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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/825,521	07/06/2007	Neal Solomon	5311.001US1

CONFIRMATION NO. 6134

144524
The Law Office of Michael J. Scheer
5531 Murietta Avenue
Sherman Oaks, CA 91401

POA ACCEPTANCE LETTER

OC000000069659037

Date Mailed: 03/14/2024

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/08/2024.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/sltorres/

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/825,521	07/06/2007	Neal Solomon	5311.001US1

CONFIRMATION NO. 6134

21186
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

POWER OF ATTORNEY NOTICE

OC000000069658987

Date Mailed: 03/14/2024

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/08/2024.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/sltorres/

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
11/825,521	**02/08/2024 04:00:25 PM Z ET**	**5311.001US1**

Title of Invention

DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	7612805
CONFIRMATION #	6134	FILED BY	Michael Scheer
PATENT CENTER #	64262254	FILING DATE	07/06/2007
CUSTOMER #	21186	FIRST NAMED INVENTOR	Neal Solomon
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1020-1000 Executed US7612805 Power of Attorney.pdf	2	Power of Attorney	165 KB
1020-1000 US7612805 Transmittal letter for Power of Attorney.pdf	1	Transmittal Letter	88 KB
1020-1000 Executed US7612805 Statement under 3.73.pdf	3	Assignee showing of ownership per 37 CFR 3.73	237 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)

1020-1000 Executed US7612805 Power of Attorney.pdf	2C4044EED249CA82005933AA3636DF353F6B32E3D4D396219C2920EA19A59DC6DEFC998F6C452E20D3D056AEBD8C4C1CAE5490515FA31850CC2282F2EA8A1BFA
1020-1000 US7612805 Transmittal letter for Power of Attorney.pdf	7C459E4F3CBB9117D6E1A536820617C9A3F9A082A56572FDCC687751120C0F4448BE6339E2554A4FFD397F7DBA44F2959FF044E84713C4A526073DB03438F224
1020-1000 Executed US7612805 Statement under 3.73.pdf	F6ED43E23698298456A402F6BB17E2081F178245764EFE00D3C1FB87B863ED281E3ECD40739B56BC4D117FB44633E27308493BF761BBED02AA2C7D69B62C5FC8

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: OPTIMUM IMAGING TECHNOLOGIES LLC

Application No./Patent No.: US 7,612,805 Filed/Issue Date: November 3, 2009

Titled: DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION

OPTIMUM IMAGING TECHNOLOGIES, a Limited Liability Company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Neal Solomon To: OPTIMUM IMAGING TECHNOLOGIES

   The document was recorded in the United States Patent and Trademark Office at

   Reel 049584, Frame 495, or for which a copy thereof is attached.

2. From: _____ To: _____

   The document was recorded in the United States Patent and Trademark Office at

   Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

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4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Neal E. Solomon/	2/8/24
Signature	Date
Neal Solomon	Managing Member
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/81A (02-15)
Approved for use through 03/31/2021. OMB 0651-0035
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PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Patent Number	US 7,612,805
Issue Date	November 3, 2009
First Named Inventor	Neal Solomon
Title	DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE
Attorney Docket No.	1020-1000

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith: 144524

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

☒ The address associated with the above-identified Customer Number.

OR

☐ The address associated with the Customer Number identified in the box at right:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the:

☐ Applicant.

OR

☒ Patent owner.

Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on _____.

SIGNATURE of Applicant or Patent Owner

Signature	Neal E. Solomon /	Date	2/8/24
Name	Neal Solomon	Telephone	
Title and Company	Managing Member OPTIMUM IMAGING TECHNOLOGIES LLC		

NOTE: Signatures of all the applicants or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☐ A total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Neal SOLOMON	Patent No.: 7,612,805
Application No.: 11/825,521	Issue Date: November 3, 2009
Filing Date: July 6, 2007	Confirmation No.: 6134
For: DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION	Attorney Docket No.: 1020-1000

TRANSMITTAL OF POWER OF ATTORNEY

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313 - 1450

Sir:

Please find attached a Revocation of Power of Attorney With a New Power of Attorney and Change of Correspondence Address (PTO/AIA/81A). Please also find attached the associated Statement Under 37 CFR 3.73(c) (PTO/AIA/96).

All previous Powers of Attorney have been revoked. It is respectfully requested that the undersigned be recognized as the attorney of record and all future correspondence be directed to the undersigned.

Date: February 8, 2023,

Respectfully submitted,

/ Michael J. Scheer/
Michael J. Scheer, Reg. No. 34,425
The Law Office of Michael J. Scheer PC
Customer No. 144524
818- 616-3363

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:19-cv-246	7/8/2019	Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
Optimum Imaging Technologies LLC	Canon Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,612,805 B2	11/3/2009	Optimum Imaging Technologies LLC
2	8,451,339 B2	5/28/2013	Optimum Imaging Technologies LLC
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

All claims asserted by and between all parties as part of the above-captioned case are hereby DISMISSED WITH PREJUDICE with all attorneys' fees, expenses, and costs of court to be borne by the party incurring the same.

CLERK	(BY) DEPUTY CLERK	DATE
David A. O'Toole	nkl	4/29/21

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY.DOCKET NO./TITLE	REQUEST ID
11/825,521	07/06/2007	Neal Solomon	5311.001US1	137618

Acknowledgement of Loss of Entitlement to Entity Status Discount

The entity status change request below filed through Private PAIR on 04/27/2021 has been accepted.

CERTIFICATIONS:

Change of Entity Status:

X Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be notification of loss of entitlement to small or micro entity status, as applicable.

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Signature:	/Timothy E. Bianchi/
Name:	Timothy E. Bianchi
Registration Number:	39610

Trials@uspto.gov
571-272-7822

Paper 10
Date: March 1, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CANON INC.,
Petitioner,

v.

OPTIMUM IMAGING TECHNOLOGIES LLC,
Patent Owner.

IPR2020-01321
Patent 7,612,805 B2

Before LYNNE E. PETTIGREW, DANIEL J. GALLIGAN, and RUSSELL E. CASS, *Administrative Patent Judges.*

GALLIGAN, *Administrative Patent Judge.*

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

I. INTRODUCTION

A. Background and Summary

Petitioner Canon Inc. filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1–3, 9, 18–20, and 24 of U.S. Patent No. 7,612,805 B2 (Ex. 1001, "the '805 patent"). Patent Owner Optimum Imaging Technologies LLC filed a Preliminary Response. Paper 7 ("Prelim. Resp."). With our authorization, Petitioner filed a Reply (Paper 8) and Patent Owner filed a Sur-reply (Paper 9) directed solely to whether we should exercise our discretion to deny the Petition under 35 U.S.C. § 314(a).

For the reasons that follow, we do not institute an *inter partes* review in this proceeding.

B. Related Matters

The parties indicate that the '805 patent is at issue in *Optimum Imaging Technologies LLC v. Canon Inc.*, No. 2:19-cv-246 (E.D. Tex.)[1] ("the Texas case"). Pet. 1; Paper 4, 2.

Petitioner also filed a petition challenging claims of related U.S. Patent No. 8,451,339 B2 ("the '339 patent"). IPR2020-01322, Paper 1.

C. Real Parties in Interest

The parties identify themselves as the real parties in interest. Pet. 1; Paper 4, 2.

[1] We refer to the United States District Court for the Eastern District of Texas as "the Texas court."

D. The '805 Patent

The '805 patent discloses a system "for the automated correction of optical and digital aberrations in a digital imaging system" that "addresses issues in still and video photography that are presented in the digital imaging environment." Ex. 1001, code (57).

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–3, 9, 18–20, and 24 of the '805 patent are unpatentable on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
9, 24	103(a)[2]	Niikawa[3]
9, 24	103(a)	Niikawa, Kawanishi[4]
1–3, 18–20	103(a)	Niikawa, Russ[5]
9, 24	103(a)	Watanabe[6]
1–3, 18–20	103(a)	Watanabe, Russ

[2] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 103 that became effective after the filing of the application for the '805 patent. Therefore, we apply the pre-AIA version of this section.

[3] Niikawa, US 2002/0135688 A1, published Sept. 26, 2002 (Ex. 1006).

[4] Kawanishi et al., US 2005/0089241 A1, published Apr. 28, 2005 (Ex. 1010).

[5] John C. Russ, *The Image Processing Handbook* (4th ed.) (Ex. 1008).

[6] Watanabe, US 2005/0280877 A1, published Dec. 22, 2005 (Ex. 1007).

II. ANALYSIS

A. Discretionary Denial Under 35 U.S.C. § 314

Institution of *inter partes* review is discretionary. *See Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) ("[T]he agency's decision to deny a petition is a matter committed to the Patent Office's discretion."); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) ("[T]he PTO is permitted, but never compelled, to institute an [*inter partes* review (IPR)] proceeding."); 35 U.S.C. § 314(a) ("The Director *may not* authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." (emphasis added)).

The Board has held that the advanced state of a parallel district court action is a factor that may weigh in favor of denying a petition under § 314(a). *See NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 20 (PTAB Sept. 12, 2018) (precedential); Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), 58 & n.2, *available at* https://www.uspto.gov/TrialPracticeGuideConsolidated ("Trial Practice Guide"). We consider the following factors to assess "whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding":

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;

4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential). In evaluating these factors, we "take[] a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.* at 6.

Analyzing the *Fintiv* factors, Patent Owner argues that we should deny institution based on the advanced state of the Texas case. Prelim. Resp. 1–23; Sur-reply 1–7. Petitioner disagrees. Pet. 3–5; Reply 1–7.

Based on our analysis of the *Fintiv* factors below, we determine that discretionary denial is warranted based on the circumstances presented.

1. Whether the Court Granted a Stay or Evidence Exists that One May Be Granted if a Proceeding Is Instituted

Patent Owner argues this factor favors denial because Petitioner, who is the defendant in the Texas case, represented to the Texas court that Petitioner would not seek a stay if this proceeding were instituted. Prelim. Resp. 4–5 (citing Ex. 2015 (transcript of telephonic status conference with the Texas court), 6:12–21). Based on Petitioner's representation that it will not seek a stay of the Texas case, we agree with Patent Owner that this factor favors denial.

2. Proximity of the Court's Trial Date to the Board's Projected Statutory Deadline for a Final Written Decision

Patent Owner argues that this factor favors denial because the trial in the Texas case is scheduled to begin May 10, 2021, and "is therefore only two months after the Board's deadline for an institution decision in March 2021 and ten months ***before*** the Board's deadline for a final written decision in approximately March of 2022." Prelim. Resp. 5; *see* Ex. 2006, 3 (resetting jury selection in the Texas case from February 1, 2021, to May 10, 2021). Petitioner argues that the trial has already been delayed twice due to COVID-19 and "[t]here is no guarantee that there will not be further delays." Reply 1. Other than pointing to past delays in the district court trial setting, Petitioner offers no evidence showing a likely delay in the current trial setting, and we decline to speculate about whether there may be further delays in the district court.

Because the Texas case's trial date is just over two months from the date of this Decision and, therefore, approximately ten months before the deadline for a final written decision if we were to institute, this factor weighs in favor of exercising discretion to deny institution.

3. Investment in the Parallel Proceeding by the Court and the Parties

Patent Owner argues that the Texas court "and the parties have already made substantial investment in preparation for trial," noting that the Texas court has issued a *Markman* order construing various terms in the '805 patent, that fact and expert discovery have closed, and that the parties have fully briefed dispositive motions. Prelim. Resp. 6 (citing Exs. 1004, 2005, 2007).

Petitioner argues that "there has been no investment in the parallel proceeding with respect to the *prior art issues involved here*." Pet. 4–5 (emphasis added). The inquiry under the third *Fintiv* factor, however, is not limited to considering efforts in the district court concerning the patentability issues raised in a petition. Rather, under factor three, we "consider[] the amount and type of work already completed in the parallel litigation by the court and the parties at the time of the institution decision." *Fintiv*, Paper 11 at 9. For example, *Fintiv* states that "if, at the time of the institution decision, the district court has issued substantive orders related to the patent at issue in the petition, this fact favors denial." *Fintiv*, Paper 11 at 9–10. The Texas court has issued a 60-page claim construction order addressing terms in the '805 patent and in the related '339 patent. Ex. 1004. As Patent Owner correctly points out, the parties have also invested significantly in the Texas case in preparation for the upcoming trial. *See* Prelim. Resp. 6 (discussing the close of fact and expert discovery and the filing of dispositive motions).

In its discussion of factor three, *Fintiv* also addresses the impact of a petitioner's diligence or delay in filing a petition:

> If the evidence shows that the petitioner filed the petition expeditiously, such as promptly after becoming aware of the claims being asserted, this fact has weighed against exercising the authority to deny institution under *NHK*. If, however, the evidence shows that the petitioner did not file the petition expeditiously, such as at or around the same time that the patent owner responds to the petitioner's invalidity contentions, or even if the petitioner cannot explain the delay in filing its petition, these facts have favored denial.

Fintiv, Paper 11 at 11–12.

Petitioner argues that "the primary references [in the Petition] were only uncovered by Petitioner in the last 2 months (which is why the Petition was not filed earlier)." Pet. 4. Patent Owner counters that Petitioner filed the Petition on the last possible day permitted under 35 U.S.C. § 315(b) and that this "delay" is unfair to Patent Owner with the Texas case in its final stages. Prelim. Resp. 7–8. Patent Owner also argues that Petitioner could have found the asserted prior art references earlier with a "reasonably diligent search." Prelim. Resp. 11–17. In their Reply and Sur-reply, Petitioner and Patent Owner dispute whether the prior art asserted in the Petition could have been found earlier with a diligent search. Reply 2–5; Sur-reply 2–5.

We need not speculate as to whether the prior art asserted in the Petition could have been found earlier because Petitioner's explanation as to petition timing misses the mark. As the above-quoted passage from *Fintiv* indicates, this inquiry is directed to ascertaining whether a petitioner acts promptly with respect to activities in the parallel litigation, such as filing a petition "promptly after becoming aware of the claims being asserted." *Fintiv*, Paper 11 at 11. Here, Petitioner did not file a petition "promptly after becoming aware of the claims being asserted" but instead waited until July 2020, over nine months after Patent Owner served infringement contentions in the Texas case on October 1, 2019. Ex. 2003. Petitioner's explanation for the timing of the filing is that the prior art asserted in the Petition "was found in additional analysis undertaken in April-June 2020." Reply 4. Petitioner may have acted promptly after discovering the asserted prior art, but using this as a justification would simply incentivize delaying searching for prior art. Petitioner's focus on the discovery of the particular prior art

asserted in the Petition fails to explain why any petition could not have been filed earlier.

In its Reply, Petitioner does not dispute Patent Owner's contentions as to the parties' and the Texas court's investment in the Texas case. Rather, Petitioner focuses on justifying the timing of the Petition, which we address above. *See* Reply 1–6. As Patent Owner notes, fact and expert discovery in the Texas case have ended, claim construction has occurred, dispositive motions and motions *in limine* have been filed, and the Joint Pretrial Order has been filed. *See* Prelim. Resp. 6 (citing Exs. 1004, 2005, 2006, 2007). Thus, the parties' and the Texas court's investment in the Texas case is substantial, as one would expect with trial scheduled to begin in just over two months.

Based on the foregoing, we determine that this factor weighs in favor of exercising discretion to deny institution.

4. Overlap Between Issues Raised in the Petition and in the Parallel Proceeding

"[I]f the petition includes the same or substantially the same claims, grounds, arguments, and evidence as presented in the parallel proceeding, this fact has favored denial." *Fintiv*, Paper 11 at 12. "Conversely, if the petition includes materially different grounds, arguments, and/or evidence than those presented in the district court, this fact has tended to weigh against exercising discretion to deny institution under *NHK*." *Id.* at 12–13.

Petitioner argues that trial in the Texas case "will not resolve the issues before the Board here inasmuch as neither the same nor similar invalidity challenges are at issue." Pet. 4. Patent Owner counters that, although "Petitioner does not assert the exact same prior art references here,

the asserted prior art references in the Petition are substantially the same as those in the district court litigation." Prelim. Resp. 18. In particular, Patent Owner contends that the prior art references asserted in the Petition are similar to Kishida (Ex. 2017), on which Petitioner relies in the Texas case. Prelim. Resp. 19–21.

With its Reply, Petitioner submitted a stipulation that it filed in the Texas case stating that, "if the Patent Trial and Appeal Board institutes *inter partes* review on IPR2020-01321, then Canon will not assert invalidity in this litigation against any claim of the '805 Patent based on JP2004-343358 ('Kishida') alone or in combination with any other reference." Ex. 1050, 1. Based on the stipulation, Petitioner asserts that "none of the IPR grounds themselves, the references used therein, or Kishida would be before the district court" and, therefore, that "[t]his fact alone causes factor 4 to weigh in [Petitioner]'s favor." Reply 6–7 (citing *Sand Revolution II, LLC v. Cont'l Intermodal Grp. – Trucking LLC*, IPR2019-01393, Paper 24 at 11–12 (PTAB June 16, 2020) (informative); *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 19 (PTAB Dec. 1, 2020) (precedential in part)).

