes. EX1080, 9:28:47, 17:45-67, 24:48-25:3, 25:51-57. A POSITA understood that ASICs relieved other processing elements of an image processing system of labor-intensive image processing tasks and were faster and consumed less power for repetitive tasks—important to handheld devices such a digital camera. And ASICS and DSPs may therefore share tasks based on individual task processing loads, and/or need for upgradeability. Likewise, a POSITA would recognize that while lens aberrations were known, optimization schemes may require the flexible programming of a DSP. Laub ¶158.

Furthermore, as discussed *supra* §IV.B, PO concedes that each of ASICs, microprocessors, and DSPs are known to be used in cameras for image processing and other tasks. EX1026, 154-155. PO states that:

“It is acknowledged that microprocessors and ASICs are used in digital cameras, however. These mechanisms have evolved to be applied to embedded computing devices including digital cameras. The microprocessor **is a CPU that controls the computing functions of the camera.**

The CPU may use memory circuits (DRAM, EPROM, EEPROM, Flash memory) in order to store and access data to perform a set of control functions. For example, the camera microprocessor is used to identify the correct exposure of an image by using the exposure meter in the camera. In addition, the microprocessor is used in conjunction with a lens CPU in order to autofocus the image. Further, the microprocessor is used in conjunction with a flash CPU in order to automatically illuminate an image based on user preferences. **Moreover, it is recognized that a digital signal processor (DSP), typically an application specific integrated circuit**

(ASIC), is used to process a digital image file. In general, the general exposure data of the image file is processed using the DSP.” *Id.* (emphasis added).

Accordingly, by PO’s own admissions it would have been obvious to implement an ASIC and DSP in combination with a CPU/microprocessor. POSITAs would have had a reasonable expectation of success of implementing this combination because microprocessors, DSPs, and ASICs were available in commercial off-the-shelf components routinely used for image processing in cameras as admitted by Patent Owner. Implementing Watanabe’s system with any combination of microprocessors, DSPs, or ASICs was well-within the POSITA’s ordinary skill. Laub, ¶¶148-163.

e. “system software”

The specification describes “processing software” as “stored in either a microprocessor or an ASIC.” EX1001, 22:9-10. POSITAs would have understood the ’805 patent as describing all processing intelligence in the claimed system as software, from software “stored in” a microprocessor or ASIC (*id.*) to application layer programs (*id.*, 6:32-37, describing “Adobe Photoshop”). Laub, ¶¶164-166. POSITAs would also have understood the ’805 patent’s reference to software as encompassing all layers of the Open Systems Interconnection (“OSI”) stack because the ’805 patent describes network and communication applications whose

functionality is provided by software represented in the OSI stack. E.g., EX1001, Fig. 33, Fig. 35 (“DBMS in Distributed Network”), 6:62-7:9, 8:26-37, 24:47-50, 30:9-22; Laub, ¶167. Watanabe’s image recording apparatus includes “in-camera software” because it “stores programs” in read-only memory (“ROM”). JP-872, [0006], Fig. 1 (ROM8); Watanabe, [0039] (“ROM 58 stores programs”), [0042] (“control program stored in ROM 58”), Fig. 1B (ROM 58), Fig. 3 (image processing program 71); Laub, ¶168.

f. “a [DBMS]”

Watanabe describes executable code that accesses a database.

First, Watanabe describes using a database. It describes “tables 70 including distortion aberration correction values and peripheral light intensity correction values in accordance with focusing points and zoom positions” that “are prepared in advance on a lens-to-lens basis[.]” Watanabe, [0047], Fig. 3 (“correction value table 70”). Watanabe’s “value table 20” is also “prepared” to correct distortion aberration and peripheral lighting “based on the focal length and zoom position for each lens[.]” JP-872, [0007]; Laub, ¶169. Watanabe’s tables comprise a database. EX1022 (“Bestgen”), 2:8-12 (“a database may be viewed as one or more tables of information”); EX1023 (“Cesare”), 1:36-39 (“Data records in a computer database are maintained in tables, which are a collection of rows all having the same columns.”); Laub, ¶169-173.

Second, Watanabe discloses “a control program stored in the ROM 58” that CPU 57 uses “to control each part” of the camera including “a correction process on image data.” Watanabe, [0042]; *id.*, [0048] (“distortion aberration correction process is executed according to distortion aberration information”), [0059] (“CPU 57... control[s] each part of the apparatus according to the image processing program”), Fig. 4 (step S104 image processing); Laub, ¶174. The “control program” comprises a DBMS at least because it is software that retrieves image correction data associated with lens-specific focusing points and zoom positions from the database (tables 70, table 20). Watanabe, [0042], [0047], [0049] (“a distortion aberration correction process is executed according to a lens type, a focusing point, and a zoom position”), Fig. 3; JP-872, [0007] (“image correction processing program 21 will cause... CPU 7 to determine the correction value table based on the lens type and adjust zoom position”); Laub, ¶¶175-176.

g. “memory storage sub-system”

Watanabe discloses a “memory storage sub-system.” Read only memory (“ROM”) 8 “stores programs and data,” random access memory (“RAM”) 9 “temporarily stores data,” and “memory card 10 and built-in memory 19” store image data in “an image data file.” JP-872, [0006], Fig. 1; *see also* Watanabe, [0035] (memory card 60, memory card interface 60a), [0042]; Laub, ¶¶177-178.

3. Limitation [9.b]

9.b	wherein the aberrations from the optical lens mechanism are corrected by applying digital filtration by using the [ASIC] and the [DSP];
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Watanabe meets [9.b] because Watanabe's DSP corrects optical image aberrations in images by applying corrections from its database. JP-872, [0006] (DSP "performs various processing" on digitized image input), [0007] (describing "distortion correction processing" and obtaining "corrected image data" for digital images "according to correction values" based on lens type, focal length, and zoom position), [0008], Fig. 4 (step 104); Watanabe, [0038] (DSP circuit 56 "executes various processes" including "correction" to "image data"), Figs. 1A-1B (DSP receives digitized image data under CPU 57 control), [0049] ("distortion aberration correction process is executed"), [0061]-[0062] (steps 103 and 203); Laub, ¶183. Watanabe's DSP processes the captured images and corrects distortion aberrations and peripheral light intensity, under CPU control (Watanabe, [0042], [0059]-[0060], Figs. 1A-1B), using the correction data from the database table 70 as shown in Fig. 3. Laub, ¶184.

The corrections that the DSP applies are "digital filtration" because they numerically process the image data. EX1028, 193 ("digital filter" is "the computational process or algorithm by which a sampled signal or sequence of numbers (acting as an input) is transformed into a second sequence of numbers

termed the output signal.”); EX1001, 14:62, 15:10-12 (describing data interpolation as example of “digital filtration”), 31:1-24 (citing fast Fourier transform as an example of a “digital filtration process”); JP-872, [0008] (“image processing program... performs image processing on the image data”); Watanabe, [0048]-[0049], [0062]-[0063]; Laub, ¶¶102-109, 179-182, and 185-187.

Watanabe meets “using” the ASIC and the DSP for the claimed function because each of the ASIC and the DSP would play a role in the claimed step. *Supra* §V.B.1 (claim construction); Laub, ¶¶63-65 (discussing claim construction), 188.

To the extent an ASIC is not taught by Watanabe digital filtration disclosure, a POSITA would recognize the benefit of modifying Watanabe for the DSP to employ an ASIC for labor intensive, repetitive image processing tasks such as digital filtration as admitted by PO. *Supra* § VI.B.2.d.i. Laub, ¶189.

4. Limitation [9.c]

9.c	wherein the microprocessor is used to provide digital and optical data to the [DSP];
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Watanabe meets [9.c] because CPU 57 operates based on a control program stored in the ROM 58 to control operation of each part of the digital still camera, including the CCD. *See also* Laub, ¶192. For example, the CPU 57 executes recording operation control of image data for the memory card 60, reproducing operation control of an image data file recorded in the memory card 60, a

connection process on image data, a correction process on image data, and so forth. That is, the CPU 57 functions as an image producing device (photographing device), a reproducing control device, a communication device, an image processing device. Watanabe, [0042], [0059] (Fig 1 Control Signal generator 64 connected to CPU 57). And as separately admitted by PO, “[t]he microprocessor is a CPU that controls the computing functions of the camera. The CPU may use memory circuits (DRAM, EPROM, EEPROM, Flash memory) in order to store and access data to perform a set of control functions.” *Supra* §VI.B.2.d.i.

Watanabe provides “optical data” because Watanabe’s in-camera software adds “information relative to distortion aberration” and “peripheral light intensity” (e.g., “optical aberrations”) to image data based on the lens used to capture the image. JP-872, [0007]; Watanabe, [0046]; Laub, ¶193. Likewise, the data corresponds to actual optical data represented in the image data that requires aberration correction.

Watanabe’s CCD captures image data and forwards it to the DSP through management of the CPU. JP-872, Fig. 1, [0006] (A/D converter 5 digitizes CCD image capture and passes signal to DSP circuit 6); Watanabe, Figs. 1A-1B, [0037]-[0038], [0061]-[0062] (steps 103, 203); *supra* §VI.B.2.c (CCD is “digital sensor”); Laub, ¶¶190-191.

5. Limitation [9.d]

9.d	wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;
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As discussed *infra* §VI.B.7 with respect to [9.f], a POSITA would have understood that Watanabe selects a “specific procedure to optimize the image” such as algorithm including a “specific sequence of operations” applied by the DSP. E.g., EX1069 (“Intratater”), 6:37-40; Laub, ¶¶196-200. The POSITA would have further understood that the stored parameters associated with such an algorithm correspond to the “specific corrections” for the identified “specific optical aberrations” of [9.d]. Laub, ¶196.

Watanabe further meets [9.d] because Watanabe’s in-camera software adds “information relative to distortion aberration” and “peripheral light intensity” (e.g., “optical aberrations”) to image data based on the lens used to capture the image. JP-872, [0007]; Watanabe, [0046]; Laub, ¶194.