Petitioner's stipulation, which only addresses invalidity defenses based on Kishida, is not as broad as the *Sotera* stipulation, in which the petitioner stated that it would not pursue any ground "that was raised or could have been reasonably raised in an IPR (i.e., any ground that could be raised under §§ 102 or 103 on the basis of prior art patents or printed publications)." *Sotera*, Paper 12 at 18–19 (emphasis omitted). Rather, Petitioner's stipulation is more similar in scope to the one in *Sand Revolution*, Paper 24 at 11–12. In that decision, a panel of the Board found that "this factor weighs marginally in favor of not exercising discretion to deny institution" and noted that a broader stipulation "might have tipped this

factor more conclusively in [the petitioner's] favor." *Sand Revolution*, Paper 24 at 12 & n.5.

Petitioner's stipulation mitigates to some degree concerns about overlapping issues between this proceeding and the Texas case. Therefore, we find that this factor weighs marginally against exercising discretion to deny institution.

5. Whether the Petitioner and the Defendant in the Parallel Proceeding Are the Same Party

Petitioner is the defendant in the Texas case. Therefore, this factor favors exercising discretion to deny institution.

6. Other Circumstances that Impact the Board's Exercise of Discretion

Petitioner argues that "the merits weigh in favor of institution given the strength of the grounds presented and developed below" (Pet. 5), while Patent Owner argues that "the Petition's Grounds are very weak" (Prelim. Resp. 22).

As discussed above, with the exception of factor 4, the other *Fintiv* factors favor denying institution. We have reviewed Petitioner's unpatentability arguments and Patent Owner's arguments in response, and based on the limited record before us, we do not view this as a case where this one factor would outweigh the other *Fintiv* factors favoring denial of institution.

7. Holistic Assessment of Fintiv *Factors*

We consider the above factors and take "a holistic view of whether efficiency and integrity of the system are best served by denying or

instituting review." *Fintiv*, Paper 11 at 6. As discussed above, the Texas case is scheduled to go to trial in just over two months and approximately ten months before the deadline for a final written decision if we were to institute (factor 2), and the Texas court and the parties in the Texas case, which are the same parties in this proceeding (factor 5), have invested substantially in the Texas case in preparation for trial (factor 3). Furthermore, Petitioner has represented to the Texas court that it will not request a stay of the Texas case (factor 1). These factors, taken together, outweigh the remaining considerations discussed in factors 4 and 6. Thus, we determine that the facts presented weigh in favor of exercising discretion to deny institution in this instance.

III. CONCLUSION

Taking into consideration the arguments in the Petition, the Preliminary Response, the Reply, the Sur-reply, and the evidence of record, we exercise our discretion to deny institution under 35 U.S.C. § 314(a).

IV. ORDER

In consideration of the foregoing, it is hereby

ORDERED that the Petition is denied and no *inter partes* review is instituted in this proceeding.

FOR PETITIONER:

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AO 120 (Rev. 08/10)

TO:	Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:19-cv-246	7/8/2019	Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
Optimum Imaging Technologies LLC	Canon Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,612,805 B2	11/3/2009	Optimum Imaging Technologies LLC
2	8,451,339 B2	5/28/2013	Optimum Imaging Technologies LLC
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/825,521	07/06/2007	Neal Solomon	5311.001US1

CONFIRMATION NO. 6134

21186
SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

POA ACCEPTANCE LETTER

OC000000107828828

Date Mailed: 05/02/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/29/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/cnguyen/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Neal Solomon	Patent No.: 7,612,805
Serial No.:	11/825,521	Issue Date: November 3, 2009
Filed:	July 6, 2007	Docket: 5311.001US1
Customer No.	21186	Confirmation No.: 6134
Title:	DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION	

REVOCATION AND POWER OF ATTORNEY
&
CHANGE OF CORRESPONDENCE ADDRESS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In accordance with 37 C.F.R. Section 1.36, M.P.E.P. Section 402.05 and 402.07, please revoke any existing Powers of Attorney, if any, and appoint the following attorneys and/or patent agents to prosecute this application and to transact all business in the Patent and Trademark Office in connection therewith:

Customer Number: 21186

Please direct all correspondence in this case to:

Schwegman Lundberg & Woessner, P.A.
Customer No. 21186

Date 4/24/19

By Neal Solomon
Name: Neal Solomon
Title: Applicant/Inventor

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Neal Solomon
Title: DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION

Docket No.:	5311.001US1	Serial No.:	11/825,521
Filed:	July 6, 2007	Due Date:	N/A
Examiner:	Usman Khan	Group Art Unit:	2622
Customer No.:	21186	Confirmation No.:	6134

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

X Revocation and Power of Attorney & Change of Correspondence Address (1 pg.)

If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
Customer No.: 21186

By: /Timothy E. Bianchi/
Timothy E. Bianchi
Reg. No. 39,610

Electronic Acknowledgement Receipt

EFS ID:	35861614
Application Number:	11825521
International Application Number:	
Confirmation Number:	6134
Title of Invention:	DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION
First Named Inventor/Applicant Name:	Neal Solomon
Correspondence Address:	Neal Solomon - P O Box 21297 - Oakland CA 94620 US 4154335400 -
Filer:	Timothy J. Christman/Mandy Brown
Filer Authorized By:	Timothy J. Christman
Attorney Docket Number:	
Receipt Date:	29-APR-2019
Filing Date:	06-JUL-2007
Time Stamp:	15:52:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		5311_001US1_RPOA_signed.pdf	163681 84b51ebbf8abbd04cb2aa364e8c2eae40378e7c6	yes	2

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Power of Attorney	2	2
Miscellaneous Incoming Letter	1	1

Warnings:	
Information:	
Total Files Size (in bytes):	163681

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	07/06/2007	Neal Solomon		6134

7590 06/23/2017

Neal Solomon
P O Box 21297
Oakland, CA 94620

EXAMINER
KHAN, USMAN A

ART UNIT	PAPER NUMBER
2622	

MAIL DATE	DELIVERY MODE
06/23/2017	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Patent No.: 7,612,805	:	
Issue Date: November 3, 2009	:	
Application No.: 11/825,521	:	ACKNOWLEDGMENT OF LETTER
Filed: July 6, 2007	:	
Title: DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION	:	

This is an acknowledgement of the letters filed May 16, 2017 and June 5, 2017 regarding the decision mailed March 28, 2017 granting the petition under 37 CFR § 1.182, filed February 24, 2017, to expedite consideration of the petition to accept the unintentionally delayed payment of a maintenance fee under 37 CFR § 1.378(b) filed February 21, 2017 and granting the petition under 37 CFR § 1.378(b), filed February 21, 2017, to accept the unintentionally delayed payment of a maintenance fee for the above-identified patent.

The letters filed May 16, 2017 and June 5, 2017 have been made of record. Any relief being sought in the letters filed May 16, 2017 and June 5, 2017 has already been granted in the decision mailed March 28, 2017.

Telephone inquiries concerning this matter may be directed to Vanitha Elgart at 571.272.7395.

/VANITHA ELGART/
Vanitha Elgart
Petitions Examiner
Office of Petitions

Office of Petitions: Routing Sheet



Application No. 11/825,521

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

☐ **GRANTED**

☒ **DISMISSED**

☐ **DENIED**

Office of Petitions: Decision Count Sheet

Mailing Month

Application No. 11825521

11825521

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: ELGART, VANITHA

Count (1) - Palm Credit 11/825,521

Decision: DISMISSED

FINANCE WORK NEEDED
☐ Select Check Box for YES

DISMISSED

Decision Type: 518 - 37 CFR 1.182 REQUEST FOR EXPEDITED CONSID

518

Notes:

Count (2)

Decision: DISMISSED

FINANCE WORK NEEDED
☐ Select Check Box for YES

DISMISSED

Decision Type: 599 - MISC. OUTGOING CORRESPOND, PTE CORRECTIC

599

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on:

Office of Petitions Internal Document - Ver. 5.0

June 5, 2017

U.S. Patent and Trademark Office
Alexandria, VA 22313

Re: Supplemental Amendment to Maintenance Fee Payment of U.S. Patent 7,612,805

Dear PTO:

This letter supplies information to amend the prior maintenance fee payment filed in February, 2017, for U.S. patent 7,612,805, the petition for which was granted in March.

In 2006, I filed a provisional patent application (application No. 11/825,521) involving digital photography and, in 2007, filed a non-provisional application, which was issued as U.S. patent 7,612,805 in November, 2009. Four years later, in November, 2013, I failed to pay the maintenance fee for '805 due to severe economic constraints, and the patent expired.

In February, 2017, I sought to revive the patent by filing the maintenance fee on the U.S. PTO electronic filing system, paying an $800 fee. However, I was told that I needed to file a petition with the Office of Petitions and pay a supplemental fee. After contacting the Office of Petitions for guidance, I completed form 66, paid a supplemental fee of $850 and an additional fee of $200 for a petition to expedite, and submitted a Petition to Accept Unintentionally Delayed Payment of Maintenance Fee in an Expired Patent. Thereafter, I received, on March 28, 2017, a grant of my petition to reinstate the patent.

This letter seeks to supplement the petition regarding the maintenance fee revival at the PTO. In my request to revive '805, I understood that the Petition to Accept and form 66 were sufficient to satisfy the requirement of showing an unintentional delay in payment of the maintenance fees. There was no place on form 66 to state the reason that may satisfy the unintentional standard, nor did I receive any request from the Office of Petitions to do so. The payment of the fees and the filing of form 45 were sufficient to satisfy the Office of Petitions' procedure to reinstate the patent.

I have learned that in February, 2017, a federal judge in Georgia ruled (in *3D Medical Imaging Systems LLC v. Visage Imaging LLC*) that a patentee's certification that a delay in paying maintenance fees was unintentional in accordance with these procedures may give rise to a claim of inequitable conduct. I believe that the procedures established by the Office of Petitions were clear and that I followed them carefully. However, in light of the ruling in *3D Medical*, I believe it prudent to supplement my previous petition to accept my delayed payment and reinstate the patent.

In particular, there were economic constraints that caused the unintentional delay in payment of the maintenance fees from November, 2013, to February, 2017. I believe when I filed my

petition – and continue to believe – that "economic constraints" is a sufficient reason for unintentional delay in paying the maintenance fees.

My belief is supported by my personal experience with the Office of Petitions. In 2012, I filed a request to make a delayed payment of a maintenance fee for another of my issued patents that had expired due to nonpayment. In that case, I explicitly cited economic constraints as the reason for the delay and my request to revive was granted. In the case of the revival of '805, the same reason of economic constraints was the underlying reason for the unintentional delay in payment.

I believe that my February petition for the reinstatement of '805 was proper. By this petition, I am endeavoring to fully inform the PTO of the basis for my certification that the delay was unintentional, and to seek confirmation that the grant of my earlier petition fully satisfies PTO policies and procedures.

No fee is due for this information supplement to add to the file for the patent. The Office of Petitions granted the petition recently to accept payment for the maintenance fee for '805 and this information represents an amendment.

This letter is being filed electronically on the PTO's electronic filing system. Based on communication with a PTO attorney, I understand that that the electronic receipt from the electronic filing represents confirmation of acceptance of the letter.

If you have any questions, please contact me at the number below.

Sincerely,

/Neal E. Solomon/

Neal Solomon

P.O. Box 21297
Oakland, CA 94620
Customer #: 103468
(415) 334-5600

Electronic Acknowledgement Receipt

EFS ID:	29391225
Application Number:	11825521
International Application Number:	
Confirmation Number:	6134
Title of Invention:	DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION
First Named Inventor/Applicant Name:	Neal Solomon
Correspondence Address:	Neal Solomon - P O Box 21297 - Oakland CA 94620 US 4154335400 -
Filer:	Neal Edward Solomon
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	05-JUN-2017
Filing Date:	06-JUL-2007
Time Stamp:	10:54:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	Optimum_Imaging_Technologies_LLC_Office_of_Petitions_805_request_for_clarification.pdf	70037 c2d8fa4e74872f8ff40da216014c79a7591387d2	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	70037		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

RECEIVED
CENTRAL FAX CENTER

MAY 16 2017

5/16/17

Fax #: 571 273 8300

To: Office of Petitions

Re: pat. # 7,612,805

From: Neal Solomon

phone: (415) 334-5600

please Expedite

5 pp. (incl. cover sheet)

PAGE 1/5 * RCVD AT 5/16/2017 7:52:16 PM [Eastern Daylight Time] * SVR:W-PTOFAX-002/15 * DNIS:2738300 * CSID: * DURATION (mm-ss):01-43

RECEIVED
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MAY 16 2017

Petition to Expedite

May 16, 2017

Office of Petitions

Patent and Trademark Office

Alexandria, VA 22314

Re: U.S. Patent # 7,612,805

Dear Office of Petitions:

Please expedite the petition for supplying supplemental information involving the maintenance fee revival of U.S. Patent No. 7,612,805 (application No. 11/825,521) with confirmation no. 6134. I am the inventor and owner of the '805.

I recently paid the maintenance fee and petition fees to reinstate the patent.

I am enclosing a letter requesting acknowledgement of receipt and confirmation of acceptance of supplemental information involving the revival of the maintenance fee for the patent.

Also enclosed is completed PTO form 2038 (credit card payment form) for the amount of $400 in order to pay $200 for request to accept the supplemental information involving the maintenance fee for the patent and $200 for the petition to expedite.

Please expedite the processing of the request as soon as possible. Note that I am a small entity.

Feel free to call if you have any questions. I appreciate your assistance in processing this request.

Respectfully submitted,

Neal Solomon

(415) 334-5600

RECEIVED
CENTRAL FAX CENTER

MAY 16 2017

May 16, 2017

Office of Petitions
U.S. Patent and Trademark Office
Alexandria, VA 22313

Re: Supplemental Amendment to Maintenance Fee Revival of U.S. Patent 7,612,805

Dear Office of Petitions:

In 2006, I filed a provisional patent application (application No. 11/825,521) involving digital photography and, in 2007, filed a non-provisional application, which was issued as U.S. patent 7,612,805 in November, 2009. Four years later, in November, 2013, I failed to pay the maintenance fee for '805 due to severe economic constraints, and the patent expired.

In February, 2017, I sought to revive the patent by filing the maintenance fee on the U.S. PTO electronic filing system, paying an $800 fee. However, I was told that I needed to file a petition with the Office of Petitions and pay a supplemental fee. After contacting the Office of Petitions for guidance, I completed form 45, paid a supplemental fee of $850 and an additional fee of $200 for a petition to expedite, and submitted a Petition to Accept Unintentionally Delayed Payment of Maintenance Fee in an Expired Patent. Thereafter, I received, on March 28, 2017, a grant of my petition to reinstate the patent.

This letter seeks to supplement the petition regarding the maintenance fee revival at the PTO. In my request to revive '805, I understood that the Petition to Accept and form 45 were sufficient to satisfy the requirement of showing an unintentional delay in payment of the maintenance fees. There was no place on form 45 to state the reason that may satisfy the unintentional standard, nor did I receive any request from the Office of Petitions to do so. The payment of the fees and the filing of form 45 were sufficient to satisfy the Office of Petitions' procedure to reinstate the patent.

I have learned that in February, 2017, a federal judge in Georgia ruled (in *3D Medical Imaging Systems LLC v. Visage Imaging LLC*) that a patentee's certification that a delay in paying maintenance fees was unintentional in accordance with these procedures may give rise to a claim of inequitable conduct. I believe that the procedures established by the Office of Petitions were clear and that I followed them carefully. However, in light of the ruling in *3D Medical*, I believe it prudent to supplement my previous petition to accept my delayed payment and reinstate the patent.

In particular, there were economic constraints that caused the unintentional delay in payment of the maintenance fees from November 2013 to February 2017. I believe when I filed my petition – and continue to believe – that "economic constraints" is a sufficient reason for unintentional delay in paying the maintenance fees.

05/22/2017 DALLEN 00000007 7612805
01 FC:1462 400.00 OP

My belief is supported by my personal experience with the Office of Petitions. In 2012, I filed a request to make a delayed payment of a maintenance fee for another of my issued patents that had expired due to nonpayment. In that case, I explicitly cited economic constraints as the reason for the delay and my request to revive was granted. In the case of the revival of '805, the same reason of economic constraints was the underlying reason for the unintentional delay in payment.

I believe that my February petition for the reinstatement of '805 was proper. By this petition, I am endeavoring to fully inform the PTO of the basis for my certification that the delay was unintentional, and to seek confirmation that the grant of my earlier petition fully satisfies PTO policies and procedures.

This petition appears to fall under 37 CFR 1.182 seeking a "decision on a question not specifically provided for in an application for patent," requiring a fee of $200. A separate $200 fee for a petition to expedite is included, for a total of $400. Please see the enclosed credit card payment form.

I appreciate a response to my petition to supply this supplemental information.

If you have any questions, please contact me at the number below.

Sincerely,

Neal J. Solomon

Neal Solomon

P.O. Box 21297
Oakland, CA 94620
Customer #: 103468
(415) 334-5600

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	07/06/2007	Neal Solomon		6134

7590 03/28/2017

Neal Solomon
P O Box 21297
Oakland, CA 94620

EXAMINER	
KHAN, USMAN A	

ART UNIT	PAPER NUMBER
2622	

MAIL DATE	DELIVERY MODE
03/28/2017	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Patent No.: 7,612,805	:	
Issue Date: November 3, 2009	:	
Application No.: 11/825,521	:	DECISION ON PETITION
Filed: July 6, 2007	:	
Title: DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION	:	

This is a decision on the petition under 37 CFR § 1.182, filed February 24, 2017, to expedite consideration of the petition to accept the unintentionally delayed payment of a maintenance fee under 37 CFR § 1.378(b) filed February 21, 2017. This is also a decision on the petition under 37 CFR § 1.378(b), filed February 21, 2017, to accept the unintentionally delayed payment of a maintenance fee for the above-identified patent.

The petition under 37 CFR §1.182 is **GRANTED**.

The petition under 37 CFR §1.378(b) is **GRANTED.**

Petition under 37 CFR §1.182

The requirements of 37 CFR §1.182 to expedite the petition to accept the unintentionally delayed payment of a maintenance fee have been satisfied.

Petition under 37 CFR §1.378(b)

This patent expired on November 4, 2013 for failure to pay the 3.5 year maintenance fee. The maintenance fee is hereby accepted and the above-identified patent is reinstated as of the mail date of this decision.

The rules and statutory provisions governing the operations of the U.S. Patent and Trademark Office require payment of a fee on filing each petition under 37 CFR § 1.378(b). In this instance, the fees required are $800 for the maintenance fee at 3.5 years and $850 for the delayed payment of the fee due at 3.5 years. The total fees owed are $1,650. Petitioner submitted payment of $1,650 on February 21, 2017.

Telephone inquiries concerning this matter may be directed to Vanitha Elgart at 571.272.7395.

/Jacob F Bétit/
Jacob F Bétit
Deputy Director
Office of Petitions

Office of Petitions: Routing Sheet



Application No. 11/825,521

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

- [X] **GRANTED**
- [ ] **DISMISSED**
- [ ] **DENIED**

Office of Petitions: Decision Count Sheet

Mailing Month

Application No. 11825521

11825521

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: ELGART, VANITHA

Count (1) - Palm Credit 11/825,521

Decision: GRANT

FINANCE WORK NEEDED
☐ Select Check Box for YES

GRANT

Decision Type: 518 - 37 CFR 1.182 REQUEST FOR EXPEDITED CONSID

518

Notes:

Count (2)

Decision: GRANT

FINANCE WORK NEEDED
☑ Select Check Box for YES

GRANT

Decision Type: 533 - 37 CFR 1.378(c) - TO ACCEPT UNINTENTIONAL DEL

533

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on:

Office of Petitions Internal Document - Ver. 5.0

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FEB 24 2017

2/24/17

Fax # 571 273 8300

To: US PTO office of petitions

Re: Maint. Fee 7,612,805

From: Neal Solomon (415) 334-5600

7 pp (incl. cover)

Petition to Expedite

USPTO
RECEIPT ACCOUNTING

RECEIVED
CENTRAL FAX CENTER

FEB 2 4 2017

Petition to Expedite

February 24, 2017

03/02/2017 DALLEN 00000007 7612805
01 FC:1599 800.00 OP

Office of Petitions

Patent and Trademark Office

Alexandria, VA 22314

Re: Patent # 7,612,805

Dear Office of Petitions:

Please expedite the processing of reinstatement of U.S. Patent No. 7,612,805 (application No. 11/825,521) with confirmation no. 6134.

I am the inventor and owner of the patent.

On February 21, 2017, I completed form 66, filed the form electronically and paid $850 in the electronic system. This was the fee for the penalty for late payment of the maintenance fee.

On February 21, 2017, I completed PTO form 2038 (Credit card payment form) for the amount of $800 in order to pay for the maintenance fee for the patent. I am enclosing these documents for your records.

Today, I am enclosing a PTO form 2038 for the amount of $200 in order to expedite the processing of the fees and the reinstate of the patent as soon as possible.

I am a small entity.

Please call if you have any questions.

I appreciate your assistance in processing this request.

Respectfully submitted,

03/02/2017 DALLEN 00000008 7612805
01 FC:1463 200.00 OP

Neal Solomon

(415) 334-5600

Electronic Acknowledgement Receipt

EFS ID:	28408877
Application Number:	11825521
International Application Number:	
Confirmation Number:	6134
Title of Invention:	DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION
First Named Inventor/Applicant Name:	Neal Solomon
Correspondence Address:	Neal Solomon - P O Box 21297 - Oakland CA 94620 US 4154335400 -
Filer:	Neal Edward Solomon
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	21-FEB-2017
Filing Date:	06-JUL-2007
Time Stamp:	11:04:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$850

RAM confirmation Number	022117INTEFSW11075800
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	US_Patent_7616805_maint_fee_petition.pdf	888366 930e4a9cb1940a2ca0065b5f78d0b27cc3e95b	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30226 bb4f74f1a742fa07324a345578beb1ae60585cd25	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	918592		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

RECEIVED
CENTRAL FAX CENTER

FEB 24 2017

PTO/SB/45 (03-09)
Approved for use through 03/31/2012. OMB 0651-0016
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

MAINTENANCE FEE TRANSMITTAL FORM

(Do not submit this form electronically via EFS-Web)

Address to:
Director of the United States
Patent and Trademark Office
Attn: Maintenance Fee
2051 Jamieson Avenue, Suite 300
Alexandria, VA 22314

- OR -

Fax to: 571-273-6500

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Director of the United States Patent and Trademark Office, Attn: Maintenance Fee, 2051 Jamieson Avenue, Suite 300, Alexandria, VA 22314" on _____.

Signature _____

Typed or printed name _____

Enclosed herewith is the payment of the maintenance fee(s) for the listed patent(s).

1. ☐ A check for the amount of $_____ for the full payment of the maintenance fee(s) and any necessary surcharge is enclosed.
2. ☑ Payment by credit card. Form PTO-2038 is enclosed.
3. ☐ The Director is hereby authorized to charge $_____ to cover the payment of the fee(s) indicated below to Deposit Account No._____.
4. ☐ The Director is hereby authorized to charge any deficiency in the payment of the required fee(s) or credit any overpayment to Deposite Account No._____.

* Information required by 37 CFR 1.366(c) (columns 1 & 2). Information requested under 37 CFR 1.366(d) (columns 3, 4, & 5).

Item	Patent Number* Column 1	U.S. Application Number* [e.g., 06/555,555] Column 2	Maintenance Fee Amount (37 CFR 1.20(e)-(g)) Column 3	Surcharge Amount (37 CFR 1.20(h)) Column 4	Payment Year (select one below) Column 5		
					3.5 yrs	7.5 yrs	11.5 yrs
1	7612705	11/825521	800-		✓		
2							
3							
4							
5							
	Subtotals: Columns 3 & 4						
	Total Payment		800-		☐ ___ additional sheets attached for listing additional patents.		

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on Form PTO-2038.

Respectfully submitted, **

Customer's Signature Neal Solomon

Customer's Name Neal Solomon

Telephone: 415 324-5600

Registration Number, if applicable: _____

Fax: _____

Note: All correspondence will be forwarded to the "Fee Address" or to the "Correspondence Address" if no "Fee Address" has been provided. See 37 CFR 1.363.

Payment of small entity fee is appropriate if small entity status still exists, see 37 CFR 1.27(g). To establish small entity status or to change status from small to large entity, a written assertion is required. See 37 CFR 1.27 and 1.33(b).

** WHERE MAINTENANCE FEE PAYMENTS ARE TO BE MADE BY AUTHORIZATION TO CHARGE A DEPOSIT ACCOUNT, BOTH THE NAME AND SIGNATURE OF AN AUTHORIZED USER ARE REQUIRED.

This collection of information is required by 37 CFR 1.366. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 5 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA. 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Director of the United States Patent and Trademark Office, Attn: Maintenance Fee, 2051 Jamieson Avenue, Suite 300, Alexandria, VA 22314.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

USPTO ACCOUNTING SECTION FEB 24 2017

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays valid OMB control number.

PETITION TO ACCEPT UNINTENTIONALLY DELAYED PAYMENT OF MAINTENANCE FEE IN AN EXPIRED PATENT (37 CFR 1.378(c))

Patent Number	Issue Date (YYYY-MM-DD)	Application Number	Filing Date (YYYY-MM-DD)	Docket Number (if applicable)
7,612,805	2009-11-03	11/825,521	2007-04-06	

CAUTION: Maintenance fee (and surcharge, if any) payment must correctly identify: (1) the patent number and (2) the application number of the actual U.S. application leading to issuance of that patent to ensure the fee(s) is/are associated with the correct patent. 37 CFR 1.366(c) and (d).

SMALL ENTITY

☑ Patentee claims, or has previously claimed, small entity status. See 37 CFR 1.27.

LOSS OF ENTITLEMENT TO SMALL ENTITY STATUS

☐ Patentee is no longer entitled to small entity status. See 37 CFR 1.27(g)

NOT Small Entity	Fee	Code
○	3 ½ year	(1551)
○	7 ½ year	(1552)
○	11 ½ year	(1553)

Small Entity	Fee	Code
✓	3 ½ year	(2551)
○	7 ½ year	(2552)
○	11 ½ year	(2553)

SURCHARGE

The surcharge required by 37 CFR 1.20(i)(2) (Fee Code 1558) must be paid as a condition of accepting unintentionally delayed payment of the maintenance fee.

MAINTENANCE FEE (37 CFR 1.20(e)-(g))

The appropriate maintenance fee must be submitted with this petition.

STATEMENT

THE UNDERSIGNED CERTIFIES THAT THE DELAY IN PAYMENT OF THE MAINTENANCE FEE TO THIS PATENT WAS UNINTENTIONAL

PETITIONER(S) REQUEST THAT THE DELAYED PAYMENT OF THE MAINTENANCE FEE BE ACCEPTED AND THE PATENT REINSTATED

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

37 CFR 1.378(d) states: "Any petition under this section must be signed by an attorney or agent registered to practice before the Patent and Trademark Office, or by the patentee, the assignee, or other party in interest."

I certify, in accordance with 37 CFR 1.4(d)(4) that I am

○ An attorney or agent registered to practice before the Patent and Trademark Office

✓ A sole patentee

○ A joint patentee; I certify that I am authorized to sign this submission on behalf of all the other patentees.

○ A joint patentee; all of whom are signing this e-petition

○ The assignee of record of the entire interest

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays valid OMB control number.

Patent Practitioner			
A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature			
Signature		Date (YYYY-MM-DD)	
Name		Registration Number	

Sole Patentee			
A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.			
Signature	Neal J Solomon	Date (YYYY-MM-DD)	2017-04-21
Name	Neal Solomon		

A Joint Patentee and I certify that I am authorized to sign this submission on behalf of all the other patentees			
A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.			
Signature		Date (YYYY-MM-DD)	
Name			

A Joint Patentee, all of whom are signing this petition			
A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature			
Patentee		Remove	
Signature		Date (YYYY-MM-DD)	
Name			

Additional Patentees may be generated within this form by selecting the Add Button: Add

The Assignee of record of the entire interest			
Under 37 CFR 3.71 an assignee becomes of record by filing a statement in compliance with 37 CFR 3.73(b). Signature requirements are set forth in 37 CFR 1.4(d), and the undersigned certifies that he / she is empowered to act on behalf of the assignee of the entire interest			
Signature		Date (YYYY-MM-DD)	
Name			

Enter Reel and Frame Number			Remove
Reel Number		Frame Number	

Click ADD for additional Reel Number and Frame Number: Add

This collection of information is required by 37 CFR 1.378(c). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in reinstating the patent.**

Electronic Patent Application Fee Transmittal

Application Number:	11825521
Filing Date:	06-Jul-2007
Title of Invention:	DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION
First Named Inventor/Applicant Name:	Neal Solomon
Filer:	Neal Edward Solomon
Attorney Docket Number:	

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
PET. REVIVE ABANDON APP, DELAY PYMT-RESP	2453	1	850	850
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**850**

Electronic Acknowledgement Receipt

EFS ID:	28408877
Application Number:	11825521
International Application Number:	
Confirmation Number:	6134
Title of Invention:	DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION
First Named Inventor/Applicant Name:	Neal Solomon
Correspondence Address:	Neal Solomon - P O Box 21297 - Oakland CA 94620 US 4154335400 -
Filer:	Neal Edward Solomon
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	21-FEB-2017
Filing Date:	06-JUL-2007
Time Stamp:	11:04:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$850

RAM confirmation Number	022117INTEFSW11075800
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	US_Patent_7616805_maint_fee_petition.pdf	888366 930a4a9cb11940a7ca008575bf78d9527cc3a95b	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30226 bb4f74f18742f867374d3455f8bedae60585ed25	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	918592		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	11/03/2009	7612805		6134

7590 10/14/2009

Neal Solomon
P O Box 21297
Oakland, CA 94620

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Neal Solomon, Oakland, CA;

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

MAILED

SEP 28 2009

OFFICE OF PETITIONS

NEAL SOLOMON
P O BOX 21297
OAKLAND CA 94620

In re Application of :
SOLOLMON, Neal :
Application No. 11/825,521 : DECISION ON PETITION
Filed: July 06, 2007 : TO WITHDRAW
Attorney Docket No. : FROM RECORD
:

This is a decision on the Request to Withdraw as attorney or agent of record under 37 C.F.R. § 1.36(b), filed September 03, 2009.

The request is **NOT APPROVED** because it is moot.

A review of the file record indicates that the power of attorney to NEAL SOLOMON has been updated. Accordingly, the request to withdraw under 37 C.F.R. § 1.36(b) is moot.

All future communications from the Office will continue to be directed to the below-listed address until otherwise notified by applicant.

Telephone inquires concerning this decision should be directed to Tredelle Jackson at 571-272-2783.

Tredelle D. Jackson
Paralegal Specialist
Office of Petitions

09-21-09

PART B - FEE(S) TRANSMITTAL

SEP 18 2009 PATENT AND TRADEMARK OFFICE

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

7590 07/23/2009

Neal Solomon
P O Box 21297
Oakland, CA 94620

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	07/06/2007	Neal Solomon		6134

TITLE OF INVENTION: DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$755	$300	$0	$1055	10/23/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
KHAN, USMAN A	2622	348-222100

09/21/2009 EAREGAY2 00000068 11825521
01 FC:2501 755.00 OP
02 FC:1504 300.00 OP

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature Neal Solomon Date 9/21/09

Typed or printed name Neal Solomon Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

7590 07/23/2009

Neal Solomon
P O Box 21297
Oakland, CA 94620

EXAMINER	
KHAN, USMAN A	
ART UNIT	PAPER NUMBER
2622	

DATE MAILED: 07/23/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

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B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTO/SB/83 (11-08)
Approved for use through 11/30/2011. OMB 0651-0035
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REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	11/825,521
Filing Date	July 6, 2007
First Named Inventor	Neal E. Solomon
Art Unit	2622
Examiner Name	Usman Khan
Attorney Docket Number	25130-13241 US

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Please withdraw me as attorney or agent for the above identified patent application, and

- ☐ all the practitioners of record;
- ☐ the practitioners (with registration numbers) of record listed on the attached paper(s); or
- ☑ the practitioners of record associated with Customer Number: 00758

NOTE: The immediately preceding box should only be marked when the practitioners were appointed using the listed Customer Number.

The reason(s) for this request are those described in 37 CFR :

☐ 10.40(b)(1)	☐ 10.40(b)(2)	☐ 10.40(b)(3)	☐ 10.40(b)(4)
☐ 10.40(c)(1)(i)	☐ 10.40(c)(1)(ii)	☐ 10.40(c)(1)(iii)	☐ 10.40(c)(1)(iv)
☐ 10.40(c)(1)(v)	☑ 10.40(c)(1)(vi)	☐ 10.40(c)(2)	☐ 10.40(c)(3)
☐ 10.40(c)(4)	☐ 10.40(c)(5)	☐ 10.40(c)(6) Please explain below:	

Certifications

Check each box below that is factually correct. WARNING: If a box is left unchecked, the request will likely not be approved.

1. ☑ I/We have given reasonable notice to the client, prior to the expiration of the response period, that the practitioner(s) intend to withdraw from employment.

2. ☑ I/We have delivered to the client or a duly authorized representative of the client all papers and property (including funds) to which the client is entitled.

3. ☑ I/We have notified the client of any responses that may be due and the time frame within which the client must respond.