Watanabe’s system software is used by its CPU (*supra* §§VI.B.2.e, VI.B.2.f) identifies “specific corrections to the [optical] aberrations”—and therefore also identifies “specific optical aberrations”—by database lookup based on the lens type, focal length, and zoom position corresponding to the parameters when the image was taken. *Supra* §V.A.1 (claim construction); Laub ¶¶60-62 (discussing claim construction); Watanabe, [0047] (“CPU determines a table according to a

lens type and determines correction values according to a focusing point and a zoom position”); JP-872, [0007] (“image correction program 21 will cause CPU 7 to determine the correction value table based on the lens type and [] zoom position.... A correction value is determined based on the focal length[.]”); *supra* §VI.B.2.f (discussing Watanabe’s database); Laub, ¶195. This meets [9.d]. Laub, ¶194.

Watanabe’s corrections are “specific corrections to the aberrations” because its CPU uses an image processing program to correct the aberration by applying the correction values. JP-872, [0007] (“[C]orrected image data 22 is obtained according to the correction value.”); Watanabe, [0048] (similar).

6. Limitation [9.e]

9.e	wherein the system software forwards the data from the digital sensor to the digital processor;
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Watanabe meets [9.e] because Watanabe’s CCD captures image data and forwards it to the DSP. JP-872, Fig. 1, [0006] (A/D converter 5 digitizes CCD image capture and passes signal to DSP circuit 6); Watanabe, Figs. 1A-1B, [0037]-[0038], [0061]-[0062] (steps 103, 203); *supra* §VI.B.2.c (CCD is “digital sensor”); Laub, ¶¶201-202.

7. Limitation [9.f]

9.f	wherein the [DSP] selects a specific procedure to optimize the image and corrects the aberrations;
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Watanabe meets [9.f] as explained at [0038] (DSP circuit 56 “executes various processes” including “correction” to “image data”), Figs. 1A-1B (DSP receives digitized image data under CPU 57 control), [0049] (“distortion aberration correction process is executed”), [0061]-[0062] (steps 103 and 203); Laub, ¶¶124, 203. Watanabe’s DSP processes the captured images and corrects distortion aberrations and peripheral light intensity, under CPU control (Watanabe, [0042], [0059]-[0060], Figs. 1A-1B), using the correction data from the database table 70 as shown in Fig. 3. Laub, ¶120.

A POSITA would have understood that a “specific procedure to optimize the image” may be an algorithm that includes a “specific sequence of operations” applied by the DSP. E.g., EX1069 (“Intratater”), 6:37-40; Laub, ¶204. Watanabe does not explain where the algorithms that its DSP applies are stored, leaving this detail to a POSITA.

A POSITA would have understood that there were two known alternatives: (1) storing the algorithm(s)—as executable code—in the DSP, or (2) storing them in other memory or computer-readable medium and loading them into the DSP as needed. Laub, ¶¶196, 199. It was known to select and load algorithms from

memory to provide particular signal processing (“filtration”) at the DSP. Laub, ¶196 (discussing EX1069 (“Intratater”), 6:37-40, 6:41-47, 6:47-54, 6:54-62, EX1070 (“Kashida”), 1:48-50, 2:14-16, 2:50-56, EX1072 (“Buchin”), 10:28-32, .” EX1071 (“Reddig”), 13:8-17). A design choice between two known implementations is obvious.

A POSITA would have understood to store or—at a minimum—identify the DSP filtration algorithm for a particular aberration correction in Watanabe’s database in order to employ the stored parameters (for example as memory offset or look-up address in the database to the algorithm memory location). Laub, ¶200. Thus, Watanabe’s DSP would “select” the algorithm by accessing the database for information identifying the algorithm (or the algorithm itself) so that it could apply it and correct the aberration. Laub, ¶¶200-205. The retrieval option frees the DSP from having to store every aberration correction algorithm used by the system in advance by loading them on an as-needed basis.

8. Limitation [9.g]

9.g	wherein the lens type is a zoom lens;
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Watanabe meets [9.g] because it discloses a zoom lens as described *supra* §VI.B.2.b (limitation [9.a]). Laub, ¶¶206-207.

9. Limitation [9.h]

9.h	wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps;
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Watanabe meets [9.h] because it describes a zoom lens that alternates between specific fixed focal length positions and teaches a zoom lens and a “mechanical mechanism including an autofocus” that moves the lens as explained for limitations [9.a] and [9.g]. *Supra* §§VI.B.2.b, VI.B.8; JP-872, [0007] (correcting distortion aberration and peripheral light intensity based on “focal length and zoom position for each lens”); Watanabe, [0049] (same for “focusing point and a zoom position”); Laub, ¶¶212-214.

A POSITA would understand that a zoom lens changes zoom positions such that images can be photographed at different magnifications. Laub, ¶¶208-211. Furthermore, as discussed *supra* §V.B.2, PO adopts a construction of “succession of steps” as meaning that a zoom lens “successively move[s] through each zoom setting/position.” EX1032, 21-22 (citing Plaintiff’s Patent Local Rule 3-1 and 3-2 Disclosures, No. 2:19-cv-00246-JRG (E.D. Tex. Oct. 1, 2019), 118-19, 239). Watanabe describes a zoom lens that moves between multiple zoom positions, and Watanabe therefore describes a zoom lens that “successively move[s] through each zoom setting/position” and meets [9.h]. Watanabe [0049] (describing “zoom positions” (plural)); Laub ¶¶66-68 (discussing claim construction), 212-214.

10. Limitation [9.i]

9.i	wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files; and
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Watanabe meets [9.i] because Watanabe corrects optical image aberrations in images at any focal length by applying corrections from the database. JP-872, [0006] (DSP “performs various processing” on digitized image input), [0007] (describing “distortion correction processing” and obtaining “corrected image data” for digital images “according to correction values” based on lens type, focal length, and zoom position), [0008], Fig. 4 (step 104); Watanabe, [0038] (DSP circuit 56 “executes various processes” including “correction” to “image data”), Figs. 1A-1B (DSP receives digitized image data under CPU 57 control), [0049] (“distortion aberration correction process is executed”), [0061]-[0062] (steps 103 and 203); Laub, ¶¶215. Watanabe’s DSP processes the captured images and corrects distortion aberrations and peripheral light intensity, under CPU control (Watanabe, [0042], [0059]-[0060], Figs. 1A-1B), using the correction data from the database table 70 as shown in Fig. 3 across the succession of data files provided to the device. Laub, ¶215.

Watanabe meets a “succession of data files” because Watanabe executes aberration correction according to zoom position. Watanabe, [0049] (“peripheral light intensity correction process is executed according to a lens type, a focusing

point and a *zoom position*,” emphasis added); Laub ¶216. PO adopts a construction that “succession of data files” means the “multiple files that are created when the system captures multiple images from multiple focal lengths consistently with the claim element above in which ‘succession of steps’ appears.” *Supra* §V.B.2; Ex. 1027, 49 (citing to Dkt. No. 69 at 19.) As discussed *supra* §VI.B.9 with respect to [9.h], Watanabe describes a zoom lens that “successively move[s] through each zoom setting/position.” Watanabe [0049] (describing “zoom positions” (plural)); Laub ¶¶214. Because Watanabe meets “succession of steps” and performs aberration correction at each zoom position, Watanabe therefore also meets the “succession of data files” under PO’s construction. Laub ¶216.

As discussed *supra* §VI.B.3, the corrections that the DSP applies are “digital filtration” because they numerically process the image data. EX1028, 193; EX1001, 14:62, 15:10-12, 31:1-24; JP-872, [0008] (“image processing program... performs image processing on the image data”); Watanabe, [0048]-[0049], [0062]-[0063]; Laub, ¶179-181.

Watanabe makes corrections to “modify multiple images from different focal lengths” because Watanabe describes selecting corrections based on lens, focal length, and zoom position across images input to the device in succession. JP-872, [0007]; Watanabe, [0049]; Laub, ¶215-216.

11. Limitation [9.j]

9.j	wherein the modified data file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.
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Watanabe meets [9.j] because it discloses memory card 10 and memory card interface 10a storing processed image data (“modified data file”) that is “optimized from aberrations.”. JP-872, [0006] (“CPU 7 controls the recording operation of image data to the memory card 10”), [0007] (“it is possible to record data that has been subjected to distortion aberration correction”), [0008] (step 206)]; *see also* Watanabe, Fig. 1B (memory card 60), Fig. 3 (corrected image data 72), [0058] (corrected image data “is recorded on the memory card 60”), [0063] (step 206); Laub, ¶217.

C. Claim 24

1. Limitations [24.PRE], [24.a], [24.b], [24.c], [24.e], [24.f], [24.g], [24.i], [24.j], and [24.k]

Watanabe meets these claim 24 limitations for the same reasons Watanabe meets the corresponding limitations in claim 9. Laub, ¶219.

Limitation	Corresponding Limitation	Discussion
[24.PRE]	[9.PRE]	VI.B.1
[24.a]	[9.a]	VI.B.2
[24.b], [24.i]	[9.b]	VI.B.3
[24.c]	[9.g], [9.h]	VI.B.8, VI.B.9
[24.e]	[9.e]	VI.B.6
[24.f]	[9.c]	VI.B.4
[24.g]	[9.d]	VI.B.5
[24.j]	[9.i]	0
[24.k]	[9.j]	VI.B.11

While [24.i] recites “correct digital or optical aberrations,” the digital and optical aberrations are joined by the disjunctive “or,” and thus Watanabe meets [24.i] by correcting optical aberrations as described above with respect to [9.b].

Watanabe meets the remaining limitations in claim 24 as follows.

2. Limitation [24.d]

24.d	creating data files corresponding to each focal length lens setting;
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Watanabe meets [24.d] because records of a database are created in advance of processing for each focal length and employed to “modify multiple images from

different focal lengths” because Watanabe describes selecting corrections based on lens, focal length, and zoom position from the database, the files exist prior to that operation. JP-872, [0007]; Watanabe, [0049]; Laub, ¶220.

3. Limitation [24.h]

24.h	selecting a specific procedure from the database using the microprocessor to optimize the image and correct the aberrations;
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Watanabe meets [24.h] because the CPU (of which a “microprocessor” is an obvious implementation as explained *supra* §VI.B.2.d) uses in-camera software to access the database and identifying at least one optical aberration in an image based on lens, focal length, and zoom position as explained for limitations [9.d]. *Supra* §VI.B.5; Laub, ¶221. Watanabe discloses distortion aberration and peripheral light intensity corrections for different focal lengths of its zoom lens. Upon processing the data to address the aberrations, the resulting image is thereby “optimized” and stored. JP-872, [0007] (correcting distortion aberration and peripheral light intensity based on “focal length and zoom position for each lens”); Watanabe, [0049] (same for “focusing point and a zoom position”); Laub, ¶222.