Please provide an explanation, if necessary:

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/83 (11-08)
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REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF CORRESPONDENCE ADDRESS

Complete the following section only when the correspondence address will change. *Changes of address will only be accepted to an inventor or an assignee that has properly made itself of record pursuant to 37 CFR 3.71.*

Change the correspondence address and direct all future correspondence to:

A. ☐ The address of the inventor or assignee associated with Customer Number: _____

OR

B. ☑ Inventor or Assignee name	Neal E. Solomon

Address P.O. Box 21297			
City Oakland	State CA	Zip 94620	Country US
Telephone		Email solomon@neal.gmail.com	

I am authorized to sign on behalf of myself and all withdrawing practitioners.

Signature	/Robert R. Sachs/		
Name	Robert R. Sachs	Registration No. 42,120	
Address 801 California Street			
City Mountain View	State CA	Zip 94041	Country US
Date	September 3, 2009	Telephone No. 415-875-2410	

NOTE: ***Withdrawal is effective when approved rather than when received.***

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	6011385
Application Number:	11825521
International Application Number:	
Confirmation Number:	6134
Title of Invention:	DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION
First Named Inventor/Applicant Name:	Neal Solomon
Correspondence Address:	Neal Solomon - P O Box 21297 - Oakland CA 94620 US 4154335400 -
Filer:	Robert R. Sachs
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	03-SEP-2009
Filing Date:	06-JUL-2007
Time Stamp:	19:02:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition to withdraw attorney or agent (SB83)	13241_US_Request_to_Withdraw.pdf	300859 fb10f3e00d8fc2126697606d357ad925beb67c53	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	300859		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Information Disclosure Statement

4. The information disclosure statement (IDS) submitted on 06/30/2009 has been considered by the examiner. The submission is in compliance with the provisions of 37 CFR 1.97.

EXAMINER'S AMENDMENT

5. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Neal Solomon on 07/07/2009.

The application has been amended as follows:

Regarding claim 3:

CAM 8/10/09

In claim 3 line ~~3~~ 4 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 3 line 9 **"applying digital filtration by using application specific integrated circuit and digital"**

has been amended to -- **selecting a specific procedure using <u>the</u> microprocessor to** --.

KAM 8/10/09

In claim 26 line ~~15~~ 17 **"applying digital filtration by using an application specific integrated circuit and"**

has been amended to -- **applying digital filtration by using the application specific integrated circuit and** --.

Regarding claim 29:

In claim 29 line 2 **"A digital camera"**

has been amended to – **a digital camera** --.

In claim 29 line 16 **"selecting a specific procedure using a microprocessor to"**

has been amended to -- **selecting a specific procedure using <u>the</u> microprocessor to** --.

KAM 8/10/09

In claim 29 line ~~18~~ 17 **"applying digital filtration by using an application specific integrated circuit and"**

has been amended to -- **applying digital filtration by using the application specific integrated circuit and** --.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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NOTICE OF ALLOWANCE AND FEE(S) DUE

7590 07/23/2009

Neal Solomon
P O Box 21297
Oakland, CA 94620

EXAMINER	
KHAN, USMAN A	
ART UNIT	PAPER NUMBER
2622	

DATE MAILED: 07/23/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	07/06/2007	Neal Solomon		6134

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Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	07/06/2007	Neal Solomon		6134

TITLE OF INVENTION: DIGITAL IMAGING SYSTEM AND METHODS FOR SELECTIVE IMAGE FILTRATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$755	$300	$0	$1055	10/23/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
KHAN, USMAN A	2622	348-222100

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	07/06/2007	Neal Solomon		6134

7590 07/23/2009

Neal Solomon
P O Box 21297
Oakland, CA 94620

EXAMINER	
KHAN, USMAN A	
ART UNIT	PAPER NUMBER
2622	

DATE MAILED: 07/23/2009

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability	Application No.	Applicant(s)	
	11/825,521	SOLOMON, NEAL	
	Examiner	Art Unit	
	USMAN KHAN	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *amendment filed on 12/12/2008, 06/18/2009, and 07/07/2009*.

2. ☒ The allowed claim(s) is/are *claims 3-4,7, and 9-37 renumbered as allowed claims 1,4,9,11,15,2-8,10,12-14, and 16-32*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 06/30/2009
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *07/07/2009* .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Usman Khan/ Examiner, Art Unit 2622	/Jason Chan/ Supervisory Patent Examiner, Art Unit 2622

Interview Summary	Application No.	Applicant(s)	
	11/825,521	SOLOMON, NEAL	
	Examiner	Art Unit	
	USMAN KHAN	2622	

All participants (applicant, applicant's representative, PTO personnel):

(1) *USMAN KHAN*. (3)_____.

(2) *NEAL SOLOMON*. (4)_____.

Date of Interview: *07 July 2009*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *3,4,7 and 9-32*.

Identification of prior art discussed: *N/A*.

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *The examiner received applicants permission to do an examiner amendment for all claims needing minor corrections*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Usman Khan/ Examiner, Art Unit 2622	/Jason Chan/ Supervisory Patent Examiner, Art Unit 2622

DETAILED ACTION

1. Applicant has amended claims 3 – 4 to overcome the objections to claims 3 - 4 made in the previous office action.

2. Applicant has amended the title of the invention to overcome the objections to specification made in the previous office action.

Election/Restrictions

3. Applicant's election with traverse of species 1 in the reply filed on 04/27/2009 is acknowledged. The traversal is found persuasive therefore the restriction requirement of 04/02/2009 is hereby withdrawn.

Because all claims previously withdrawn from consideration under 37 CFR 1.142 have been rejoined, **the restriction requirement as set forth in the Office action mailed** on 04/02/2009 is hereby **withdrawn**. In view of the withdrawal of the restriction requirement as to the rejoined inventions, applicant(s) are advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application. Once the restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Information Disclosure Statement

4. The information disclosure statement (IDS) submitted on 06/30/2009 has been considered by the examiner. The submission is in compliance with the provisions of 37 CFR 1.97.

EXAMINER'S AMENDMENT

5. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Neal Solomon on 07/07/2009.

The application has been amended as follows:

Regarding claim 3:

In claim 3 line 3 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 3 line 9 **"applying digital filtration by using application specific integrated circuit and digital"**

has been amended to **-- applying digital filtration by using application specific integrated circuit and the digital --**.

In claim 3 line 11 **"wherein a microprocessor is used to provide digital and optical data to the digital"**

has been amended to **-- wherein the microprocessor is used to provide digital and optical data to the digital --**.

Regarding claim 4:

In claim 4 line 4 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 4 line 11 **"wherein a microprocessor is used to provide digital and optical data to the digital"**

has been amended to **-- wherein the microprocessor is used to provide digital and optical data to the digital --**.

Regarding claim 7:

In claim 7 line 3 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 7 line 7 **"applying digital filtration by using application specific integrated circuit and digital"**

has been amended to **-- applying digital filtration by using application specific integrated circuit and <u>the</u> digital --**.

In claim 7 line 9 **"wherein a microprocessor is used to provide digital and optical data to the digital"**

has been amended to **-- wherein <u>the</u> microprocessor is used to provide digital and optical data to the digital --**.

Regarding claim 9:

In claim 9 line 3 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 9 line 7 **"applying digital filtration by using application specific integrated circuit and digital"**

has been amended to **-- applying digital filtration by using application specific integrated circuit and <u>the</u> digital --**.

In claim 9 line 9 **"wherein a microprocessor is used to provide digital and optical data to the digital"**

has been amended to **-- wherein the microprocessor is used to provide digital and optical data to the digital --**.

Regarding claim 10:

In claim 10 line 3 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 10 line 9 **"wherein a microprocessor is used to provide digital and optical data to the digital"**

has been amended to **-- wherein the microprocessor is used to provide digital and optical data to the digital --**.

Regarding claim 23:

In claim 23 line 2 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 23 line 6 **"applying digital filtration by using application specific integrated circuit and digital"**

has been amended to **-- applying digital filtration by using application specific integrated circuit and the digital --**.

In claim 23 line 13 **"selecting a specific procedure using a microprocessor to"**

has been amended to **-- selecting a specific procedure using <u>the</u> microprocessor to --**.

In claim 23 line 15 **"applying digital filtration by using an application specific integrated circuit and"**

has been amended to **-- applying digital filtration by using the application specific integrated circuit and --**.

Regarding claim 26:

In claim 26 line 2 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 26 line 10 **"analyzing a data file by a microprocessor to separate specific objects in the"**

has been amended to **-- analyzing a data file by <u>the</u> microprocessor to separate specific objects in the --**.

In claim 26 line 15 **"selecting a specific procedure using a microprocessor to"**

has been amended to **-- selecting a specific procedure using the microprocessor to --**.

In claim 26 line 15 **"applying digital filtration by using an application specific integrated circuit and"**

has been amended to **-- applying digital filtration by using the application specific integrated circuit and --**.

Regarding claim 29:

In claim 29 line 2 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 29 line 16 **"selecting a specific procedure using a microprocessor to"**

has been amended to **-- selecting a specific procedure using the microprocessor to --**.

In claim 29 line 18 **"applying digital filtration by using an application specific integrated circuit and"**

has been amended to **-- applying digital filtration by using the application specific integrated circuit and --**.

Regarding claim 31:

In claim 31 line 2 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 31 line 15 **"selecting a specific procedure using a microprocessor to"**

has been amended to **-- selecting a specific procedure using the microprocessor to --**.

In claim 31 line 24 **"storing the modified digital processor in memory by forwarding the file from the"**

has been amended to **-- storing the modified data file in memory by forwarding the data file from the --**.

Regarding claim 35:

In claim 35 line 2 **"A digital camera"**

has been amended to **– a digital camera --**.

In claim 35 line 20 **"applying digital filtration by using an application specific integrated circuit and"**

has been amended to **-- applying digital filtration by using the application specific integrated circuit and --**.

Allowable Subject Matter

6. Claims 3 - 4, 7, and 9 - 37 are allowed.

The following is an examiner's statement of reasons for allowance:

Regarding independent **claim 3**, the prior art of record fails to teach or fairly suggest wherein the data are forwarded from the digital sensor to the digital signal processor by an application specific integrated circuit; wherein the digital signal processor applies a fast Fourier transform to a data file in order to satisfy a user specified special effects function; wherein the digital signal processor modifies the data file by applying the special effects function; and 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; in combination with other elements of the claim.

Regarding **claims 11 - 12**, these claims are allowed as being dependent from allowed independent claim 3.

Regarding independent **claim 4**, the prior art of record fails to teach or fairly suggest wherein the data are forwarded from the digital sensor to the digital signal processor: wherein a data file is analyzed by the microprocessor to separate specific objects in the image using the differentiation of the depth-of-field; wherein the digital signal processor applies filtration only to specific objects in the image; wherein the aberrations of the specific objects are corrected: and wherein the digital signal

processor forwards the modified data file to storage in memory; in combination with other elements of the claim.

Regarding **claims 13 - 16**, these claims are allowed as being dependent from allowed independent claim 4.

Regarding independent **claim 7**, the prior art of record fails to teach or fairly suggest wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps; wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files; and 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; in combination with other elements of the claim.

Regarding **claims 17**, these claims are allowed as being dependent from allowed independent claim 7.

Regarding independent **claim 9**, the prior art of record fails to teach or fairly suggest wherein the type of filtration applied by the digital signal processor is applied to specific moving objects; wherein the digital image that is captured is forwarded from the digital sensor to the digital signal processor; wherein a data file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements; wherein the digital signal processor applies filtration only to a specific continuous object

that is isolated and is in motion; and wherein the digital signal processor forwards the modified data file to be stored in memory; in combination with other elements of the claim.

Regarding **claims 18 - 20**, these claims are allowed as being dependent from allowed independent claim 9.

Regarding independent **claim 10**, the prior art of record fails to teach or fairly suggest wherein a network of digital imaging sensors is linked together in a fixed structure; wherein the network is coordinated to track specific objects that are within its collective field of vision; wherein the network captures images of objects using the digital imaging sensors; wherein the individual digital imaging sensors forward the imaging data to a central digital signal processor; wherein the digital signal processor selects a specific procedure to optimize the imaging data and corrects the aberrations; wherein a data file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements; wherein the digital signal processor applies filtration only to specific continuous objects that ate isolated and are in motion; and wherein the modified data file consisting of the data optimized from the aberrations that are corrected from the original optical image is stored in memory; in combination with other elements of the claim.

Regarding **claims 21 - 22**, these claims are allowed as being dependent from allowed independent claim 10.

Regarding independent **claim 23**, the prior art of record fails to teach or fairly suggest forwarding the data from a digital sensor to a digital signal processor by an application specific integrated circuit; applying digital filtration by using the application specific integrated circuit and digital signal processor to correct digital or optical aberrations; applying a fast Fourier transform to a data file in order to satisfy a user specified special effects function; modifying the data file by applying the special effects function using the digital signal processor and; storing the data file in memory.; in combination with other elements of the claim.

Regarding **claims 24 - 25**, these claims are allowed as being dependent from allowed independent claim 23.

Regarding independent **claim 26**, the prior art of record fails to teach or fairly suggest forwarding the data from a digital sensor to a digital signal processor; analyzing a data file by a microprocessor to separate specific objects in the image using the differentiation of the depth-of-field; providing digital and optical data to the digital signal processor; identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations; selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations; applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations; correcting the aberrations of the specific objects in the image by applying the digital signal processor filtration; and

forwarding the modified data file from the digital signal process to storage in memory.; in combination with other elements of the claim.

Regarding **claims 27 - 28**, these claims are allowed as being dependent from allowed independent claim 26.

Regarding independent **claim 29**, the prior art of record fails to teach or fairly suggest alternating the lens focal length of a zoom lens from specific fixed focal length lens settings in a succession of steps; creating data files corresponding to each focal length lens setting; forwarding the data from a digital sensor to digital signal processor; providing digital and optical data to a digital signal processor; identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations; selecting a specific procedure from the database using the microprocessor to optimize the image and correct the aberration; applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations; correcting optical aberrations with digital filtration to modify multiple images from different focal lengths in a succession of data files; and storing the modified data files in memory.; in combination with other elements of the claim.

Regarding **claims 30**, these claims are allowed as being dependent from allowed independent claim 29.

Regarding independent **claim 31**, the prior art of record fails to teach or fairly suggest selecting a specific procedure from the database using a microprocessor to

optimize the image and correct the aberrations; analyzing a data file by the microprocessor to separate specific objects in the image; using the temporal differentiation of caching in which successive images share geometric elements; applying filtration only to a specific continuous object that is isolated and is in motion by using the digital signal processor; correcting optical aberrations with digital filtration; and storing the modified data file in memory by forwarding the data file from the digital signal processor; in combination with other elements of the claim.

Regarding **claims 32 - 34**, these claims are allowed as being dependent from allowed independent claim 31.

Regarding independent **claim 35**, the prior art of record fails to teach or fairly suggest linking a network of digital imaging sensors together in a fixed structure: coordinating the network to track specific objects that are within its collective field of vision; capturing the network images of objects using the digital imaging sensors; forwarding the imaging data from individual digital imaging sensors to a central digital signal processor; analyzing the data in the images in the digital signal processor by using the microprocessor to separate specific images in the network; providing digital and optical data to the digital signal processor; identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations; selecting a specific procedure to optimize the image and correct the aberrations; applying digital filtration by using the application specific integrated circuit and digital signal processor to correct digital or optical aberrations; modifying a data by correcting optical aberrations

with digital filtration; analyzing the data file by using the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share objects that are isolated and are in motion; and forwarding the consolidated date file to storage in memory; in combination with other elements of the claim.

Regarding **claims 36 - 37**, these claims are allowed as being dependent from allowed independent claim 35.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Eleftheriadis et al. (US patent No. 6,055,330) teaches using depth of field to separate objects.

8. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Usman Khan whose telephone number is (571) 270-1131. The examiner can normally be reached on Mon-Fri 6:45-3:15.

10. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Usman Khan/
Usman Khan
07/09/2009
Patent Examiner

/Jason Chan/
Supervisory Patent Examiner, Art Unit 2622

Notice of References Cited	Application/Control No. 11/825,521	Applicant(s)/Patent Under Reexamination SOLOMON, NEAL	
	Examiner USMAN KHAN	Art Unit 2622	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,055,330	04-2000	Eleftheriadis et al.	382/154
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11825521	SOLOMON, NEAL
Examiner	**Art Unit**
USMAN KHAN	2622

ORIGINAL		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
348	222.1	H 0 4 N 5 / 228 (2006.01)	

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
348	273	342	208.11	333.08	335
348	340				

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1	10	17	28	33										
	2	12	18	29	34										
1	3	13	19	30	35										
4	4	14	20	31	36										
	5	16	21	32	37										
	6	17	22												
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6	14	25	30												
7	15	26	31												
8	16	27	32												

/USMAN KHAN/ Examiner.Art Unit 2622 (Assistant Examiner)	07/09/2009 (Date)	**Total Claims Allowed:** 32	
/JASON CHAN/ Supervisory Patent Examiner.Art Unit 2622 (Primary Examiner)	07/09/2009 (Date)	O.G. Print Claim(s) 3	O.G. Print Figure 1

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	20	aberration ADJ correct$4 AND camera AND filtration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:34
S2	6	aberration ADJ correct$4 AND camera AND digital NEAR2 (filter OR filtration) AND integrated ADJ circuit	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:38
S3	0	aberration ADJ correct$4 With digital NEAR2 (filter OR filtration) AND camera	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:43
S4	0	aberration ADJ correct$4 same digital NEAR2 (filter OR filtration) AND camera	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:43
S5	39	aberration ADJ correct$4 AND digital NEAR2 (filter OR filtration) AND camera	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:43
S6	88	aberration ADJ correct$4 With (filter OR filtration) AND camera	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:44
S7	1049109	(image NEAR2 (pickup OR pick$1up OR pick ADJ up) NEAR2 device OR image ADJ sensing ADJ apparatus OR camera OR imager OR recording NEAR2 device OR taking NEAR2 device OR capturing NEAR2 unit)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:44
S8	111	aberration ADJ correct$4 With (filter OR filtration) AND S7	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:49

S9	1	"20080174678"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 08:02
S10	1	aberration ADJ correct$4 With digital NEAR2 (filter OR filtration)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 08:11
S11	26	aberration ADJ correct$4 With (filter OR filtration) AND integrated ADJ circuit	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 08:12
S12	27	"6023977"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 08:53
S13	23	"6023977" AND filter	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:33
S14	18	"6023977" AND filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:33
S15	7	"6023977" AND filter AND aberration AND (IC OR integrated)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:34
S16	7	"6023977" AND filter AND aberration AND (IC OR integrated OR ASIC)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:55
S17	10754	filter AND aberration AND (IC OR integrated OR ASIC)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:56
S18	1049785	(image NEAR2 (pickup OR pick$1up OR pick ADJ up) NEAR2 device OR image ADJ sensing ADJ apparatus OR camera OR imager OR recording NEAR2 device OR taking NEAR2 device OR capturing NEAR2 unit)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:57

S19	1345	filter AND aberration NEAR2 correct$4 AND (IC OR integrated OR ASIC) AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:57
S20	187	filter SAME aberration NEAR2 correct$4 AND (IC OR integrated OR ASIC) AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:58
S21	11	"3311519"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 10:19
S22	36	((NEAL) near2 (SOLOMON)).INV.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 11:15
S23	2	"20070002158"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 11:32
S24	2	"20060285002"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 11:33
S25	2227	microprocessor NEAR2 advantage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 12:43
S26	150	microprocessor NEAR2 advantage AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 12:44
S27	706	(348/231.99).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/07/24 13:05
S28	42606	ASIC SAME (CPU OR microprocessor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:24

S29	8392	ASIC SAME (CPU OR microprocessor) AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:25
S30	5879	ASIC WITH (CPU OR microprocessor) AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:25
S31	133	ASIC SAME (CPU OR microprocessor) AND S18 AND filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:25
S32	12	ASIC SAME (CPU OR microprocessor) AND S18 AND filter WITH aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:26
S33	15	ASIC SAME (CPU OR microprocessor) AND S18 AND filter SAME aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:28
S34	12	ASIC AND (CPU OR microprocessor) AND S18 AND filter WITH aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:29
S35	12	ASIC SAME (CPU OR microprocessor) AND S18 AND filter WITH aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:37
S36	133	ASIC SAME (CPU OR microprocessor) AND S18 AND filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:39
S37	47	ASIC SAME (CPU OR microprocessor) AND S18 AND digital NEAR2 filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:39
S38	30	ASIC SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:40

S39	1	ASIC SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter SAME aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:41
S40	1	(ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter SAME aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:41
S41	30	(ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:42
S42	1	(ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter AND aberration ADJ correct$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:42
S43	36	((NEAL) near2 (SOLOMON)).INV.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 06:58
S44	2	S43 AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 07:14
S45	0	aberration NEAR2 correction SAME (ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 07:17
S46	2	("5883830").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/04 07:18
S47	3	("6452632").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/04 07:18
S48	26	aberration NEAR2 correction AND (ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 07:26

S49	12	nano-grid	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 09:08
S50	793	(348/224.1,273,342).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/07 08:17
S51	1640	(348/208.11,333.08,335,340).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/07 08:25
S52	1632	(348/222.1).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/07 09:05
S53	56	((NEAL) near2 (SOLOMON)).INV.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/06/29 09:59
S54	897	(348/224.1,273,342).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2009/06/30 15:13
S55	1914	(348/208.11,333.08,335,340).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2009/06/30 15:20
S56	2181	(348/222.1).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2009/06/30 15:20
S57	1	fast NEAR3 fourier NEAR3 transform SAME user NEAR3 special NEAR4 effect$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:19
S58	16	fast NEAR3 fourier NEAR3 transform SAME special NEAR4 effect$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:19

S59	22	fourier NEAR3 transform SAME special NEAR4 effect$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:21
S60	2125	fast NEAR3 fourier NEAR3 transform NEAR10 (image OR picture OR photograph OR photo$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:24
S61	9	fast NEAR3 fourier NEAR3 transform NEAR10 (image OR picture OR photograph OR photo$4) NEAR4 effect$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:25
S62	0	fast NEAR3 fourier NEAR3 transform NEAR10 (image OR picture OR photograph OR photo$4) NEAR4 effect$4 SAME user	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:25
S63	1	user NEAR4 (specified OR defined) NEAR4 special NEAR4 effect$4 NEAR10 (image OR picture OR photograph OR photo$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:28
S64	16	fast NEAR3 fourier NEAR3 transform SAME special NEAR4 effect$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:29
S65	3	depth NEAR2 field NEAR10 filtration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 06:55
S66	1582	user SAME fast NEAR3 fourier NEAR3 transform	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:39
S67	3	user WITH fast NEAR3 fourier NEAR3 transform WITH effect$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:40
S68	56	((NEAL) near2 (SOLOMON)).INV.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:42

S69	2	fast NEAR3 fourier NEAR3 transform AND S68	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:42
S70	1	fourier NEAR3 transform SAME user NEAR3 special NEAR4 effect$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:45
S71	12	fourier NEAR3 transform NEAR10 special NEAR4 effect$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:45
S72	2117	fast NEAR3 fourier NEAR3 transform NEAR10 (image OR picture OR photo OR photograph)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:47
S73	1072	fast NEAR3 fourier NEAR3 transform NEAR3 (image OR picture OR photo OR photograph)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:47
S74	99	fast NEAR3 fourier NEAR3 transform NEAR3 (image OR picture OR photo OR photograph) NEAr3 filter$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:47
S75	0	fast NEAR3 fourier NEAR3 transform NEAR3 (image OR picture OR photo OR photograph) NEAr3 USER	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:47
S76	1	fast NEAR3 fourier NEAR3 transform NEAR3 (image OR picture OR photo OR photograph) NEAR10 USER	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:48
S77	29	fast NEAR3 fourier NEAR3 transform NEAR3 (image OR picture OR photo OR photograph) NEAR10 apply$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/01 08:48
S78	1	fast NEAR3 fourier NEAR3 transform NEAR3 (image OR picture OR photo OR photograph) NEAR10 user	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/06 11:34

S79	5	fast NEAR3 fourier NEAR3 transform NEAR10 (image OR picture OR photo OR photograph) NEAR10 user	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/06 11:38
S80	52	apply$4 NEAR4 fast NEAR3 fourier NEAR3 transform NEAR10 (image OR picture OR photo OR photograph)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/06 13:03
S81	3	separate NEAR4 (object OR subject) NEAR5 (depth NEAR2 field OR Depth$1of $1field)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/07 13:03
S82	33	"6055330"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/07 13:04
S83	56	((NEAL) near2 (SOLOMON)).INV.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/08 08:48
S84	2	fast NEAR3 fourier NEAR3 transform AND S83	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/08 08:48
S85	56	((NEAL) near2 (SOLOMON)).INV.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2009/07/08 14:50

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S86	72	fast NEAR3 fourier NEAR3 transform NEAR10 (image OR picture OR photo OR photograph).CLM.	US-PGPUB	WITH	ON	2009/07/08 14:50
S87	246	depth NEAR2 field NEAR10 (image OR picture OR photo OR photograph).CLM.	US-PGPUB	WITH	ON	2009/07/08 14:59
S88	117	aberration NEAR2 correction.CLM. SAME (image OR picture OR photo OR photograph).CLM.	US-PGPUB	WITH	ON	2009/07/09 07:34

S89	26	aberration ADJ correct$4.CLM. AND (filter$4 OR filtration).CLM. AND (image NEAR2 (pickup OR pick$1up OR pick ADJ up) NEAR2 (device OR apparatus OR unit) OR image ADJ sensing ADJ (device OR apparatus OR unit) OR camera OR imager OR recording NEAR2 (device OR apparatus OR unit) OR taking NEAR2 (device OR apparatus OR unit) OR capturing NEAR2 (device OR apparatus OR unit)).CLM.	US-PGPUB	WITH	ON	2009/07/09 07:42

7/9/2009 1:10:06 PM
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	11/825 521
Filing Date	7/6/07
First Named Inventor	Neal Solomon
Art Unit	2622
Examiner Name	Usman Khan
Attorney Docket Number	

NON PATENT LITERATURE DOCUMENTS			
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		"EF Lenswork III: The Eyes of EOS", 4th Ed., 2004, Canon Inc. Lens Product Group ; pages 170-177	

Examiner Signature	/Usman Khan/	Date Considered	07/07/2009

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /U.K./

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11825521	SOLOMON, NEAL
	Examiner	**Art Unit**
	USMAN KHAN	2622

SEARCHED

Class	Subclass	Date	Examiner
348	222.1,231.99	07/24/2008; 06/30/2009	UK
348	224.1,273,342,208.11,333.08,335,340	08/07/2008; 06/30/2009	UK

SEARCH NOTES

Search Notes	Date	Examiner
EAST (Including databases: US-PGPUB, USPAT, USOCR, FPRS, EPO, JPO, DERWENT, IBM_TDB): See attached EAST search history	08/07/2008; 07/09/2009	UK
inventor name search	07/24/2008; 07/09/2009	UK
Examiners: Lin Ye	08/04/2008	UK
Examiners: Nhan Tran	07/07/2009	UK
Examiners: Luong Nguyen	07/06/2009	UK

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
	PgPub text search, see interference search history included in the search report	07/08/2009 AND 07/09/2009	UK

/USMAN KHAN/ Examiner.Art Unit 2622	

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CONFIRMATION NO. 6134

SERIAL NUMBER	FILING or 371(c) DATE / RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/825,521	07/06/2007	~~359~~ 348	2622	

APPLICANTS
Neal Solomon, Oakland, CA; UK

**** CONTINUING DATA ***************************
This appln claims benefit of 60/807,065 07/11/2006 UK

**** FOREIGN APPLICATIONS ***************************

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07/25/2007

Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No	☐ Yes ☑ No	/USMAN A KHAN/ Examiner's Signature	☐ Initials	CA	19 UK	~~10~~ 32	~~3~~ 10

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Neal Solomon
P O Box 21297
Oakland, CA 94620
UNITED STATES

TITLE
Digital imaging system and methods for selective image filtration UK

FILING FEE RECEIVED	FEES: Authority has been given in Paper
1427	No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:

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- ☐ 1.16 Fees (Filing)
- ☐ 1.17 Fees (Processing Ext. of time)
- ☐ 1.18 Fees (Issue)
- ☐ Other _____
- ☐ Credit

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11825521	SOLOMON, NEAL
	Examiner	Art Unit
	USMAN KHAN	2622

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/07/2008	07/07/2009							
	1	✓	-							
	2	✓	-							
1	3	O	=							
4	4	O	=							
	5	✓	-							
	6	O	-							
9	7	O	=							
	8	O	-							
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30	35		=							
31	36		=							

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11825521	SOLOMON, NEAL
	Examiner	**Art Unit**
	USMAN KHAN	2622

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/07/2008	07/07/2009							
32	37		=							

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Neal E. Solomon
APPLICATION NO.:	11/825,521
CONFIRMATION NO.:	6134
FILING DATE:	JULY 6, 2007
TITLE:	DIGITAL IMAGING SYSTEM
EXAMINER:	USMAN KHAN
GROUP ART UNIT:	2622
ATTY. DKT. NO.:	N/A

MAIL STOP AMENDMENT
COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

AMENDMENT A

This amendment is in response to the communication June 4, 2009.

IN THE CLAIMS

Please amend claims 1-10.

1. (Cancelled.)

2. (Cancelled.)

3. [Currently Amended) ~~A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor for special effects;~~

A digital imaging system for image filtration comprising:

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;

wherein the optical lens mechanism is a fixed focal length;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the data ~~file is~~ are forwarded from the digital sensor to the digital signal processor by an application specific integrated circuit;

wherein the digital signal processor applies a fast Fourier transform to ~~the~~ a data file in order to satisfy a user specified special effects function;

wherein the digital signal processor modifies the data file by applying the special effects function; and

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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.; ~~and~~

~~wherein the digital file is stored in memory.~~

4. [Currently Amended] ~~A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor are applied only to specific objects:~~

A digital imaging system for image filtration comprising:

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;

wherein the optical lens mechanism is a fixed focal length;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the data ~~digital file is~~ are forwarded from the digital sensor ~~to the microprocessor and~~ to the digital signal processor;

wherein ~~the~~ a data file is analyzed by the microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;

wherein the digital signal processor applies filtration only to specific objects in the image;

wherein the aberrations of the specific objects are corrected; and

wherein the digital signal processor forwards the modified data file to storage in memory.

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5. (Cancelled.)

6. (Cancelled.)

7. [Currently Amended] ~~The system of claim 1 comprising:~~

A digital imaging system for image filtration comprising:

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;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the lens type is a zoom lens; ~~and;~~

wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps; ~~and;~~

wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files; and

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.

8. (Cancelled.)

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9. [Currently Amended] ~~The system of claim 1;~~

A digital imaging system for image filtration comprising:

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;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the system uses a video camera to capture moving objects;

wherein the type of filtration applied by the digital signal processor is applied to specific moving objects;

wherein the digital image that is captured is forwarded from the digital sensor ~~to the microprocessor and~~ to the digital signal processor;

wherein ~~the~~ a data file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements;

wherein the digital signal processor applies filtration only to a specific continuous object that is isolated and is in motion; and

wherein the digital signal processor forwards the modified data file to be stored in memory.

10. [Currently Amended] ~~The system of claim 1;~~

A digital imaging system for image filtration comprising:

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A digital camera mechanism, an optical lens mechanism, digital sensors, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein a network of digital imaging sensors is linked together in a fixed structure;

wherein the network is coordinated to track specific objects that are within its collective field of vision;

wherein the network captures images of objects using the digital imaging sensors;

wherein the individual digital imaging sensors forward the imaging data to a central digital signal processor;

wherein the digital signal processor selects a specific procedure to optimize the imaging data and corrects the aberrations;

~~wherein the image aberrations are corrected; and~~

wherein a data file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements;

wherein the digital signal processor applies filtration only to specific continuous objects that are isolated and are in motion; and

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wherein the modified data file consisting of the data optimized from the aberrations that are corrected from the original optical image is stored in memory.

~~wherein the imaging data file is forwarded to storage in memory.~~

11. [New claim] The system of claim 3:
wherein the special effects function is a color enhancing function.

12. [New claim] The system of claim 3:
wherein the special effects function is a diffusion function of soft effect.

13. [New claim] The system of claim 4:
wherein the subject is isolated by focusing on the subject and narrowing the depth of field range by manipulating the aperture.

14. [New claim] The system of claim 4:
wherein filtration is applied only to the background of an image exclusive of specific selected objects.

15. [New claim] The system of claim 4:
wherein specific color filtration is applied to objects.

16. [New claim] The system of claim 4:
wherein specific filtration applied to specific objects is soft effects.

17. [New claim] The system of claim 7:
wherein as the zoom lens changes focal length positions, the system anticipates the direction of zoom lens changes to accelerate the filtration modifications.

18. [New claim] The system of claim 9:
wherein a specific continuous object is selectively filtered with soft effects.

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19. [New claim] The system of claim 9:

wherein the background of the image is filtered independently of the moving objects.

20. [New claim] The system of claim 9:

wherein multiple moving objects are tracked and differentiation between objects is made by changing the depth of field of the objects.

21. [New claim] The system of claim 10:

wherein as an object moves through the sensor network, the system sensors are coordinated to hand off the object to other sensors on the grid.

22. [New claim] The system of claim 10:

wherein the background of the image in the sensor network is selectively filtered.

23. [Amended claim] A method of image filtration which comprises:

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;

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:

forwarding the data ~~file~~ from a digital sensor to ~~a microprocessor and to~~ a digital signal processor by an application specific integrated circuit;

providing digital and optical data to the digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

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applying a fast Fourier transform to ~~the~~ a data file in order to satisfy a user specified special effects function;

modifying the data file by applying the special effects function using the digital signal processor; and;

storing the data file in memory.

24. [New claim] The method of claim 23 further comprising the step of:

applying the special effects function as a color enhancing function.

25. [New claim] The method of claim 23 further comprising the step of:

applying the special effects function as a diffusion function of soft effect.

26. [Amended claim] A method of image filtration which comprises:

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;

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;

forwarding the data ~~file~~ from a digital sensor ~~to a microprocessor and~~ to a ~~the~~ digital signal processor;

analyzing ~~the~~ a data file by a microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;

providing digital and optical data to the digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

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correcting the aberrations of the specific objects in the image by applying the digital signal processor filtration ~~only to specific objects in the image~~; and

forwarding the modified data file from the digital signal process to storage in memory.

27. [New claim] The method of claim 26 further comprising the step of:

applying specific color filtration to objects.

28. [New claim] The method of claim 26 further comprising the step of:

applying soft effects filtration to specific objects.

29. [Amended claim] A method of image filtration comprising:

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;

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;

alternating the lens focal length of a zoom lens from specific fixed focal length lens settings in a succession of steps;

creating data files corresponding to each focal length lens setting;

forwarding the ~~digital files~~ data from a digital sensor to ~~a microprocessor and to~~ the digital signal processor;

providing digital and optical data to a digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

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correcting optical aberrations with digital filtration to modify multiple images from different focal lengths in a succession of data files; and

storing the modified data files in memory.

30. [New claim] The method of claim 29 further comprising:

wherein as the zoom lens changes focal length positions, anticipating the direction of zoom lens changes to accelerate the filtration modifications.

31. [Amended claim] A method for image filtration comprising:

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;

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:

capturing moving objects using a video camera;

forwarding the ~~digital image~~ data that ~~is~~ are captured from the digital sensor to a ~~microprocessor and to a~~ digital signal processor;

~~applying filtration by a the digital signal processor to specific moving objects;~~

providing digital and optical data to a digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations;

analyzing ~~the~~ a data file by the microprocessor to separate specific objects in the image;

using the temporal differentiation of caching in which successive images share geometric elements;

applying filtration only to a specific continuous object that is isolated and is in motion by using the digital signal processor;

correcting optical aberrations with digital filtration; and

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storing the modified digital processor in memory by forwarding the file from the digital signal processor.

32. [New claim] The method of claim 31 further comprising the step of:
filtering with soft effects a specific continuous object.

33. [New claim] The method of claim 31 further comprising the step of:
filtering the background of the image independently of the moving objects.

34. [New claim] The method of claim 31 further comprising:
tracking multiple moving objects; and
differentiating between objects by changing the depth of field of the objects.

35. [Amended claim] A method for image filtration comprising:
A digital camera mechanism, an optical lens mechanism, digital sensors, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;
wherein the aberrations from the optical system are corrected by applying digital filtration by using the application specific integrated circuit and digital signal processor, the method consisting of:
linking a network of digital imaging sensors together in a fixed structure;
coordinating the network to track specific objects that are within its collective field of vision;
capturing the network images of objects using the digital imaging sensors;
forwarding the imaging data from individual digital imaging sensors to a central digital signal processor;
analyzing the data in the images in the digital signal processor by using the microprocessor to separate specific images in the network;
providing digital and optical data to the digital signal processor;
identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

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selecting a specific procedure to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

modifying a data file by correcting optical aberrations with digital filtration;

analyzing the data file by using the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements;

applying filtration by the digital signal processor only to specific continuous objects that are isolated and are in motion; and

forwarding the consolidated ~~imaging~~ data file to storage in memory.

36. [New claim] The method of claim 35 further comprising the step of:

coordinating the hand off of the object to other sensors on the grid as objects move through the sensor network.

37. [New claim] The method of claim 35 further comprising the step of:

filtering the background of the image in the sensor network by differentiating the objects.

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ABSTRACT

A system is disclosed for the automated correction of optical and digital aberrations in a digital imaging system. The system includes digital filtration and digital system corrections to optical and digital aberrations. The system addresses issues in still and video photography that are presented in the digital imaging environment.

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To: Usman Khan

From: Neal Salomon

Fax: 571 270 2131

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July 8, 2009

Mr. Usman Khan
Patent Examiner
U.S. Patent Office
P.O. Box 1450
Alexandria, VA 22313

Dear Mr. Kahn:

Responsive to our July 8, 2009, phone call, please find the amendments to the claims that were submitted in response to our communication June 4, 2009.

Please note that the independent claims are modified as we discussed. I believe that they are structured precisely to meet your specifications.

If you have any questions about this, please contact me at the number below. Please send all correspondence to: Neal Solomon, P.O. Box 21297, Oakland, CA 94620.

I appreciate your assistance in processing this application.

I enjoyed our call and look forward to working with you on this matter.

Yours very truly,

Neal Solomon

Neal Solomon
(415) 334-5600

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Neal E. Solomon
APPLICATION NO.:	11/825,521
CONFIRMATION NO.:	6134
FILING DATE:	JULY 6, 2007
TITLE:	DIGITAL IMAGING SYSTEM
EXAMINER:	USMAN KHAN
GROUP ART UNIT:	2622
ATTY. DKT. NO.:	N/A

MAIL STOP AMENDMENT
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ALEXANDRIA, VA 22313-1450

AMENDMENT A

This amendment is in response to the communication June 4, 2009.

IN THE CLAIMS

Please amend claims 1-10.

1. (Cancelled.)

2. (Cancelled.)

3. [Currently Amended] ~~A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor for special effects;~~

A digital imaging system for image filtration comprising:

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;

wherein the optical lens mechanism is a fixed focal length;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the data ~~file is~~ are forwarded from the digital sensor to the digital signal processor by an application specific integrated circuit;

wherein the digital signal processor applies a fast Fourier transform to ~~the~~ a digital file in order to satisfy a user specified special effects function;

wherein the digital signal processor modifies the digital file by applying the special effects function; and

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wherein the modified digital file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.; ~~and~~

~~wherein the digital file is stored in memory.~~

4. [Currently Amended] ~~A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor are applied only to specific objects;~~

A digital imaging system for image filtration comprising:

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;

wherein the optical lens mechanism is a fixed focal length;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the data ~~digital file is~~ are forwarded from the digital sensor ~~to the microprocessor and~~ to the digital signal processor;

wherein ~~the~~ a digital file is analyzed by the microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;

wherein the digital signal processor applies filtration only to specific objects in the image;

wherein the aberrations of the specific objects are corrected; and

wherein the digital signal processor forwards the modified digital file to storage in memory.

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5. (Cancelled.)

6. (Cancelled.)

7. [Currently Amended] ~~The system of claim 1 comprising:~~

A digital imaging system for image filtration comprising;

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;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the lens type is a zoom lens; ~~and;~~

wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps; ~~and;~~

wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files; and

wherein the modified digital file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.

8. (Cancelled.)

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9. [Currently Amended] ~~The system of claim 1;~~

A digital imaging system for image filtration comprising:

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;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the system uses a video camera to capture moving objects;

wherein the type of filtration applied by the digital signal processor is applied to specific moving objects;

wherein the digital image that is captured is forwarded from the digital sensor ~~to the microprocessor and~~ to the digital signal processor;

wherein ~~the~~ a digital file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements;

wherein the digital signal processor applies filtration only to a specific continuous object that is isolated and is in motion; and

wherein the digital signal processor forwards the modified digital file to be stored in memory.

10. [Currently Amended] ~~The system of claim 1;~~

A digital imaging system for image filtration comprising:

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A digital camera mechanism, an optical lens mechanism, digital sensors, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data ~~file~~ from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein a network of digital imaging sensors is linked together in a fixed structure;

wherein the network is coordinated to track specific objects that are within its collective field of vision;

wherein the network captures images of objects using the digital imaging sensors;

wherein the individual digital imaging sensors forward the imaging data to a central digital signal processor;

wherein the image aberrations are corrected ; and

wherein the imaging data file is forwarded to storage in memory.

11. [New claim] The system of claim 3:

wherein the special effects function is a color enhancing function.

12. [New claim] The system of claim 3:

wherein the special effects function is a diffusion function of soft effect.

13. [New claim] The system of claim 4:

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wherein the subject is isolated by focusing on the subject and narrowing the depth of field range by manipulating the aperture.

14. [New claim] The system of claim 4:
wherein filtration is applied only to the background of an image exclusive of specific selected objects.

15. [New claim] The system of claim 4:
wherein specific color filtration is applied to objects.

16. [New claim] The system of claim 4:
wherein specific filtration applied to specific objects is soft effects.

17. [New claim] The system of claim 7:
wherein as the zoom lens changes focal length positions, the system anticipates the direction of zoom lens changes to accelerate the filtration modifications.

18. [New claim] The system of claim 9:
wherein a specific continuous object is selectively filtered with soft effects.

19. [New claim] The system of claim 9:
wherein the background of the image is filtered independently of the moving objects.

20. [New claim] The system of claim 9:
wherein multiple moving objects are tracked and differentiation between objects is made by changing the depth of field of the objects.

21. [New claim] The system of claim 10:
wherein as an object moves through the sensor network, the system sensors are coordinated to hand off the object to other sensors on the grid.

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22. [New claim] The system of claim 10:
wherein the background of the image in the sensor network is selectively filtered.

23. [Amended claim] A method of image filtration which comprises:
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;
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:
forwarding the data ~~file~~ from a digital sensor to ~~a microprocessor and to~~ a digital signal processor by an application specific integrated circuit;
providing digital and optical data to the digital signal processor;
identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;
selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations;
applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;
applying a fast Fourier transform to ~~the~~ a digital file in order to satisfy a user specified special effects function;
modifying the digital file by applying the special effects function using the digital signal processor; and;
storing the digital file in memory.

24. [New claim] The method of claim 23 further comprising the step of:
applying the special effects function as a color enhancing function.

25. [New claim] The method of claim 23 further comprising the step of:
applying the special effects function as a diffusion function of soft effect.

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26. [Amended claim] A method of image filtration which comprises:

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;

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:

forwarding the data ~~file~~ from a digital sensor ~~to a microprocessor and~~ to a ~~the~~ digital signal processor;

analyzing ~~the~~ a digital file by a microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;

providing digital and optical data to the digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

correcting the aberrations of the specific objects in the image by applying the digital signal processor filtration ~~only to specific objects in the image~~; and

forwarding the modified digital file from the digital signal process to storage in memory.

27. [New claim] The method of claim 26 further comprising the step of:

applying specific color filtration to objects.

28. [New claim] The method of claim 26 further comprising the step of:

applying soft effects filtration to specific objects.

29. [Amended claim] A method of image filtration comprising:

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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:

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:

alternating the lens focal length of a zoom lens from specific fixed focal length lens settings in a succession of steps;

creating digital files corresponding to each focal length lens setting;

forwarding the ~~digital files~~ data from a digital sensor to ~~a microprocessor and to~~ the digital signal processor;

providing digital and optical data to a digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

correcting optical aberrations with digital filtration to modify multiple images from different focal lengths in a succession of data files; and

storing the modified digital files in memory.

30. [New claim] The method of claim 29 further comprising:

wherein as the zoom lens changes focal length positions, anticipating the direction of zoom lens changes to accelerate the filtration modifications.

31. [Amended claim] A method for image filtration comprising:

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;

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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:

capturing moving objects using a video camera;

forwarding the ~~digital image~~ data that ~~is~~ are captured from the digital sensor to a ~~microprocessor and to a~~ digital signal processor;

~~applying filtration by a the digital signal processor to specific moving objects;~~

providing digital and optical data to a digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database using a microprocessor to optimize the image and correct the aberrations;

analyzing ~~the~~ a digital file by the microprocessor to separate specific objects in the image;

using the temporal differentiation of caching in which successive images share geometric elements;

applying filtration only to a specific continuous object that is isolated and is in motion by using the digital signal processor;

correcting optical aberrations with digital filtration; and

storing the modified digital processor in memory by forwarding the file from the digital signal processor.

32. [New claim] The method of claim 31 further comprising the step of:
filtering with soft effects a specific continuous object.

33. [New claim] The method of claim 31 further comprising the step of:
filtering the background of the image independently of the moving objects.

34. [New claim] The method of claim 31 further comprising:
tracking multiple moving objects; and
differentiating between objects by changing the depth of field of the objects.

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35. [Amended claim] A method for image filtration comprising:

A digital camera mechanism, an optical lens mechanism, digital sensors, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;

wherein the aberrations from the optical system are corrected by applying digital filtration by using the application specific integrated circuit and digital signal processor. the method consisting of;

linking a network of digital imaging sensors together in a fixed structure:

coordinating the network to track specific objects that are within its collective field of vision;

capturing the network images of objects using the digital imaging sensors;

forwarding the imaging data from individual digital imaging sensors to a central digital signal processor;

analyzing the images in the digital signal processor by using the microprocessor to separate specific images in the network;

providing digital and optical data to the digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

correcting optical aberrations with digital filtration; and

forwarding the consolidated imaging data file to storage in memory.

36. [New claim] The method of claim 35 further comprising the step of:

coordinating the hand off of the object to other sensors on the grid as objects move through the sensor network.

37. [New claim] The method of claim 35 further comprising the step of:

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filtering the background of the image in the sensor network by differentiating the objects.

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ABSTRACT

A system is disclosed for the automated correction of optical and digital aberrations in a digital imaging system. The system includes digital filtration and digital system corrections to optical and digital aberrations. The system addresses issues in still and video photography that are presented in the digital imaging environment.

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To: Usman Khan

From: Neal Solomon

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July 7, 2009

Mr. Usman Khan
Patent Examiner
U.S. Patent Office
P.O. Box 1450
Alexandria, VA 22313

Dear Mr. Kahn:

Responsive to our July 7, 2009, phone call, please find the amendments to the claims that were submitted in response to our communication June 4, 2009.

Please note that the independent claims are modified as we discussed. I believe that they are structured precisely to meet your specifications.

If you have any questions about this, please contact me at the number below. Please send all correspondence to: Neal Solomon, P.O. Box 21297, Oakland, CA 94620.

I appreciate your assistance in processing this application.

I enjoyed our call and look forward to working with you on this matter.

Yours very truly,

Neal Solomon

Neal Solomon
(415) 334-5600

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	11/825,521
Filing Date	7/6/07
First Named Inventor	Neal Solomon
Art Unit	2622
Examiner Name	Usman Khan
Attorney Docket Number	

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		"EF Lenswork III: The Eyes of EOS", 4th Ed., 2004, Canon Inc. Lens Product Group	

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
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APPLICANT:	Neal E. Solomon
APPLICATION NO.:	11/825,521
CONFIRMATION NO.:	6134
FILING DATE:	JULY 6, 2007
TITLE:	DIGITAL IMAGING SYSTEM
EXAMINER:	USMAN KHAN
GROUP ART UNIT:	2622
ATTY. DKT. NO.:	N/A

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AMENDMENT A

This amendment is in response to the communication June 4, 2009.

IN THE CLAIMS

Please amend claims 1-10.

1. (Cancelled.)

2. (Cancelled.)

3. [Currently Amended] ~~A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor for special effects:~~

A digital imaging system for image filtration comprising:

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;

wherein the optical lens mechanism is a fixed focal length;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data file from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the data file is forwarded from the digital sensor to the digital signal processor by an application specific integrated circuit;

wherein the digital signal processor applies a fast Fourier transform to the digital file in order to satisfy a user specified special effects function;

wherein the digital signal processor modifies the digital file by applying the special effects function; and

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wherein the modified digital file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.; ~~and~~

~~wherein the digital file is stored in memory.~~

4. [Currently Amended] ~~A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor are applied only to specific objects;~~

A digital imaging system for image filtration comprising:

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;

wherein the optical lens mechanism is a fixed focal length;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data file from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the data ~~digital~~ file is forwarded from the digital sensor to the microprocessor and to the digital signal processor;

wherein the digital file is analyzed by the microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;

wherein the digital signal processor applies filtration only to specific objects in the image;

wherein the aberrations of the specific objects are corrected; and

wherein the digital signal processor forwards the modified digital file to storage in memory.

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5. (Cancelled.)

6. (Cancelled.)

7. [Currently Amended] ~~The system of claim 1 comprising:~~

A digital imaging system for image filtration comprising:

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;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data file from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the lens type is a zoom lens; ~~and;~~

wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps; ~~and;~~

wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files; and

wherein the modified digital file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.

8. (Cancelled.)

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9. [Currently Amended] ~~The system of claim 1;~~

A digital imaging system for image filtration comprising:

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;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data file from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein the system uses a video camera to capture moving objects;

wherein the type of filtration applied by the digital signal processor is applied to specific moving objects;

wherein the digital image that is captured is forwarded from the digital sensor to the microprocessor and to the digital signal processor;

wherein the digital file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements;

wherein the digital signal processor applies filtration only to a specific continuous object that is isolated and is in motion; and

wherein the digital signal processor forwards the modified digital file to be stored in memory.