VII. GROUND 2: WATANABE IN VIEW OF RUSS RENDERS OBVIOUS CLAIMS 1-3, AND 18-20

A. Russ

JOHN C. RUSS, THE IMAGE PROCESSING HANDBOOK (CRC Press, 4th ed. 2002) (“Russ”), published in 2002. EX1054; EX1062 (LC Classification

showing a 2002 publication); EX1082 (publisher confirmation of a publication date of July 26, 2002).

B. Watanabe in View of Russ

Watanabe discloses or suggests camera with a fixed focal length lens because fixed focal length lenses were well-known as interchangeable with zoom lenses as dictated by imaging conditions. A POSITA would recognize that cameras often substitute one lens assembly for another zoom to fixed, or vice versa, as conditions demand. Laub, ¶243. A POSITA would have understood that digital cameras, such as the one described in Watanabe, would have been expected to receive either fixed or zoom lenses. The POSITA also would have understood that the correction process would not have materially differed for either type of lens , and would have caused no problems in operation because Watanabe teaches that “peripheral light intensity correction values in accordance with focusing points and zoom positions are prepared in advance on a lens to lens basis.” Watanabe [0047]; Laub, ¶120. The only difference is that correction information is provided per focal length. A fixed focal length lens would be less complicated to implement than Watanabe’s zoom lens because a fixed focal length lens typically has a single (or a few) focal length-related correction option, while a zoom lens would have correction operations for each possible zoom setting (i.e., each different focal length). Laub, ¶97.

Watanabe leaves specific image processing and filtration techniques to a POSITA, the '805 claims only conventional image processing methods. Laub, ¶233. In this regard, Russ describes such conventional manners of processing image data and executing special effects, particularly in the frequency domain. Laub, ¶223-232. For instance, while Watanabe does not mention such well-known techniques as Fourier transforms, the Russ handbook teaches how images are processed using the same. Russ at p. 278 (“Although many different types of image transforms can be used, the best known (at least, the one with the most recognizable name) is the Fourier transform.”).

Russ “presents an extensive collection of image processing tools, so that the user of computer-based systems can both understand those methods provided in packaged software, and program those additions that may be needed for particular applications.” Russ at “Introduction.” Russ is relevant to digital cameras because it sets forth standard operations of image processing used in, for example, digital cameras. Russ at p. 8-13, 36-50. In particular, Russ describes known image processing techniques for image correction, including applying filters, neighborhood averaging and ranking, rank leveling, and the Fourier transform. Laub, ¶¶223-232. Russ dedicates an entire chapter to processing images in the frequency space using the Fourier transform. Russ describes using the fast Fourier transform to apply various filters to adjust images to correct blurring and the like.

Russ at p. 297-306. In addition to aberration correction, Russ provides ways to enhance images (i.e., apply special effects). Russ at p. 207, 243, 286, 277. A POSITA would be motivated to use a fast Fourier transform because it was widely known to be a powerful and efficient tool in image processing. Russ at p. 278; Laub, ¶230-231, 237.

Watanabe performs various image processing after sorting image data into color-difference data and brightness data. Watanabe at [0038]. Special effects have long been used in digital cameras, examples include image softening, sepia effects, and color saturation adjustment. A POSITA would look to modify Watanabe with the conventional details of Russ to arrive at specific mechanisms for implementing the broad teachings of Watanabe. A POSITA would understand that any conventional image processing methods could be used, such as those described in Russ. Laub, ¶¶234-239. For instance, while Watanabe does not mention using Fourier transforms, Russ teaches how images are processed using the same. Russ at p. 278 (“Although many different types of image transforms can be used, the best known ... is the Fourier transform.”).

Given that Russ is a handbook for executing image processing, and Watanabe performs multiple types of image processing, a POSITA would have had a reasonable expectation of success combining these references. Laub, ¶240.

C. Claim 1

1. Limitations [1.PRE], [1.a], [1.c], [1.d], [1.e], [1.f], [1.g], and [1.k]

Watanabe meets these claim 1 limitations for the same reasons Watanabe meets the corresponding limitations in claim 9. Laub, ¶242.

Limitation	Corresponding Limitation	Discussion
[1.PRE]	[9.PRE]	VI.B.1
[1.a]	[9.a]	VI.B.2
[1.c]	[9.b]	VI.B.3
[1.d]	[9.c]	VI.B.4
[1.e]	[9.d]	VI.B.5
[1.f]	[9.e]	VI.B.6
[1.g]	[9.f]	VI.B.7
[1.k]	[9.j]	VI.B.11

Watanabe meets the remaining limitations in claim 1 as follows.

2. Limitation [1.b]

1.b	wherein the optical lens mechanism is a fixed focal length;
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Watanabe teaches an optical lens mechanism and that “peripheral light intensity correction values in accordance with focusing points and zoom positions are prepared in advance on a lens to lens basis.”. Watanabe [0036], [0047]. FIG. 3 shows that the lens type is saved in the process information. Watanabe at FIG. 3. This suggests to a POSITA that the lens is interchangeable and can accept a fixed focal length lens. The POSITA also would have understood that the correction

process would not have materially differed between fixed and zoom lens types, and that the only difference between lens types is that correction information is provided per focal length, such that using that a fixed focal length lens would be less complicated because it has fewer focal length-related correction options. Laub, ¶243.

3. Limitation [1.h]

1.h	wherein the data are forwarded from the digital sensor to the [DSP] by an [ASIC];
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Watanabe meets [1.h] because Watanabe’s CCD captures image data and forwards it to the DSP. JP-872, Fig. 1, [0006] (A/D converter 5 digitizes CCD image capture and passes signal to DSP circuit 6); Watanabe, Figs. 1A-1B, [0037]-[0038], [0061]-[0062] (steps 103, 203); *supra* §VI.B.2.c (CCD is “digital sensor”); Laub, ¶244. Furthermore, as discussed *supra* §VI.B.2.d, PO concedes that DSPs and ASICs are well known components used in cameras for image processing and other tasks, and that the selection of one known solution over another, or a shared arrangement, is a simple design choice. EX1026, 154-155; Laub, ¶245.

4. Limitation [1.i]

1.i	wherein the [DSP] applies a fast Fourier transform to a data file in order to satisfy a user specified special effects function;
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Claim 1 does not require that the “image” in which an aberration is corrected also be processed for special effects. Rather, the claim covers two independent processes: (1) an aberration of an image is corrected (e.g., EX1001, Fig. 5), and (2) a special effects function is applied to a data file that may or may not be the same image (e.g., EX1001, Fig. 14, which is a process independent of the process in Fig. 5). Laub, ¶¶246-247.

In any event, even if claim 1 was construed to require that the special effects function was applied to the same as the image in which an aberration is corrected, Watanabe in view of Russ renders obvious this construction. Laub, ¶247.

Watanabe teaches that its processes can be implemented by a user. Watanabe at [0041] (explaining that the camera has buttons for selecting functions, configuring settings, carrying out a function by operation, and “other functions according to each operation mode”); [0083] (teaching that the photographer can select desired entry contents from the display). In Watanabe, “the digital signal processing circuit 56 sorts out image data inputted from the A/D converter 55 into color-difference data and brightness data and executes various processing.” Watanabe at [0038]. Laub, ¶248.

Russ also teaches that user applied special effects may be executed through a fast Fourier transform. Russ at “Introduction” (providing image processing tools “so that the user of computer-based systems can ... understand those methods

provided in packaged software.”), 277 (“applying computer methods to images for purposes of enhancement”), 312 (“The . . . filter can be constructed either manually or automatically.”), 305 (“The transform of this image is then processed by smoothing and leveling, and then thresholded to locate the peaks. The inverse of this mask is then smoothed and multiplied by the frequency transform of the original image to produce the filtered result.”), 334 (“Thresholds may be set interactively by a user watching the image and using a colored overlay to show the result of turning a knob or otherwise adjusting the settings. . . . [T]he user may adjust virtual sliders or mark a region on a histogram to select the range of brightness values.”). Laub, ¶249.

Russ teaches that there is “utility of working in the frequency domain” to perform various “processing operations,” because many of these processing operations can only be performed in an original image in the spatial domain with “significantly greater computational effort.” Russ, 277. Russ teaches various special effects functions for enhancing images, and which use a fast Fourier transform, so that efficient computation is performed in the frequency domain, Russ, 277-278, 332, *see, e.g.*, 297-298 (Fourier transform used for “[i]solating periodic noise,” with the same results as “Gaussian smoothing and Laplacian sharpening”), 303 (Fourier transform used for various “[m]asks and filters”), 309 (Fourier transform used for “[s]election of periodic information”), 322-324

(Fourier transform used for “noise content in the image to be sharpened” caused by an “out-of-focus blur” to produce a “deblurred image”), 325 (Fourier transform for correction of “[m]otion blur”). A POSITA would find it obvious to use a fast Fourier transform to satisfy special effects function, such as smoothing or sharpening, noise reduction, deblurring, or enhancement, in order to enhance an image. Laub, ¶249.

5. Limitation [1.j]

1.j	wherein the [DSP] modifies the data file by applying the special effects function; and
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In Watanabe, “the digital signal processing circuit 56 sorts out image data inputted from the A/D converter 55 into color-difference data and brightness data and executes various processing.” Watanabe at [0038]. A POSITA would find it obvious to apply a special effects function because viewers prefer special effects functions, such as white balance or other adjustments, that makes colors appear more realistic or enhanced, as discussed *infra* §VII.D. EX1035 (“Dorrell ”), [0003], [0025], [0145]-[0146]; *See also* EX1053, 343 (“desirable to distribute the intensities of a color image equally between the highlights and the shadows” using “a variety of color transformations for the correction of tonal and color imbalances”); Laub, ¶250.

When a fast Fourier transform is performed on a data file, Russ teaches various special effects functions that may be applied to enhance an image, as discussed *supra* §VII.C.4. Russ, 277-278, 297-298, 303, 309, 322-325, 332. Accordingly, Russ meets [1.j].

D. Claim 2

2.PRE	The system of claim 1:
2.a	wherein the special effects function is a color enhancing function.