10. [Currently Amended] ~~The system of claim 1;~~

A digital imaging system for image filtration comprising:

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A digital camera mechanism, an optical lens mechanism, digital sensors, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data file from the digital sensor to the digital processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations;

wherein a network of digital imaging sensors is linked together in a fixed structure;

wherein the network is coordinated to track specific objects that are within its collective field of vision;

wherein the network captures images of objects using the digital imaging sensors;

wherein the individual digital imaging sensors forward the imaging data to a central digital signal processor

wherein the image aberrations are corrected ; and

wherein the imaging data file is forwarded to storage in memory.

11. [New claim] The system of claim 3;

wherein the special effects function is a color enhancing function.

12. [New claim] The system of claim 3:

wherein the special effects function is a diffusion function of soft effect.

13. [New claim] The system of claim 4:

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wherein the subject is isolated by focusing on the subject and narrowing the depth of field range by manipulating the aperture.

14. [New claim] The system of claim 4:

wherein filtration is applied only to the background of an image exclusive of specific selected objects.

15. [New claim] The system of claim 4:

wherein specific color filtration is applied to objects.

16. [New claim] The system of claim 4:

wherein specific filtration applied to specific objects is soft effects.

17. [New claim] The system of claim 7:

wherein as the zoom lens changes focal length positions, the system anticipates the direction of zoom lens changes to accelerate the filtration modifications.

18. [New claim] The system of claim 9:

wherein a specific continuous object is selectively filtered with soft effects.

19. [New claim] The system of claim 9:

wherein the background of the image is filtered independently of the moving objects.

20. [New claim] The system of claim 9:

wherein multiple moving objects are tracked and differentiation between objects is made by changing the depth of field of the objects.

21. [New claim] The system of claim 10:

wherein as an object moves through the sensor network, the system sensors are coordinated to hand off the object to other sensors on the grid.

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22. [New claim] The system of claim 10:

wherein the background of the image in the sensor network is selectively filtered.

23. [New claim] A method of image filtration which comprises:

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;

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;

forwarding the data file from a digital sensor to a microprocessor and to a digital signal processor by an application specific integrated circuit,

providing digital and optical data to the digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

applying a fast Fourier transform to the digital file in order to satisfy a user specified special effects function;

modifying the digital file by applying the special effects function using the digital signal processor; and;

storing the digital file in memory.

24. [New claim] The method of claim 23 further comprising the step of:

applying the special effects function as a color enhancing function.

25. [New claim] The method of claim 23 further comprising the step of:

applying the special effects function as a diffusion function of soft effect.

PAGE 10/16 * RCVD AT 6/7/2009 11:00:34 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/6 * DNIS:2702131 * CSID:4154334033 * DURATION (mm-ss):04-26

26. [New claim] A method of image filtration which comprises:

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;

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;

forwarding the data file from a digital sensor to a microprocessor and to a ~~the~~ digital signal processor;

analyzing the digital file by a microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;

providing digital and optical data to the digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

correcting the aberrations of the specific objects in the image by applying the digital signal processor filtration ~~only to specific objects in the image~~; and

forwarding the modified digital file from the digital signal process to storage in memory.

27. [New claim] The method of claim 26 further comprising the step of:
applying specific color filtration to objects.

28. [New claim] The method of claim 26 further comprising the step of:
applying soft effects filtration to specific objects.

29. [New claim] A method of image filtration comprising:

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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;

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;

alternating the lens focal length of a zoom lens from specific fixed focal length lens settings in a succession of steps;

creating digital files corresponding to each focal length lens setting;

forwarding the digital files from a digital sensor to a microprocessor and to the digital signal processor;

providing digital and optical data to a digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

correcting optical aberrations with digital filtration to modify multiple images from different focal lengths in a succession of data files; and

storing the modified digital files in memory.

30. [New claim] The method of claim 29 further comprising:

wherein as the zoom lens changes focal length positions, anticipating the direction of zoom lens changes to accelerate the filtration modifications.

31. [New claim] A method for image filtration comprising:

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;

PAGE 12/16 * RCVD AT 6/7/2009 11:00:34 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/6 * DNIS:2702131 * CSID:4154334033 * DURATION (mm-ss):04-26

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;

capturing moving objects using a video camera;

forwarding the digital image that is captured from the digital sensor to a microprocessor and to a digital signal processor;

~~applying filtration by a the digital signal processor to specific moving objects;~~

providing digital and optical data to a digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure from the database to optimize the image and correct the aberrations;

analyzing the digital file by the microprocessor to separate specific objects in the image;

using the temporal differentiation of caching in which successive images share geometric elements;

applying filtration only to a specific continuous object that is isolated and is in motion by using the digital signal processor;

correcting optical aberrations with digital filtration; and

storing the modified digital processor in memory by forwarding the file from the digital signal processor.

32. [New claim] The method of claim 31 further comprising the step of:
filtering with soft effects a specific continuous object.

33. [New claim] The method of claim 31 further comprising the step of:
filtering the background of the image independently of the moving objects.

34. [New claim] The method of claim 31 further comprising:
tracking multiple moving objects; and
differentiating between objects by changing the depth of field of the objects.

PAGE 13/16 * RCVD AT 6/7/2009 11:00:34 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/6 * DNIS:2702131 * CSID:4154334033 * DURATION (mm-ss):04-26

35. [New claim] A method for image filtration comprising:

A digital camera mechanism, an optical lens mechanism, digital sensors, a microprocessor, a digital signal processor, an application specific integrated circuit, system software, a database management system and a memory storage sub-system;

wherein the aberrations from the optical system are corrected by applying digital filtration by using the application specific integrated circuit and digital signal processor, the method consisting of;

linking a network of digital imaging sensors together in a fixed structure;

coordinating the network to track specific objects that are within its collective field of vision;

capturing the network images of objects using the digital imaging sensors;

forwarding the imaging data from individual digital imaging sensors to a central digital signal processor;

analyzing the images in the digital signal processor by using the microprocessor to separate specific images in the network;

providing digital and optical data to the digital signal processor;

identifying specific optical aberrations and accessing a database to identify specific corrections to the aberrations;

selecting a specific procedure to optimize the image and correct the aberrations;

applying digital filtration by using an application specific integrated circuit and digital signal processor to correct digital or optical aberrations;

correcting optical aberrations with digital filtration; and

forwarding the consolidated imaging data file to storage in memory.

36. [New claim] The method of claim 35 further comprising the step of:

coordinating the hand off of the object to other sensors on the grid as objects move through the sensor network.

37. [New claim] The method of claim 35 further comprising the step of:

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filtering the background of the image in the sensor network by differentiating the objects.

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ABSTRACT

A system is disclosed for the automated correction of optical and digital aberrations in a digital imaging system. The system includes digital filtration and digital system corrections to optical and digital aberrations. The system addresses issues in still and video photography that are presented in the digital imaging environment.

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RECEIVED
CENTRAL FAX CENTER
JUN 18 2009

To: Usman Kahn

From: Neal Solomon

phone: (415) 334-5600

Your Fax: (571) 270-2131

Re: 11/825,521

PAGE 1/16 * RCVD AT 6/7/2009 11:00:34 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/6 * DNIS:2702131 * CSID:4154334033 * DURATION (mm-ss):04-26

RECEIVED
CENTRAL FAX CENTER
JUN 18 2009

June 8, 2009

Mr. Usman Khan
Patent Examiner
U.S. Patent Office
P.O. Box 1450
Alexandria, VA 22313

Dear Mr. Kahn:

Responsive to our June 4, 2009, phone call, please find the amendments to the claims that were submitted in response to the first office action mailed August 15, 2008.

Please note that the independent claims are modified as we discussed. I believe that they are structured precisely to meet your specifications.

The revised title of the Application is: Digital Imaging System and Methods for Sclective Image Filtration. This revised title is intended to be descriptive of the subject matter in the Application.

The primary resource used for information disclosure is "EF Lenswork III: The Eyes of EOS" (4th Ed., 2004), Canon Inc. Lens Product Group."

Please note the revised abstract.

If you have any questions about this, please contact me at the number below. Please send all correspondence to: Neal Solomon, P.O. Box 21297, Oakland, CA 94620.

I appreciate your assistance in processing this application.

I enjoyed our call and look forward to working with you on this matter.

Yours very truly,

Neal Solomon

Neal Solomon
(415) 334-5600

PAGE 2/16 * RCVD AT 6/7/2009 11:00:34 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-6/6 * DNIS:2702131 * CSID:4154334033 * DURATION (mm-ss):04-26

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Neal E. Solomon
APPLICATION NO.:	11/825,521
CONFIRMATION NO.:	6134
FILING DATE:	JULY 6, 2007
TITLE:	DIGITAL IMAGING SYSTEM
EXAMINER:	USMAN KHAN
GROUP ART UNIT:	2622
ATTY. DKT. NO.:	N/A

MAIL STOP AMENDMENT
COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

AMENDMENT A

This amendment is in response to the Official Action mailed April 2, 2009.

REMARKS

This is responsive to request for restriction in the case according to communication dated April 2, 2009.

The first office action indicated that original claims 3, 4, 6, 7, 9 and 10 were allowable if they were rewritten as independent claims. In the response to the office action, the inventor provided a rewriting of the allowable claims as independent system claims according to the Examiner's request. In addition, the inventor provided dependent system claims to these specific independent system claims. Further, the inventor added parallel independent method claims and their dependencies to matter that were included in the original disclosure.

The examiner has requested that the inventor specify the species of figures to which the subject matter pertains, particularly in light of the new claims.

It is clear that Species I, which the examiner indicates includes figures 5, 6, 7, 8, 11, 12 and 14, should be selected as the primary species for examination. These figures pertain to filtration of images in digital cameras, including filtration pertaining to correction of aberrations, special effects, objects and part(s) of an image. However, figures 13, 25 (not specified in any class of species) and 32 should also be included in this class because they share the subject matter. While specific objects are filtered in several of the figures in this species, a part of the image is filtered in figure 32, making this figure eligible for inclusion because it share features of others in the class.

Further, it is suggested that figures 29, 30 and 31 (particularly figure 31), which pertain to filtration involving *zoom* lenses, should also be included in this species as a distinct family. Since the invention that includes the main allowed claims focuses on the filtration of images and image components, the distinction between fixed focal length lenses and zoom lenses are less relevant than the primary issue of filtration. Fixed and zoom lenses are merely different animals of the species and share numerous components as disclosed in the original disclosure, several specific claims of which the Examiner has already allowed in some form.

The inventor looks forward to working with the Examiner to focus the claim language to a high standard consistent with the original disclosure.

The examiner is invited to contact the undersigned by telephone, mail, or electronic mail in order to advance prosecution. Applicant acknowledges that a copy of any electronic mail communications will be made of record in the application file per MPEP section 502.03.

Respectfully submitted,

NEAL E. SOLOMON

Dated: April 28, 2008

/Neal E. Solomon/

Neal E. Solomon
Applicant

(415) 334-5600

Electronic Acknowledgement Receipt

EFS ID:	5228420
Application Number:	11825521
International Application Number:	
Confirmation Number:	6134
Title of Invention:	Digital imaging system
First Named Inventor/Applicant Name:	Neal Solomon
Correspondence Address:	Neal Solomon - P O Box 21297 - Oakland CA 94620 US 4154335400 -
Filer:	Robert R. Sachs
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	27-APR-2009
Filing Date:	06-JUL-2007
Time Stamp:	18:44:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		13241_US_Amendment_A.pdf	20963 4418449c4a9d166c0fed4a584cb719aba36973ab	yes	3

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Applicant Arguments/Remarks Made in an Amendment	2	3

Warnings:	
Information:	
Total Files Size (in bytes):	20963

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	07/06/2007	Neal Solomon		6134

7590 04/02/2009

Neal Solomon
P O Box 21297
Oakland, CA 94620

EXAMINER	
KHAN, USMAN A	

ART UNIT	PAPER NUMBER
2622	

MAIL DATE	DELIVERY MODE
04/02/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/825,521	SOLOMON, NEAL	
	Examiner	Art Unit	
	USMAN KHAN	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *1* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2008*.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3,4,7 and 9-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *3-4,7,9-37* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The examiner is requiring restriction in the case because of the newly added claims in the amendment filed on 12/12/2008 includes subject matter not claimed earlier.

Election/Restrictions

This application contains claims directed to the following patentably distinct species:

Species I: Figures 5, 6, 7, 8, 11, 12, and 14

Species II: Figure 10, 13

Species III: Figure 15

Species IV: Figure 22-23 and 27

Species V: Figure 29

Species VI: Figure 30-33

The species are independent or distinct because claims to the different species recite the mutually exclusive characteristics of such species. In addition, these species are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there are no generic claims.

There is an examination and search burden for these patentably distinct species due to their mutually exclusive characteristics. The species require a different field of search (e.g., searching different classes/subclasses or electronic resources, or employing different search queries); and/or the prior art applicable to one species would not likely be applicable to another species; and/or the species are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election of the species may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species.

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record

showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Usman Khan whose telephone number is (571) 270-1131. The examiner can normally be reached on Mon-Thru 6:45-4:15; Fri 6:45-3:15 or Alt. Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Usman Khan/

Usman Khan
03/16/2009
Patent Examiner
Art Unit 2622

/David L. Ometz/
Supervisory Patent Examiner, Art Unit 2622



12-15-08

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Neal E. Solomon
APPLICATION NO.:	11/825,521
CONFIRMATION NO.:	6134
FILING DATE:	JULY 6, 2007
TITLE:	DIGITAL IMAGING SYSTEM
EXAMINER:	USMAN KHAN
GROUP ART UNIT:	2622
ATTY. DKT. NO.:	N/A

MAIL STOP AMENDMENT
COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

AMENDMENT A

This amendment is in response to the Official Action mailed August 15, 2008.

12/15/2008 CCHAU1 00000019 11825521

01 FC:2202 312.00 OP
02 FC:2201 550.00 OP
03 FC:1999 58.00 OP



12-15-08

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Neal E. Solomon
APPLICATION NO.:	11/825,521
CONFIRMATION NO.:	6134
FILING DATE:	JULY 6, 2007
TITLE:	DIGITAL IMAGING SYSTEM
EXAMINER:	USMAN KHAN
GROUP ART UNIT:	2622
ATTY. DKT. NO.:	N/A

MAIL STOP AMENDMENT
COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

AMENDMENT A

This amendment is in response to the Official Action mailed August 15, 2008.

12/15/2008 CCHAU1 00000019 11825521

01 FC:2202 312.00 OP
02 FC:2201 550.00 OP
03 FC:1999 58.00 OP

IN THE CLAIMS

Please amend claims 1-10.

1. (Cancelled.)

2. (Cancelled.)

3. [Currently Amended] ~~A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor for special effects;~~

A digital imaging system for image filtration comprising:

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;

wherein the data file is forwarded from the digital sensor to the digital signal processor by an application specific integrated circuit;

wherein the digital signal processor applies a fast Fourier transform to the digital file in order to satisfy a user specified special effects function;

wherein the digital signal processor modifies the digital file by applying the special effects function; and

wherein the digital file is stored in memory.

4. [Currently Amended] ~~A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor are applied only to specific objects;~~

A digital imaging system for image filtration comprising:

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;

wherein the data ~~digital~~ file is forwarded from the digital sensor to the microprocessor and to the digital signal processor;

wherein the digital file is analyzed by the microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;

PETITIONERS EX1019
Page 173

wherein the digital signal processor applies filtration only to specific objects in the image; and

wherein the digital signal processor forwards the modified digital file to storage in memory.

5. (Cancelled.)

6. (Cancelled.)

7. [Currently Amended] ~~The system of claim 1 comprising:~~

A digital imaging system for image filtration comprising:

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;

wherein the lens type is a zoom lens; ~~and;~~

wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps; ~~and;~~

wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files; and

wherein the modified digital file is stored in memory.

8. (Cancelled.)

9. [Currently Amended] ~~The system of claim 1;~~

A digital imaging system for image filtration comprising:

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;

wherein the system uses a video camera to capture moving objects;

wherein the type of filtration applied by the digital signal processor is applied to specific moving objects;

PETITIONERS EX1019
Page 174

wherein the digital image that is captured is forwarded from the digital sensor to the microprocessor and to the digital signal processor;

wherein the digital file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements;

wherein the digital signal processor applies filtration only to a specific continuous object that is isolated and is in motion; and

wherein the digital signal processor forwards the modified digital file to be stored in memory.

10. [Currently Amended] ~~The system of claim 1;~~

A digital imaging system for image filtration comprising:

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;

wherein a network of digital imaging sensors is linked together in a fixed structure;

wherein the network is coordinated to track specific objects that are within its collective field of vision;

wherein the network captures images of objects using the digital imaging sensors;

wherein the individual digital imaging sensors forward the imaging data to a central digital signal processor; and

wherein the imaging data file is forwarded to storage in memory.

11. [New claim] The system of claim 3:

wherein the special effects function is a color enhancing function.

12. [New claim] The system of claim 3:

wherein the special effects function is a diffusion function of soft effect.

13. [New claim] The system of claim 4:

PETITIONERS EX1019
Page 175

wherein the subject is isolated by focusing on the subject and narrowing the depth of field range by manipulating the aperture.