In Watanabe, “the digital signal processing circuit 56 sorts out image data inputted from the A/D converter 55 into color-difference data and brightness data and executes various processes.” Watanabe at [0038]. A POSITA would understand that Watanabe suggests implementing user selected color enhancing special effects. Watanabe at [0041] (explaining that the camera has series of buttons for selecting a function, configuring settings, displaying guidance on a screen, carrying out a function by operation, and “other functions according to each operation mode”); [0083] (teaching that the photographer can select desired entry contents from the display). For example, when a DSP adjusts an image white balance, it applies color filters (“color filtration”). Dorrell, [0155]-[0159], Figs. 4-6, 12; EX1036 (“Masuno”), [0081]-[0082] [0147]-[0156]; Laub, ¶254. “White balance” is used to adjust a digital photograph to make its colors appear more realistic or enhanced. EX1035 (“Dorrell ”), [0003], [0025], [0145]-[0146]; Laub,

¶254. The POSITA would find it obvious to apply white balance or other “a color enhancing function” in order to make image colors appear more realistic, which is standard in cameras and desirable to viewers. Laub, ¶¶252-254.

Russ carries out color enhancement. Russ teaches that FFT is used on images to adjust color features. Russ at p. 277 (“applying computer methods to images for purposes of enhancement”), 308-09 (“[C]olored halftone prints are typically made using cyan, magenta, yellow, and black inks, with each color having a halftone screen oriented at a different angle. The procedure required is to separate the color channels, process each one, and then recombine them ... A top hat filter was applied to the Fourier transform power spectrum from each channel to select the noise peaks, which were then removed. Recombining the resultant color channel images produces the result shown.”), 305 (“The transform of this image is then processed by smoothing and leveling, and then thresholded to locate the peaks. The inverse of this mask is then smoothed and multiplied by the frequency transform of the original image to produce the filtered result.”), 334 (“Thresholds may be set interactively by a user watching the image and using a colored overlay to show the result of turning a knob or otherwise adjusting the settings. . . . [T]he user may adjust virtual sliders or mark a region on a histogram to select the range of brightness values.”). Laub, ¶254.

E. Claim 3

3.PRE	The system of claim 1:
3.b	wherein the special effects function is a diffusion function of soft effect.

As discussed *supra* §VII.C.4, Russ teaches that fast Fourier transforms may be used to perform various special effects functions for enhancing an image. Russ, 277-278, 297-298, 303, 309, 322-325, 332.

Watanabe teaches “various processing” and “correction[s]” that enhance its images. Watanabe at [0038], *see, e.g.*, [0032] (“distortion aberration correction, peripheral light intensity correction”). Russ teaches additional processes for enhancing images, such as such as smoothing or sharpening, noise reduction, deblurring, or enhancement, in order to enhance an image. Russ, 277-278, 297-298, 303, 309, 322-325, 332. For example, Russ teaches an FFT used in softening image features, particularly using a low-pass filter, *see, e.g.*, Russ 301-03 (“Butterworth low-pass filters with radii of 10 and 25 pixels in the frequency-domain image smooths the noise with some blurring of the high-frequency detail.”), 286 (explaining that removing unwanted information in the frequency domain naturally leads to visually smooth filtering). Laub, ¶258. The POSITA would find it obvious to use Russ’s image enhancement techniques, including smoothing effects, in Watanabe’s camera, in order to provide further image

enhancements on top of Watanabe’s explicitly described corrections. Laub, ¶¶256-258.

F. Claim 18

1. Limitations [18.PRE], [18.a], [18.b], [18.d], [18.e], [18.g], and [18.j]

Watanabe in view of Russ meets these limitations of claim 18 for the same reasons Watanabe meets the corresponding limitations in claims 9. Laub, ¶260.

Limitation	Corresponding Limitation	Discussion
[18.PRE]	[9.PRE]	VI.B.1
[18.a]	[9.a]	VI.B.2
[18.b], [18.g]	[9.b]	VI.B.3
[18.d]	[9.c]	VI.B.4
[18.e]	[9.d]	VI.B.5
[18.j]	[9.j]	VI.B.11

While [18.g] recites “correct digital or optical aberrations,” the digital and optical aberrations are joined by the disjunctive “or,” and thus Watanabe meets [18.g] by correcting optical aberrations as described above with respect to [9.b]. Laub, ¶261.

Watanabe meets the remaining limitations in claim 18 as follows.

2. Limitation [18.c]

[18.c]	forwarding the data from a digital sensor to a [DSP] by an [ASIC];
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Watanabe meets [18.c] for the same reason it meets limitation [1.h] *supra* §VII.C.3. Laub, ¶262. Moreover, PO concedes that DSPs and ASICs are well known components used in cameras for image processing and other tasks, and may share responsibility. *Supra* §VI.B.2.d; EX1026, 154-155; Laub, ¶263.

3. Limitation [18.f]

[18.f]	selecting a specific procedure from the database using the microprocessor to optimize the image and correct the aberrations: [sic]
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Watanabe meets [18.f] for the same reason it meets limitation [24.h] *supra* §VI.C.3. Laub, ¶264.

As discussed *supra* §VI.B.7, a POSITA would have understood that a “specific procedure to optimize the image and corrects the aberrations” may be an algorithm that includes a “specific sequence of operations” applied by the DSP. E.g., EX1069 (“Intratater”), 6:37-40; Laub, ¶ 265. Furthermore, the POSITA would have understood that Watanabe’s microprocessor would “select” the such a correction algorithm by accessing the database for information identifying the algorithm (or the algorithm itself) then forward the algorithm to the DSP so that it could apply the filter and correct the aberration. *Supra* §VI.B.7; Laub, ¶266.

4. Limitation [18.h]

[18.h]	applying a fast Fourier transform to a data file in order to satisfy a user specified special effects function;
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Similar to claim 1, claim 18 recites a “data file,” to which a Fourier transform is applied to satisfy an effects function, and elsewhere in the claim separately recites “data” (e.g., “forwarding the *data* from a digital sensor to a [DSP] by an [ASIC],” emphasis added) and an “image” (selecting a specific procedure from the database using the microprocessor to optimize the *image* and correct the aberrations,” emphasis added). Laub, ¶267.

Similar to claim 1 (as discussed *supra* §VII.C.4), claim 18 therefore does not require that the “image” to be optimized from aberration also be processed for special effects. Rather, the claim covers two independent process: (1) an aberration of an image is to be corrected (e.g., EX1001, Fig. 5), and (2) a special effects function is applied to a data file that may or may not be the same image (e.g., EX1001, Fig. 14, which is a process independent of the process in Fig. 5). Laub, ¶268.

Accordingly, Watanabe+Russ meets [18.h] for the same reason it meets limitation [1.i] *supra* §VII.C.4. Laub, ¶269.

5. Limitation [18.i]

[18.i]	modifying the data file by applying the special effects function using the [DSP]; and
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Watanabe+Russ meets [18.i] for the same reason it meets limitation [1.j] *supra* §VII.C.5. Laub, ¶270.

G. Claim 19

19.PRE	The method of claim 18 further comprising the step of:
19.a	applying the special effects function as a color enhancing function.

As discussed *supra* §VII.D with respect to claim 2, the POSITA would find it obvious to apply white balance or other “a color enhancing function” in order to make image colors appear more realistic, which is standard in cameras and desirable to viewers. Laub, ¶272.

Accordingly, Watanabe+Russ meets claim 19 for the same reason it meets claim 2 *supra* §VII.D. Laub, ¶273.

H. Claim 20

20.PRE	The method of claim 18 further comprising the step of:
20.a	applying the special effects function as a diffusion function of soft effect.

As discussed *supra* §VII.E with respect to claim 3, the POSITA would find it obvious to use Russ’s image enhancement techniques, including smoothing effects (“a diffusion function of soft effect”), in Watanabe’s camera, in order to provide further image enhancements on top of Watanabe’s explicitly described corrections. Laub, ¶275.

Accordingly, Watanabe+Russ meets claim 20 for the same reason it meets claim 3 *supra* §VII.E. Laub, ¶276.

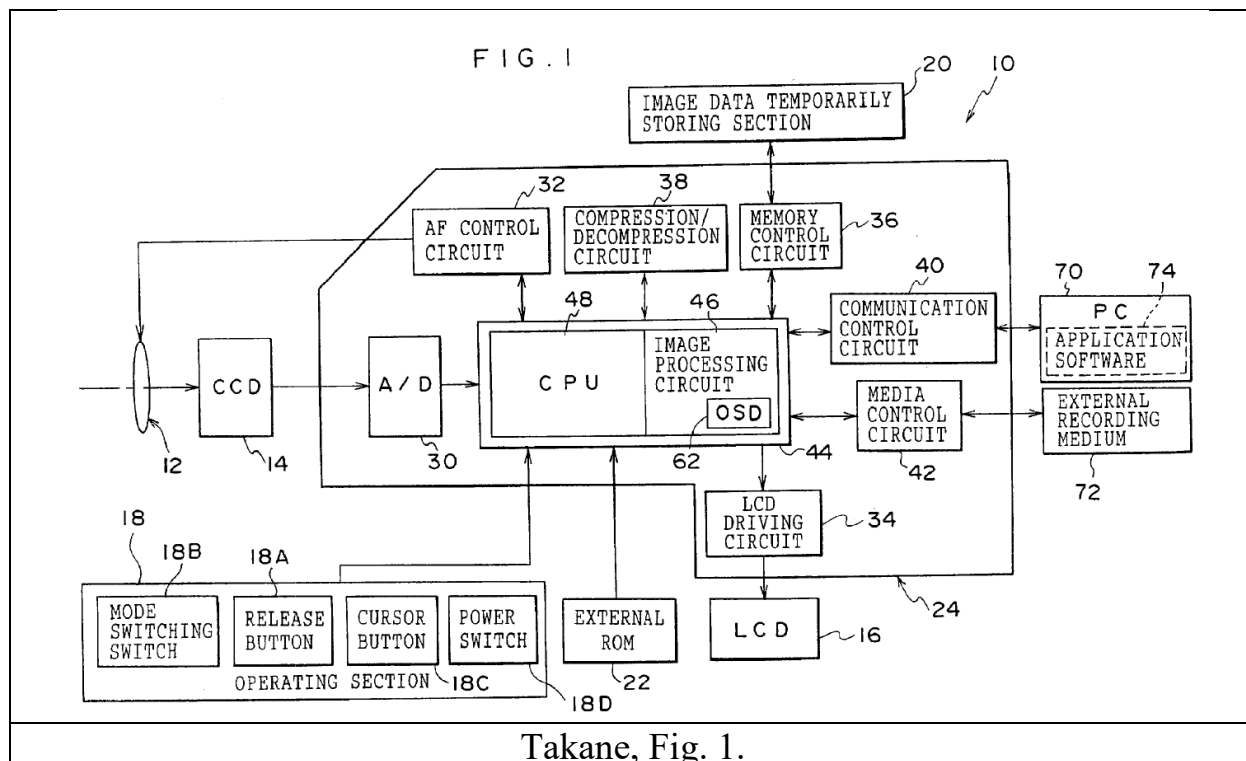
VIII. GROUND 3: TAKANE IN VIEW OF WATANABE RENDERS OBVIOUS CLAIMS 9 AND 24

A. Takane in View of Watanabe

Takane describes a digital imaging system that captures images and provides image processing that corrects distortion. Takane, Abstract; Laub, ¶¶277-278.

Takane's digital camera includes "external ROM 22 in which various programs, parameters, conversion tables and the like are stored in advance[.]" Takane, [0033], Figs. 1, 2. Laub, ¶280.

Takane describes storing polynomial coefficients (hereinafter "correction parameters") that "approximate[] the amount of displacement of the optical distortion... in advance" in distortion correction circuits 56 and 58 of image processing circuit 46 (Fig. 1, below), which "correct the optical distortion" in image data "using these parameters." Takane, [0054]; (known to use optical distortion displacement polynomial inverse "as a correction formula"). Takane also stores correction parameters based on "image size." Takane, [0060]. Laub, 278-282.



While Takane explains that it was known to store parameters “for each focal length” of different lenses and to “carry[] out correction by selecting the parameters in accordance with the focal length at the time of photographing,” Takane, [0008], Takane leaves the camera’s data storage and retrieval techniques to the POSITA. Laub, ¶¶283-284.

Watanabe discloses storing optical distortion correction parameters by lens, focal length, and zoom position in tables as explained *supra* §§VI.B.2.f ([9.a]), VI.B.3 ([9.b]). Watanabe's tables comprise a database. *Supra* §VI.B.2.f ([9.a]); Bestgen, 2:8-12; Cesare, 1:36-39; Laub, ¶285. Watanabe's control program retrieves image correction data associated with lens-specific focusing points and

zoom positions from the database (tables 70, table 20), thus comprising a DBMS. *Supra* §VI.B.2.f ([9.a]); Laub, ¶286. Watanabe's software obtains distortion correction parameters for to the DSP to correct image distortions. *Supra* §VI.B.5 ([9.d]); Laub, ¶286.

POSITAs would have had several reasons to use Watanabe's database and DBMS teachings in order to achieve Takane's system by organizing distortion correction parameters by image size, lens, focal length, and zoom position in tables comprising a database, then identifying and retrieving parameters, and providing them to Takane's distortion correction circuits to correct distortion, because Watanabe demonstrates these techniques were conventional. Laub, ¶¶287-289. .

Using Watanabe's database and DBMS teaching was within the POSITA's ordinary skill and would have benefited Takane in the same manner as Watanabe. Laub, ¶¶290-291; *KSR*, 550 U.S. at 417. POSITAs would have had a reasonable expectation of success because Watanabe demonstrates that storing correction parameters in a database and DBMS software retrieving parameters from the database were conventional. Laub, ¶292.

In the combination of Takane in view of Watanabe, Takane is modified with the table teachings of Watanabe (database) to organize and store parameters for optical distortion correction for each image size, lens, focal length, and zoom position in Takane's ROM 22 for simplified and streamlined access. Laub, ¶293.

Takane’s software—a “control routine” (Takane, [0028]) and a “dynamic image photographing processing... sub-routine” (Takane, [0030])—retrieves parameters from the database and loads them into the distortion correction circuits based on the image size, lens, focal length, and zoom position at the time of image capture. Laub, ¶¶294-295.

B. Claim 9

1. Limitation [9.PRE]

9.PRE	A digital imaging system for image filtration comprising:
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If [9.PRE] is limiting Takane+Watanabe meets it because Takane describes a digital photographing device that performs filtration by correcting optical distortion by digital signal processing on images captured by “dynamic image photographing in which continuous results of photographing by the CCD... are outputted.” Takane, [0041]; *id.*, [0006], [0011], [0014], [0017]; Laub, ¶¶297-299. Takane corrects optical image aberrations in a digital images as explained *infra* §§VIII.B.2-VIII.B.11 (limitations [9.a]-[9.j]).

2. Limitation [9.a]

9.a	a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a [DSP], an [ASIC], system software, a database management system and a memory storage sub-system;
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Takane+Watanabe meets [9.a] as shown below.

a. “digital camera mechanism”

Takane describes a “digital photographing device.” Takane, [0015], [0041]-[0042]; Laub, ¶¶300-301. The digital camera captures digital images. Takane, [0015], [0034], [0041], [0102], [0105]; Laub, ¶277.

b. “optical lens mechanism”

Takane describes an “optical unit 12” that “is structured as a zoom lens whose focal length can be changed[.]” Takane, [0038]; limitation [9.b]; Laub, ¶¶302-304.

c. “digital sensor”

Takane captures digital images using a CCD, which it digitizes to provide digital image data. Takane, [0033], [0035], [0039], [0041]-[0042], [0044], Fig. 1 (CCD 14, A/D 30); EX1001, 2:41-50 (CCD is digital sensor); Laub, ¶¶305-306.

d. “a microprocessor, a [DSP], an [ASIC]”

Takane’s “main controlling section 24” is “includes CPU 48 and image processing circuit 46, which further includes signal processing circuits 50, 52, 54 and distortion correction circuits 56, 58. Takane, [0036]; *id.*, [0035], Figs. 1 (control section 24, CPU 48, image processing circuit 46), Fig. 2 (image processing circuit 46 detail); Laub, ¶¶307-311. As discussed *supra* §IV.B, PO concedes that it is known that “a microprocessor is a CPU that controls the computing functions of the camera.” Takane describes a CPU that controls functions of its digital camera. *See, e.g.*, Takane [0028] (“a CPU of the digital

camera”), [0035] (“CPU 48 serving as a control section”), [0072] (“CPU 48 governs the operations”). Therefore, Takane describes a microprocessor. Furthermore, a microprocessor is an obvious implementation of a CPU. Laub, ¶311.

A DSP is a signal processing circuit. *Supra* §VI.B.2.d (Ground 1 limitation [9.a]); Laub, ¶307. Takane does not describe how distortion correction circuits 56 or 58 are implemented, leaving the decision to the POSITA. Laub, ¶¶312-313. POSITAs would have had reasons to use a DSP to implement circuits 50, 52, 54, 56, and 58, with a reasonable expectation of success, because DSPs were designed and routinely used for digital signal processing—including image processing—and Takane describes circuits 50, 52, 54, 56, and 58 as providing digital signal processing. *Supra* §VI.B.2.d (Ground 1, [9.a], discussing DSP); Takane, [0043]-[0047], [0050], [0054]-[0059], [0078]; Laub, ¶¶314-320.

POSITAs would have understood that using a DSP for distortion correction in circuits 56 and 58 would at least advantageously provide greater flexibility for such functions as explicitly suggested as within the scope of the invention. Takane, [0133]. Thus, a POSITA would recognize the benefits of DSP implementation to leverage the programmability of the DSP to apply different correction circuit options as explicitly taught by Takane. *Id.*

An ASIC is known to offload labor-intensive operations of a system whereby its higher speed hardware switching operation may be leveraged for repetitive tasks such as aberration correction. For example, as shown in EX1079, 6:58-62, 21:54-57, 25:7-13, DSPs, processors, and ASICS were known for implementing FFT operations such as those of the '805 patent. DSPs provide upgrade benefits as compared to ASICs based on software programming while the dedicated hardware of ASICs is better suited to repetitive labor-intensive tasks to consume less power. EX1081, 7:48-8:23. For these reasons, ASICs were known image processing component of correction schemes. EX1080, 9:28:47, 17:45-67, 24:48-25:3, 25:51-57. A POSITA understood that ASICs relieved other processing elements of an image processing system of labor-intensive image processing tasks and were faster and consumed less power for repetitive tasks—important to handheld devices such a digital camera.

Furthermore, as discussed *supra* §IV.B, PO concedes that each of ASICs, microprocessors, and DSPs are known to be used in cameras for image processing and other tasks. EX1026, 154-155.

Accordingly, it would have been obvious to implement an ASIC and DSP in combination with a CPU/microprocessor. POSITAs would have had a reasonable expectation of success of implementing this combination because microprocessors, DSPs, and ASICs were available in commercial off-the-shelf components routinely

used for image processing. Implementing Watanabe's system with any combination of microprocessors, DSPs, or ASICs was well-within the POSITA's ordinary skill. Laub, ¶319.

Thus, Takane's control section 24 including one or more DSPs implementing image processing circuit 46 meets [9.a]. Laub, ¶320.

e. "system software"

Takane's digital camera includes external ROM 22 that stores "programs... in advance[.]" Takane, [0033]. Takane's device executes a "control routine" that includes image processing. Laub, ¶321. Takane, [0028], [0030], [0051] (distortion circuits and CPU each connect to a common bus); [0073], [0079] (CPU 48 drives distortion circuit 56); [0100]-[0111], Fig. 2 (bus 60 connects external ROM 22 to CPU 48 and distortion circuits 56); Fig. 3 (step 106), Fig. 5. The stored programs and the routines that Takane's camera executes are "system software" meeting [9.a]. Laub, ¶¶322-323.

f. "a [DBMS]"

In Takane+Watanabe, Takane's microprocessor executes software that accesses a database comprising tables with correction parameters that it provides to the DSP comprising distortion correction circuit 56. *Supra* §VIII.A (discussing combination). The software accessing the database is a DBMS. *Id.*; *supra* §VI.B.2.f (discussing DBMS); Laub, ¶¶325-327. The database contains

parameters for correcting optical distortion. *Supra* §VIII.A; *infra* §VIII.B.3 ([9.d]); Laub, ¶328. Thus, Takane+Watanabe provides a “a [DBMS].” Laub, ¶329.

g. “memory storage sub-system”

Takane describes “storing section 20” comprising SRAM or SDRAM, under control of memory control circuit 36. Takane, [0033], [0065], Figs. 1, 2; Laub, ¶¶330-331.

3. Limitation [9.b]

9.b	wherein the aberrations from the optical lens mechanism are corrected by applying digital filtration by using the [ASIC] and the [DSP];
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Takane+Watanabe meets [9.b] because Takane’s first distortion correction circuit 56 comprising a DSP (*supra* §VIII.B.2.d ([9.a])) corrects optical distortion in the image data using the polynomial parameters relating to distortion based on the particular lens and focal length used for the image capture. Takane, [0054]-[0062], [0100]-[0102]; *supra* §VIII.A (discussing combination); Laub, ¶332. Takane describes determining the image before correction using nearest-neighbor or bi-linear interpolation and a multidimensional function parameterized by the coefficients associated with the lens focal length (Takane, [0056]-[0057]), then correcting optical distortion by “making the pixel data... into pixel data of the coordinates (x, y) in the image after correction.” Takane, [0058]; Laub, ¶333. This process applies “digital filtration” of [9.b]. Laub, ¶¶334-335. As discussed *infra*

§VIII.B.5 with respect to [9.d], Takane identifies “specific corrections” that are used to correction these “specific optical aberrations.”

To the extent an ASIC is not taught by Takane’s general processing disclosure, a POSITA would recognize the benefit of modifying Takane for the DSP to employ an ASIC for labor intensive, repetitive tasks such as digital filtration. *Supra* §VI.B.2.d.i. Laub, ¶¶336-337.

4. Limitation [9.c]

9.c	wherein the microprocessor is used to provide digital and optical data to the [DSP];
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Takane+Watanabe meets [9.c] because Takane’s CCD captures images. Takane, [0041]; Laub, ¶339. Takane’s A/D converter digitizes the images and sends them to the CPU (“microprocessor”), which then passes them to signal processing circuit 50, dynamic image signal processing circuit 52, and first distortion correction circuit 56, which comprise a DSP. *Supra* §VIII.B.2.d ([1.a]), Takane, [0042]-[0045], [0053]. Figs. 1, 2; Laub, ¶338. This meets [9.e]. Laub, ¶338.

Takane meets provides “optical data” because Takane’s DSP has “correction sections correcting optical distortion included in the digital image data,” which corresponds to optical data for images. Laub, ¶340.

5. Limitation [9.d]

9.d	wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;
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In Takane+Watanabe, Takane's microprocessor executes software that accesses a database comprising tables with correction parameters that it provides to the DSP comprising distortion correction circuit 56, in order to identify "specific corrections to the [optical] aberrations," and therefore also identifies "specific optical aberrations" *Supra* §VIII.A (discussing combination). Laub, ¶¶341-347. The database contains parameters for correcting optical distortion. *Supra* §VIII.A; *infra* §VIII.B.5 ([9.d]); Laub, ¶¶342-344.

Takane's "main controlling section 24" is the microprocessor that includes CPU 48 and image processing circuit 46, with first distortion correction circuit 56. *Supra* §VIII.B.2.d. Takane's microprocessor executes software (*supra* §VIII.B.2.e ([9.a] "system software")) that identifies "parameters which are peculiar to the predetermined image size... at the time of dynamic image photographing" that have been "stored for each of a plurality of predetermined focal distances." Takane, [0060]; *supra* §VIII.A (describing combination); Laub, ¶¶345, 354.

The '805 specification describes matching a lens type with its aberrations. EX1001, 10:49-51. During child case prosecution, PO argued that "[s]pecific lenses have different types of optical aberration[.]" EX1026, 157. Knowing the

lens type identifies the aberrations for that lens. Takane describes correcting aberrations based on the lens type. Takane's software selects "optimal parameters" for a particular lens, at a particular focal length at the time images are captured, then applies image processing to correct the expression of aberrations across different lenses and focal lengths. Takane, [0060]; Laub, ¶344. This meets [9.d] because it identifies "specific optical aberrations" and their respective "specific corrections" associated with each particular lens, at a particular focal length at image capture. Takane, [0054]-[0059]); Laub, ¶344. Moreover, Takane explains that it was known that every lens has at least "pin cushion" and "barrel distortion" aberrations that are correctable by Takane's method Takane, [0005]; Laub, ¶344.

As discussed *infra* §VIII.B.7 with respect to [9.f], a POSITA would have understood that Takane in view of Watanabe selects a "specific procedure to optimize the image," such as algorithm including a "specific sequence of operations" applied by the DSP. E.g., EX1069 ("Intratater"), 6:37-40; Laub, ¶¶196, 351-352. The POSITA would have further understood that the stored parameters associated with such an algorithm correspond to the "specific corrections" for the identified "specific optical aberrations" of [9.d]. Laub, ¶¶348-356.

Takane's image processing circuit 46, and first distortion correction circuit 56, "carries out predetermined digital signal processing" and corrects optical

distortion on digital images. Takane, [0043], [0100]-[0102], Fig. 3 (step 106), Fig. 5 (step 142); Laub, ¶355. Takane stores correction parameters “in advance” in first distortion correction circuit 56 based on the lens and focal length, then corrects optical distortion in digital images using the correction parameters. Takane, [0054]; Laub, ¶348. Thus, Takane+Watanabe meets [9.d]. Laub, ¶357.

6. Limitation [9.e]

9.e	wherein the system software forwards the data from the digital sensor to the digital processor;
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Takane+Watanabe meets [9.e] because Takane’s CCD captures images. Takane, [0041]; Laub, ¶358. Takane’s A/D converter digitizes the images and sends them to signal processing circuit 50, dynamic image signal processing circuit 52, and first distortion correction circuit 56, which comprise a DSP. *Supra* §VIII.B.2.d ([1.a]), Takane, [0042]-[0045], [0053]. Figs. 1, 2; Laub, ¶358. This meets [9.e]. Laub, ¶359.

7. Limitation [9.f]

9.f	wherein the [DSP] selects a specific procedure to optimize the image and corrects the aberrations;
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A POSITA would have understood that a “specific procedure to optimize the image” may be an algorithm that includes a “specific sequence of operations” applied by the DSP. E.g., EX1069 (“Intratater”), 6:37-40; Laub, ¶196, 360-361.

Takane in view of Watanabe meets [9.f] because its DSP selects an algorithm for correcting aberrations.

Takane does not explain where it stores the multi-dimensional function(s) $F(d)$ that its DSP uses to determine distortion offset, leaving this detail to a POSA. A POSA would have understood that there were two known alternatives: (1) storing the algorithm(s)—as executable code—in the DSP, or (2) storing them in other memory or computer-readable medium and loading them into the DSP as needed. Laub, ¶349. It was known to select and load algorithms from memory to provide particular signal processing (“filtration”) at the DSP. Laub, ¶196, 350 A design choice between two known implementations is obvious.

In Takane in view of Watanabe, a POSA would have understood to store or—at a minimum—identify the DSP filtration algorithm for a particular aberration correction in Watanabe’s database in order to employ the stored parameters (for example as memory offset or look-up address in the database to the algorithm memory location). Laub, ¶205. Thus, Takane’s DSP would “select” the algorithm (“specific procedure”) by accessing the database for information identifying the algorithm (or the algorithm itself) so that it could apply it and correct the aberration. Laub, ¶205. The retrieval option frees the DSP from having to store every aberration correction algorithm used by the system in advance by loading them on an as-needed basis.

Takane+Watanabe meets [9.f] because in the combination Takane’s main controlling section 24—the microprocessor (*supra* §VIII.B.2.d) —uses in-camera software (*supra* §VIII.B.2.e) to access a database to obtain correction parameters associated with the lens and focal length at the time of image capture, which the microprocessor provides to the distortion correction circuit. *Supra* §§VIII.A (discussing combination), VIII.B.2([9.a]), VIII.B.7([9.f]); Takane, [0054]-[0062], [0100]-[0102]; Laub, ¶¶194, 203. The correction parameters “express[] a polynomial which approximates the amount of displacement of the optical distortion.” Takane, [0054]. Constructing this polynomial for each image size and focal length is an algorithm, as is digital filtration that uses that polynomial to interpolate pixel positions and correct distortion. Takane, [0054]-[0060]; Laub, ¶348. The “multidimensional function F(d)” is stored, then provided to the DSP distortion circuit 56 in order to provide the “parameters” that “express the polynomial approximating the amount of displacement of the optical distortion” and enable the filtration algorithm. Laub, ¶348.

Therefore, Takane+Watanabe meets [9.f] because Takane as modified by Watanabe provides a DSP that executes to accesses a database comprising tables with correction parameters that it provides to the DSP comprising distortion correction circuit 56, in order to identify “specific procedure to optimize the

image” that is a correction to an optical aberration. *Supra* §VIII.A (discussing combination); §VIII.B.5 ([9.d]); Laub, ¶360-362.

8. Limitation [9.g]

9.g	wherein the lens type is a zoom lens;
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Takane+Watanabe meets [9.g] because Takane describes a zoom lens as explained *supra* §VIII.B.2.b ([9.a]). Laub, ¶363.

9. Limitation [9.h]

9.h	wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps;
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Takane+Watanabe meets [9.h] because Takane’s “optical unit 12 is structured as a zoom lens whose focal length can be changed[.]” Takane, [0038]; *supra* §VIII.B.2.b ([9.a]); Laub, ¶¶364-365.

10. Limitation [9.i]

9.i	wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files; and
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Takane+Watanabe meets [9.i] because Takane+Watanabe corrects optical image aberrations in images at any focal length by applying corrections from the database using Takane’s first distortion correction circuit 56 comprising a DSP (*supra* §VIII.B.2.d ([9.a])) corrects optical distortion in the image data using the

polynomial parameters relating to distortion based on the particular lens and focal length used for image capture. Takane, [0054]-[0062], [0100]-[0102]; *supra* §VIII.A (discussing combination); Laub, ¶¶366-369. Takane using the correction data from the database across the succession of data files provided to the device by determining the image before correction using nearest-neighbor or bi-linear interpolation and a multidimensional function parameterized by the coefficients associated with the lens focal length (Takane, [0056]-[0057]), then correcting optical distortion by “making the pixel data... into pixel data of the coordinates (x, y) in the image after correction.” Takane, [0058]; Laub, ¶333. This process applies “digital filtration” of [9.i]. Laub, ¶334.

Takane’s “main controlling section 24” is the microprocessor that includes CPU 48 and image processing circuit 46, with first distortion correction circuit 56. *Supra* §VIII.B.2.d. Takane’s microprocessor executes software (*supra* §VIII.B.2.e ([9.a] “system software”)) that identifies “parameters which are peculiar to the predetermined image size... at the time of dynamic image photographing” that have been “stored for each of a plurality of predetermined focal distances.” Takane, [0060]; *supra* §VIII.A (describing combination); Laub, ¶342. Takane’s software selects “optimal parameters” for the focal length and lens at the time images are captured, then applies image processing to correct the optical distortion associated with the lens and focal length. Takane, [0060]; Laub, ¶354. This meets

[9.i] because it identifies “at least one optical image aberration,” e.g., the “pin-cushion” or “barrel” distortion that Takane describes as known to be correctable with its method (Takane, [0005], [0054]-[0059]), for the lens and focal length at image capture. Laub, ¶332, 344, 366.

11. Limitation [9.j]

9.j	wherein the modified data file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.
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Takane+Watanabe meets [9.j] because Takane stores corrected image data in storing section 20. Takane, [0065], [0102]; Laub, ¶370.

C. Claim 24

1. Limitations [24.PRE], [24.a], [24.b], [24.c], [24.e], [24.f], [24.g], [24.i], [24.j], and [24.k]

Takane+Watanabe meets these claim 24 limitations for the same reasons

Takane+Watanabe meets the corresponding limitations in claim 9. Laub, ¶372.

Limitation	Corresponding Limitation	Discussion
[24.PRE]	[9.PRE]	VIII.B.1
[24.a]	[9.a]	VIII.B.2
[24.b], [24.i]	[9.b]	VIII.B.3
[24.c]	[9.g], [9.h]	VIII.B.8, VIII.B.9
[24.e]	[9.e]	VIII.B.6
[24.f]	[9.c]	VIII.B.4
[24.g]	[9.d]	VIII.B.5
[24.j]	[9.i]	VIII.B.10
[24.k]	[9.j]	VIII.B.11

While [24.i] recites “correct digital or optical aberrations,” the digital and optical aberrations are joined by the disjunctive “or,” and thus Takane+Watanabe meets [24.i] by correcting optical aberrations as described above with respect to [9.b].

Takane+Watanabe meets the remaining limitations in claim 24 as follows.

2. Limitation [24.d]

24.d	creating data files corresponding to each focal length lens setting;
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Takane+Watanabe meets [24.d] because Takane’s microprocessor executes software (*supra* §VIII.B.2.e ([9.a] “system software”)) that identifies “parameters which are peculiar to the predetermined image size... at the time of dynamic image photographing” that have been “stored for each of a plurality of predetermined focal distances.” Takane, [0060]; *supra* §VIII.A (describing combination); Laub ¶373.

Watanabe describes selecting corrections based on lens, focal length, and zoom position from the database, so these files are created prior to image processing. JP-872, [0007]; Watanabe, [0049]. Laub, ¶374.

3. Limitation [24.h]

24.h	selecting a specific procedure from the database using the microprocessor to optimize the image and correct the aberrations;
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Takane+Watanabe meets [24.h] because Takane’s “main controlling section 24” including a CPU 48 (of which a “microprocessor” is an implementation as explained *supra* §VIII.B.2.d), the control section 24 also including image processing circuit 46, with first distortion correction circuit 56. *Supra* §VIII.B.2.d. Takane’s microprocessor executes software (*supra* §VIII.B.2.e ([9.a] “system software”)) that identifies “parameters which are peculiar to the predetermined

image size... at the time of dynamic image photographing” that have been “stored for each of a plurality of predetermined focal distances.” Takane, [0060]; *supra* §VIII.A (describing combination); Laub, ¶¶375-376. Takane’s software selects “optimal parameters” for the focal length and lens at the time images are captured. Takane, [0060]; Laub, ¶295.

IX. GROUND 4: TAKANE IN VIEW OF WATANABE IN VIEW OF RUSS RENDERS OBVIOUS CLAIMS 1-3, AND 18-20

A. Claim 1

1. Limitations [1.PRE], [1.a], [1.c], [1.d], [1.e], [1.f], [1.g], and [1.k]

Takane+Watanabe meets these claim 1 limitations for the same reasons

Takane+Watanabe meets the corresponding limitations in claim 9. Laub, ¶¶377-382, 384.

Limitation	Corresponding Limitation	Discussion
[1.PRE]	[9.PRE]	VIII.B.1
[1.a]	[9.a]	VIII.B.2
[1.c]	[9.b]	VIII.B.3
[1.d]	[9.c]	VIII.B.4
[1.e]	[9.d]	VIII.B.5
[1.f]	[9.e]	VIII.B.6
[1.g]	[9.f]	VIII.B.7
[1.k]	[9.j]	VIII.B.11

Takane+Watanabe meets the remaining limitations in claim 1 as follows.

2. Limitation [1.b]

1.b	wherein the optical lens mechanism is a fixed focal length;
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Takane+Watanabe teaches an optical lens mechanism. Watanabe at [0036]. FIG. 3 shows that the lens type is saved in the process information. Watanabe at FIG. 3. This suggests to a POSITA that the lens is interchangeable and can accept a fixed focal length lens. Laub, ¶385.

3. Limitation [1.h]

1.h	wherein the data are forwarded from the digital sensor to the [DSP] by an [ASIC];
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Takane in view of Watanabe meets [1.h]. As discussed *supra* §VIII.B.6 with respect to [9.e], Takane's CCD captures images. Takane, [0041]; Laub, ¶386. Takane's A/D converter digitizes the images and sends them to signal processing circuit 50, dynamic image signal processing circuit 52, and first distortion correction circuit 56, which comprise a DSP. *Supra* §VIII.B.2.d ([1.a]), Takane, [0042]-[0045], [0053]. Figs. 1, 2; Laub, ¶358. This meets [9.e]. Laub, ¶386.

To the extent an ASIC is not taught by Takane's general processing disclosure, a POSITA would recognize the benefit of modifying Takane for the DSP to employ an ASIC for labor intensive, repetitive tasks such as digital filtration. *Supra* §VI.B.2.d.i. Laub, ¶387.

4. Limitation [1.i]

1.i	wherein the [DSP] applies a fast Fourier transform to a data file in order to satisfy a user specified special effects function;
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As discussed *supra* §VII.C.4, claim 1 does not require that the “image” in which an aberration is corrected also be processed for special effects. In any event, even if claim 1 was construed to require that the special effects function was applied to the same as the image in which an aberration is corrected, Takane in view of Watanabe in view of Russ renders obvious this construction. Laub, ¶388.

Watanabe teaches that its processes can be implemented by a user. Watanabe at [0041] (explaining that the camera has buttons for selecting functions, configuring settings, carrying out a function by operation, and “other functions according to each operation mode”); [0083] (teaching that the photographer can select desired entry contents from the display). In Watanabe, “the digital signal processing circuit 56 sorts out image data inputted from the A/D converter 55 into color-difference data and brightness data and executes various processing.” Watanabe at [0038]. Laub, ¶¶389-390.

Russ also teaches that user applied special effects may be executed through a fast Fourier transform. Russ at “Introduction” (providing image processing tools “so that the user of computer-based systems can ... understand those methods provided in packaged software.”), 277 (“applying computer methods to images for

purposes of enhancement”), 312 (“The . . . filter can be constructed either manually or automatically.”), 305 (“The transform of this image is then processed by smoothing and leveling, and then thresholded to locate the peaks. The inverse of this mask is then smoothed and multiplied by the frequency transform of the original image to produce the filtered result.”), 334 (“Thresholds may be set interactively by a user watching the image and using a colored overlay to show the result of turning a knob or otherwise adjusting the settings. . . . [T]he user may adjust virtual sliders or mark a region on a histogram to select the range of brightness values.”). Laub, ¶391. As discussed *supra* §VII.C.4, a POSITA would find it obvious to use a fast Fourier transform to satisfy special effects function, such as smoothing or sharpening, noise reduction, deblurring, or enhancement, in order to enhance an image. Laub, ¶391.

5. Limitation [1.j]

1.j	wherein the [DSP] modifies the data file by applying the special effects function; and
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In Watanabe, “the digital signal processing circuit 56 sorts out image data inputted from the A/D converter 55 into color-difference data and brightness data and executes various processing.” Watanabe at [0038]. A special effects functions would be applied in the digital signal processing circuit 56 as well. Laub, ¶392.

As discussed *supra* §VII.C.5, a POSITA would find it obvious to apply a special effects function because viewers prefer special effects functions, such as white balance or other adjustments, that makes colors appear more realistic or enhanced. *Supra* §VII.D; EX1035 (“Dorrell ”), [0003], [0025], [0145]-[0146]; EX1053, 343; Laub, ¶¶393-394.

B. Claim 2

2.PRE	The system of claim 1:
2.a	wherein the special effects function is a color enhancing function.

Takane+Watanabe meets claim 1 (*supra* §IX.A).

In Watanabe, “the digital signal processing circuit 56 sorts out image data inputted from the A/D converter 55 into color-difference data and brightness data and executes various processes.” Watanabe at [0038]; Laub, ¶397. A POSITA would understand that Watanabe would also implement user selected color enhancing special effects. Watanabe at [0041] (explaining that the camera has series of buttons for selecting a function, configuring settings, displaying guidance on a screen, carrying out a function by operation, and “other functions according to each operation mode”); [0083] (teaching that the photographer can select desired entry contents from the display). *See Also supra* §VII.D; Laub, ¶399.

Russ carries out color enhancement. Russ teaches that FFT is used on images to adjust color features. Russ at p. 277 (“applying computer methods to

images for purposes of enhancement”), 308-09 (“[C]olored halftone prints are typically made using cyan, magenta, yellow, and black inks, with each color having a halftone screen oriented at a different angle. The procedure required is to separate the color channels, process each one, and then recombine them ... A top hat filter was applied to the Fourier transform power spectrum from each channel to select the noise peaks, which were then removed. Recombining the resultant color channel images produces the result shown.”), 305 (“The transform of this image is then processed by smoothing and leveling, and then thresholded to locate the peaks. The inverse of this mask is then smoothed and multiplied by the frequency transform of the original image to produce the filtered result.”), 334 (“Thresholds may be set interactively by a user watching the image and using a colored overlay to show the result of turning a knob or otherwise adjusting the settings. . . . [T]he user may adjust virtual sliders or mark a region on a histogram to select the range of brightness values.”). Laub, ¶¶396, 398-399.

C. Claim 3

3.PRE	The system of claim 1:
3.b	wherein the special effects function is a diffusion function of soft effect.

Takane+Watanabe meets claim 1 (*supra* §IX.A).

Watanabe performs “various processing.” Watanabe at [0038]. Laub, ¶401
 Russ teaches that FFT is used to soften image features, particularly using a low-

pass filter. Russ at p. 301-03 (“Butterworth low-pass filters with radii of 10 and 25 pixels in the frequency-domain image smooths the noise with some blurring of the high-frequency detail.”), 286 (explaining that removing unwanted information in the frequency domain naturally leads to visually smooth filtering). Laub, ¶¶402-403. See Also *surpa* §VII.E, Laub, ¶403.

D. Claim 18

1. Limitations [18.PRE], [18.a], [18.b], [18.d], [18.e], [18.g], and [18.j]

Takane+Watanabe+Russ meets these limitations of claim 18 for the same reasons Takane+Watanabe meets the corresponding limitations in claim 9. Laub, ¶405.

Limitation	Corresponding Limitation	Discussion
[18.PRE]	[9.PRE]	VIII.B.1
[18.a]	[9.a]	VIII.B.2
[18.b], [18.g]	[9.b]	VIII.B.3
[18.d]	[9.c]	VIII.B.4
[18.e]	[9.d]	VIII.B.5
[18.j]	[9.j]	VIII.B.11

While [18.g] recites “correct digital or optical aberrations,” the digital and optical aberrations are joined by the disjunctive “or,” and thus Takane+Watanabe meets [18.g] by correcting optical aberrations as described above with respect to [9.b]. Laub, ¶406.

Takane+Watanabe+Russ meets the remaining limitations in claim 18 as follows.

1. Limitation [18.c]

[18.c]	forwarding the data from a digital sensor to a [DSP] by an [ASIC];
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Takane+Watanabe meets [18.c] for the same reason it meets limitation [1.h] *supra* §IX.A.3. Laub, ¶¶407-408.

2. Limitation [18.f]

[18.f]	selecting a specific procedure from the database using the microprocessor to optimize the image and correct the aberrations: [sic]
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Takane+Watanabe meets [18.f] for the same reason it meets limitation [24.h] *supra* §VIII.C.3. Laub, ¶¶409-410.

3. Limitation [18.h]

[18.h]	applying a fast Fourier transform to a data file in order to satisfy a user specified special effects function;
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Takane+Watanabe+Russ meets [18.h] for the same reason it meets limitation [1.i] *supra* §IX.A.4. Laub, ¶411.

4. Limitation [18.i]

[18.i]	modifying the data file by applying the special effects function using the [DSP]; and
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Takane+Watanabe+Russ meets [18.i] for the same reason it meets limitation [1.j] *supra* §IX.A.5. Laub, ¶412.

E. Claim 19

19.PRE	The method of claim 18 further comprising the step of:
19.a	applying the special effects function as a color enhancing function.

Takane+Watanabe meets claim 18 (*supra* §IX.D).

Watanabe+Takane+Russ meets [19.a] for the same reason it meets [2.a] *supra* §IX.B. Laub, ¶¶414-415.

F. Claim 20

20.PRE	The method of claim 18 further comprising the step of:
20.a	applying the special effects function as a diffusion function of soft effect.

Takane+Watanabe meets claim 18 (*supra* §IX.D).

Watanabe+Takane+Russ meets [20.a] for the same reason it meets [3.a] *supra* §IX.C. Laub, ¶¶417-418.

X. NO BASIS FOR DISCRETIONARY DENIAL

A. *Fintiv*

1. Stay Potential

While Petitioner will seek pre-institution stay, without “specific evidence” how the court will rule this factor is neutral. *Sand Revolution II v. Continental Intermodal Group–Trucking*, IPR2019-01393, Paper 24.

2. Trial Timing

Petitioner filed this Petition before the district court has held an initial scheduling conference, so Factor 2 weighs against denial. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11.

FWD can be expected in November 2025. Sony was served with the complaint on May 13. It has not answered or filed any motion (EX1038), and the court has not set a trial date. While the median-time-to-trial is 21.4 months (EX1039), Director's Interim Procedure ("IP") at 3, without accounting for such late service the median-time-to-trial analysis is inapplicable. This weighs against discretionary denial.

3. Litigation Investment

PO filed a complaint, but Petitioner has not answered, filed any motion, and the court has not even held an initial scheduling conference. EX1038. This weighs against denial.

4. Issue Overlap

Sony challenges 8 claims, while in the Litigation PO only asserts claims 1 and 9. EX1037, ¶¶18-41. Challenging claims the district court will not address weighs against denial.

5. Litigation Defendants

Petitioner is a district court defendant, which "is far from an unusual circumstance." *Sand Revolution II*, Paper 24, 12-13. This factor is neutral.

6. Other Considerations

Ground 1 shows that a single reference renders claims 9 and 24 unpatentable. The Petition's "strong showing on the merits" (*supra* §§VI-IX) weighs against denial.

7. Compelling Evidence

If the Board finds Factors 1-5 favor denial then the Grounds provide "compelling evidence" of unpatentability. The Petition demonstrates the prior art teaches the Challenged Claims—in some cases via a single reference—while dependent claims simply add well-known aberration types to the base claim. E.g., *supra* §VI.B (Ground 1).

B. Section 325(d) discretionary denial is unwarranted.

Discretionary denial is unwarranted because the Office never considered the patentability of Challenged Claims over Watanabe (Ground 1) or Watanabe in combination with any other reference (Grounds 2-4), or art substantially similar thereto, failing *Advanced Bionics* step one.

XI. CONCLUSION

The Board should institute review and cancel claims 1-3, 9, 18-20, and 24.

Respectfully submitted,
Sony Corporation

Date: May 20th 2024

By: /Scott A. McKeown/
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APPENDIX A: U.S. PATENT NO. 7,612,805 CLAIM LIST

Ref	Limitation
1.PRE	A digital imaging system for image filtration comprising:
1.a	a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;
1.b	wherein the optical lens mechanism is a fixed focal length;
1.c	wherein the aberrations from the optical lens mechanism are corrected by applying digital filtration by using the application specific integrated circuit and the digital signal processor;
1.d	wherein the microprocessor is used to provide digital and optical data to the digital signal processor;
1.e	wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;
1.f	wherein the system software forwards the data from the digital sensor to the digital processor;
1.g	wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;
1.h	wherein the data are forwarded from the digital sensor to the digital signal processor by an application specific integrated circuit;
1.i	wherein the digital signal processor applies a fast Fourier transform to a data file in order to satisfy a user specified special effects function;
1.j	wherein the digital signal processor modifies the data file by applying the special effects function; and
1.k	wherein the modified data file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.
2.PRE	The system of claim 1:
2.a	wherein the special effects function is a color enhancing function.
3.PRE	The system of claim 1:
3.b	wherein the special effects function is a diffusion function of soft effect.
9.PRE	A digital imaging system for image filtration comprising:
9.a	a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;

Ref	Limitation
9.b	wherein the aberrations from the optical lens mechanism are corrected by applying digital filtration by using the application specific integrated circuit and the digital signal processor;
9.c	wherein the microprocessor is used to provide digital and optical data to the digital signal processor;
9.d	wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;
9.e	wherein the system software forwards the data from the digital sensor to the digital processor;
9.f	wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;
9.g	wherein the lens type is a zoom lens;
9.h	wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps;
9.i	wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files; and
9.j	wherein the modified data file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.
18.PRE	A method of image filtration which comprises
18.a	a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;
18.b	wherein the aberrations from the optical lens mechanism are corrected by applying digital filtration by using the application specific integrated circuit and the digital signal processor, the method consisting of;
18.c	forwarding the data from a digital sensor to a digital signal processor by an application specific integrated circuit;
18.d	providing digital and optical data to the digital signal processor;
18.e	identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations: [sic]
18.f	selecting a specific procedure from the database using the microprocessor to optimize the image and correct the aberrations: [sic]

Ref	Limitation
18.g	applying digital filtration by using the application specific integrated circuit and digital signal processor to correct digital or optical aberrations: [sic]
18.h	applying a fast Fourier transform to a data file in order to satisfy a user specified special effects function;
18.i	modifying the data file by applying the special effects function using the digital signal processor; and
18.j	storing the data file in memory.
19.PRE	The method of claim 18 further comprising the step of:
19.a	applying the special effects function as a color enhancing function.
20.PRE	The method of claim 18 further comprising the step of:
20.a	applying the special effects function as a diffusion function of soft effect.
24.PRE	A method of image filtration comprising:
24.a	a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;
24.b	wherein the aberrations from the optical lens mechanism are corrected by applying digital filtration by using the application specific integrated circuit and digital signal processor, the method consisting of;
24.c	alternating the lens focal length of a zoom lens from specific fixed focal length lens settings in a succession of steps;
24.d	creating data files corresponding to each focal length lens setting;
24.e	forwarding the data from a digital sensor to the digital signal processor;
24.f	providing digital and optical data to a digital signal processor;
24.g	identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;
24.h	selecting a specific procedure from the database using the microprocessor to optimize the image and correct the aberrations;
24.i	applying digital filtration by using the application specific integrated circuit and digital signal processor to correct digital or optical aberrations;
24.j	correcting optical aberrations with digital filtration to modify multiple images from different focal lengths in a succession of data files; and
24.k	storing the modified data files in memory.

CERTIFICATE OF SERVICE UNDER 37 C.F.R. § 42.6 (E)(4)

I certify that on May 20, 2024, I will cause a copy of the foregoing document, including any exhibits or appendices filed therewith, to be served via Overnight FedEx at the following correspondence address of record for the patent:

The Law Office of Michael J. Scheer
5531 Murietta Avenue
Sherman Oaks, CA 91401

Date: May 20, 2024

/MacAulay Rush/
MacAulay Rush
Paralegal
WOLF, GREENFIELD & SACKS, P.C.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24, the undersigned certifies that the foregoing Petition for *Inter Partes* Review contains 13,894 words excluding a table of contents, a table of authorities, Mandatory Notices under § 42.8, a certificate of service or word count, or appendix of exhibits or claim listing. Petitioner has relied on the word count feature of the word processing system used to create this paper in making this certification.

Date: May 20, 2024

/MacAulay Rush/
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