14. [New claim] The system of claim 4:

wherein filtration is applied only to the background of an image exclusive of specific selected objects.

15. [New claim] The system of claim 4:

wherein specific color filtration is applied to objects.

16. [New claim] The system of claim 4:

wherein specific filtration applied to specific objects is soft effects.

17. [New claim] The system of claim 7:

wherein as the zoom lens changes focal length positions, the system anticipates the direction of zoom lens changes to accelerate the filtration modifications.

18. [New claim] The system of claim 9:

wherein a specific continuous object is selectively filtered with soft effects.

19. [New claim] The system of claim 9:

wherein the background of the image is filtered independently of the moving objects.

20. [New claim] The system of claim 9:

wherein multiple moving objects are tracked and differentiation between objects is made by changing the depth of field of the objects.

21. [New claim] The system of claim 10:

wherein as an object moves through the sensor network, the system sensors are coordinated to hand off the object to other sensors on the grid.

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22. [New claim] The system of claim 10:

wherein the background of the image in the sensor network is selectively filtered.

23. [New claim] A method of image filtration which comprises:

forwarding the data file from a digital sensor to a digital signal processor by an application specific integrated circuit,

applying a fast Fourier transform to the digital file in order to satisfy a user specified special effects function;

modifying the digital file by applying the special effects function using the digital signal processor; and

storing the digital file in memory.

24. [New claim] The method of claim 23 further comprising the step of:

applying the special effects function as a color enhancing function.

25. [New claim] The method of claim 23 further comprising the step of:

applying the special effects function as a diffusion function of soft effect.

26. [New claim] A method of image filtration which comprises:

forwarding the data file from a digital sensor to a microprocessor and to the digital signal processor;

analyzing the digital file by a microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;

applying the digital signal processor filtration only to specific objects in the image; and

forwarding the modified digital file from the digital signal process to storage in memory.

27. [New claim] The method of claim 26 further comprising the step of:

applying specific color filtration to objects.

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28. [New claim] The method of claim 26 further comprising the step of:

applying soft effects filtration to specific objects.

29. [New claim] A method of image filtration comprising:

alternating the lens focal length of a zoom lens from specific fixed focal length lens settings in a succession of steps;

creating digital files corresponding to each focal length lens setting;

forwarding the digital files from a digital sensor to a microprocessor and to the digital signal processor;

correcting optical aberrations with digital filtration to modify multiple images from different focal lengths in a succession of data files; and

storing the modified digital files in memory.

30. [New claim] The method of claim 29 further comprising:

wherein as the zoom lens changes focal length positions, anticipating the direction of zoom lens changes to accelerate the filtration modifications.

31. [New claim] A method for image filtration comprising:

capturing moving objects using a video camera;

applying filtration by the digital signal processor to specific moving objects;

forwarding the digital image that is captured from the digital sensor to the microprocessor and to the digital signal processor;

analyzing the digital file by the microprocessor to separate specific objects in the image;

using the temporal differentiation of caching in which successive images share geometric elements;

applying filtration only to a specific continuous object that is isolated and is in motion by using the digital signal processor; and

storing the modified digital processor in memory by forwarding the file from the digital signal processor.

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32. [New claim] The method of claim 31 further comprising the step of:
filtering with soft effects a specific continuous object.

33. [New claim] The method of claim 31 further comprising the step of:
filtering the background of the image independently of the moving objects.

34. [New claim] The method of claim 31 further comprising:
tracking multiple moving objects; and
differentiating between objects by changing the depth of field of the objects.

35. [New claim] A method for image filtration comprising:
linking a network of digital imaging sensors together in a fixed structure;
coordinating the network to track specific objects that are within its collective field of vision;
capturing the network images of objects using the digital imaging sensors;
forwarding the imaging data from individual digital imaging sensors to a central digital signal processor; and
forwarding the consolidated imaging data file to storage in memory.

36. [New claim] The method of claim 35 further comprising the step of:
coordinating the hand off of the object to other sensors on the grid as objects move through the sensor network.

37. [New claim] The method of claim 35 further comprising the step of:
filtering the background of the image in the sensor network by differentiating the objects.

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REMARKS

The Examiner allowed claims 3, 4, 6, 7, 9 and 10. The Examiner rejected claims 1 and 2 under 35 U.S.C. 103 (a) for obviousness as being anticipated by Alon and Havens. Claim 5 was rejected under 35 U.S.C. 103 for being anticipated by Alon. Claim 8 was rejected as being dependent on a rejected claim (claim 1). These claims are being withdrawn.

The Examiner objected to claims 3, 4, 6, 7, 9 and 10 being written as dependent claims. Claims 3, 4, 7, 9 and 10 are amended to read as independent claims and are now in an allowable condition. Since claims 3 and 4 are now independent claims, the Examiner's "informality" objection is removed. Claim 7 is being withdrawn.

The revised title of the Application is: Digital Imaging System and Methods for Selective Image Filtration. This revised title is intended to be descriptive of the subject matter in the Application.

The primary resource used for information disclosure is "EF Lenswork III: The Eyes of EOS" (4th Ed., 2004), Canon Inc. Lens Product Group.

Claims 11-37 are new claims. Claims 11-22 are dependent system claims. These dependent claims show descriptive characteristics that are in the disclosure. Claims 23-37 are method claims that mirror the system claims.

Claims 11 and 12 have reference in the disclosure on page 22, number 5, paragraph 1. Please also see figures 11-14 and the detailed description for these figures.

Claim 13 has reference in the disclosure on page 23, number 6, paragraph 1 and in figures 11-14 and the detailed description for these figures.

Claim 14 has reference in the disclosure on page 24, number 6, paragraph one and in figures 11-14 and the detailed description for these figures.

Claims 15 and 16 has reference in the disclosure on page 24, number 6, paragraph two and in figures 11-14 and the detailed description for these figures.

Claim 17 has reference in the disclosure on page 39, number 19, paragraph two in figure 29 and the detailed description for this figure.

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Claims 18 and 19 have reference in the disclosure on pages 24, number 6, paragraph and page 40, number 20, paragraph 3 and in figures 30-32 and the detailed descriptions for these figures.

Claim 20 has reference in the disclosure at page 24, number 6, paragraph 3 and on pages 40-41, number 21, paragraphs 2 and 3 and in figure 33 and the detailed description for this figure.

Claim 21 has reference in the disclosure at page 41, number 22, paragraph 2 and in figure 33 and the detailed description for this figure.

Claims 22 has reference in the disclosure at page 41, number 22, paragraphs 2 and 3 and in figure 33 and the detailed description for this figure.

Method claims 23 to 37 correspond to the system claims.

There is no new matter in the patent application. Further, there is no prior art that covers these new claims. Alon does not speak to any of the elements of the new dependent claims or to the new method claims.

Favorable action is solicited. The examiner is asked to issue a Notice of Allowance for claims 3, 4, 7, 9, 10 and 11-37. The examiner is invited to contact the undersigned by telephone, mail, or electronic mail in order to advance prosecution. Applicant acknowledges that a copy of any electronic mail communications will be made of record in the application file per MPEP section 502.03.

Respectfully submitted,

NEAL E. SOLOMON

Dated: December 12, 2008

/Neal E. Solomon/

Neal E. Solomon
Applicant

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Page 181

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/825,521	07/06/2007	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☒ RATE ($)	SMALL ENTITY ☒ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 12/12/2008	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 32	Minus	** 20	= 12	X $26 =	312	OR	X $ =	
Independent (37 CFR 1.16(h))	* 8	Minus	***3	= 5	X $110 =	550	OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE	862	OR	TOTAL ADD'L FEE	

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/JOY DOBBS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/825,521	07/06/2007	Neal Solomon		6134

7590 08/15/2008

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EXAMINER	
KHAN, USMAN A	

ART UNIT	PAPER NUMBER
2622	

MAIL DATE	DELIVERY MODE
08/15/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/825,521	SOLOMON, NEAL	
	Examiner	Art Unit	
	USMAN KHAN	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5 and 8* is/are rejected.

7)☒ Claim(s) *3,4,6,7,9 and 10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 July 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objection

Claims 3 - 4 are objected to because of the following informalities: each of these dependent claims should start with "The". Appropriate correction is required.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 5 is rejected under 35 U.S.C. 102(e) as being anticipated by Alon et al. (US PgPub 2007/0236574).

Regarding **claim 5,** Alon et al. teaches a digital imaging system (paragraph 0007 and 0025 *et seq.*) comprising: a digital camera mechanism (paragraph 0007 *et seq.* and 0025 *et seq.*), an optical lens mechanism (paragraphs 0008, 0039, and 0051 *et seq.*), a digital sensor (paragraphs 0011 and 0020 *et seq.*), a microprocessor (paragraph 0047), a nano-grid mechanism (paragraphs 0008 *et seq.* filter), a digital

signal processor (paragraphs 0048 and 0092), system software (paragraphs 0020 and 0054) and a memory storage sub-system (paragraphs 0089, 0092, and 0095 - 0096); wherein the nano-grid mechanism is between the optical lens mechanism and the digital sensor (paragraphs 0008 *et seq.* filter); wherein the nano-grid mechanism is comprised of an array of nano-filaments (paragraphs 0008 *et seq.* filter); wherein the nano-grid mechanism receives an electrical signal from the microprocessor and modifies its filament structure by modulating the filaments (paragraphs 0008 *et seq.* filter); wherein the nano-grid mechanism performs a function to provide filtration to the image before the digital sensor captures the image (paragraphs 0008 *et seq.* filter); wherein the image is captured by the digital sensor (paragraphs 0011 and 0020 *et seq.*) and the digital image file forwarded to the digital signal processor (paragraphs 0048 and 0092)and; wherein the digital file is stored in memory (paragraphs 0089, 0092, and 0095 - 0096).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 - 2, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alon et al. (US PgPub 2007/0236574) in view of over Havens (US PgPub 2007/0080280).

Regarding **claim 1,** Alon et al. teaches a digital imaging system (paragraph 0007 and 0025 *et seq.*) comprising: A digital camera mechanism (paragraph 0007 *et seq.* and 0025 *et seq.*), an optical lens mechanism (paragraphs 0008, 0039, and 0051 *et seq.*), a digital sensor (paragraphs 0011 and 0020 *et seq.*), a microprocessor (paragraph 0047), a digital signal processor (paragraphs 0048 and 0092), system software (paragraphs 0020 and 0054), a database management system (paragraphs 0089, 0092, and 0095 - 0096) and a memory storage sub-system (paragraphs 0089, 0092, and 0095 - 0096); wherein the optical lens mechanism is a fixed focal length (paragraphs 0008, 0039, and 0051 *et seq.*); wherein the aberrations from the optical lens mechanism are corrected by applying digital filtration by using the digital signal processor (paragraphs 0007 0011 – 00209, 0047 and 0097); wherein a microprocessor is used to provide digital and optical data to the digital signal processor (paragraph 0047); wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations (paragraphs 0020 and 0054); wherein the system software forwards the data file from the digital sensor to the digital signal processor (paragraphs 0020 and 0054); wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations (paragraphs 0048 and 0092; Also, paragraphs 0007 0011 – 0020, 0047 and 0097) and; wherein the modified digital file consisting of the digital data optimized from the aberrations that are corrected

from the original optical image is stored in memory (paragraphs 0089, 0092, and 0095 - 0096).

However, Alon et al. fails to teach an application specific integrated circuit used for correcting aberrations. Havens, on the other hand teaches an application specific integrated circuit along with a microprocessor can be used for processing data.

More specifically, Havens teaches an application specific integrated circuit along with a microprocessor can be used for processing data (paragraphs 0045 – 0046, 0063).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Havens with the teachings of Alon et al. since the use of both an ASIC and a microprocessor in a system will increase the system speed.

Regarding **claim 2,** Alon et al. teaches a digital imaging system (paragraph 0007 and 0025 *et seq.*) comprising: A digital camera mechanism (paragraph 0007 *et seq.* and 0025 *et seq.*), an optical lens mechanism (paragraphs 0008, 0039, and 0051 *et seq.*), a digital sensor (paragraphs 0011 and 0020 *et seq.*), a microprocessor (paragraph 0047), a digital signal processor (paragraphs 0048 and 0092), system software (paragraphs 0020 and 0054), a database management system (paragraphs 0089, 0092, and 0095 - 0096) and a memory storage sub-system (paragraphs 0089, 0092, and 0095 - 0096); wherein the optical lens mechanism is a fixed focal length (paragraphs 0008, 0039, and 0051 *et seq.*); wherein image depth-of-field is optimized by forwarding the digital file

from the digital sensor to the microprocessor (paragraphs 0047, 0049, 0056 - 0057, and 0071); wherein system software accesses a database to determine the optimal aperture by comparing the distance data to similar images in the database (paragraphs 0020 and 0054; also, 0089, 0092, and 0095 - 0096); wherein a microprocessor is used to provide digital image data to the digital signal processor (paragraph 0047); wherein the digital signal processor optimizes the digital file aperture setting by comparing it to the database data (paragraphs 0089, 0092, and 0095 - 0096); wherein the microprocessor adjusts the camera's aperture setting (paragraphs 0047, 0049, 0056 - 0057, and 0071); wherein the digital sensor captures the image and forwards the image data file to the digital signal processor to make modifications to the digital file (paragraphs 0048 and 0092; Also, paragraphs 0007 0011 – 0020, 0047 and 0097) and; wherein the digital file is stored in memory (paragraphs 0089, 0092, and 0095 - 0096).

However, Alon et al. fails to teach an application specific integrated circuit used for correcting aberrations. Havens, on the other hand teaches an application specific integrated circuit along with a microprocessor can be used for processing data.

More specifically, Havens teaches an application specific integrated circuit along with a microprocessor can be used for processing data (paragraphs 0045 – 0046, 0063).

Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to incorporate the teachings of Havens with the teachings of Alon et al. since the use of both an ASIC and a microprocessor in a system will increase the system speed.

Regarding **claim 8**, as mentioned above in the discussion of claim 1 Alon et al. in view of Havens teaches all of the limitations of the parent claim. Additionally, Alon et al. teaches that the imaging system is integrated into a video camera (paragraph 0007 and 0025 *et seq.*).

Allowable Subject Matter

Claims 3 – 4, 6 – 7, and 9 - 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter for **Claims 3**: "A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor are special effects; wherein the digital signal processor applies a fast Fourier transform to the digital file in order to satisfy a user specified special effects function" in combination with the other limitations in the claim and the parent claim is not discussed or suggested in any of the prior art that was searched.

The following is a statement of reasons for the indication of allowable subject matter for **Claims 4**: "A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor are applied only to specific objects; wherein the digital file is analyzed by the microprocessor to separate specific objects in the image using the differentiation of the depth-of-field; wherein the digital signal processor applies filtration only to specific objects in the image" in combination with the other limitations in the claim and the parent claim is not discussed or suggested in any of the prior art that was searched.

The following is a statement of reasons for the indication of allowable subject matter for **Claims 6**: "The system of claim 1; wherein the digital sensor contains a tri-pixel configuration; wherein three differentiated sub-pixels in each pixel in which one of the sub-pixels is in the center of the pixel and is the largest and deepest of the sub-pixels; wherein the other two sub-pixels are smaller than the center sub-pixel and are on

the sides of the center sub-pixel; wherein the sub-pixels forward image data to the filament on each row and; wherein each row forwards the image data to the digital signal processor" in combination with the other limitations in the claim and the parent claim is not discussed or suggested in any of the prior art that was searched.

The following is a statement of reasons for the indication of allowable subject matter for **Claims 7**: "The system of claim 1 comprising: wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps and; wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files" in combination with the other limitations in the claim and the parent claim is not discussed or suggested in any of the prior art that was searched.

The following is a statement of reasons for the indication of allowable subject matter for **Claims 9**: "The system of claim 1; wherein the type of filtration applied by the digital signal processor is applied to specific moving objects; wherein the digital image that is captured is forwarded from the digital sensor to the microprocessor and to the digital signal processor; wherein the digital file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements; wherein the digital signal processor applies filtration only to a specific continuous object that is isolated and is in motion and; wherein the digital signal processor forwards the modified digital file to be

stored in memory" in combination with the other limitations in the claim and the parent claim is not discussed or suggested in any of the prior art that was searched.

The following is a statement of reasons for the indication of allowable subject matter for **Claims 10**: "The system of claim 1; wherein a network of digital imaging sensors is linked together in a fixed structure; wherein the network is coordinated to track specific objects that are within its collective field of vision; wherein the network captures images of objects using the digital imaging sensors; wherein the individual digital imaging sensors forward the imaging data to a central digital signal processor" in combination with the other limitations in the claim and the parent claim is not discussed or suggested in any of the prior art that was searched.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Langdon et al. (US patent No. 6,023,977) teaches an aberration correction system.

Thiele et al. (US patent No. 6,508,764) teaches an aberration correction system.

Robinson (US PgPub 2007/0002158) teaches an aberration correction system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Usman Khan whose telephone number is (571) 270-

1131. The examiner can normally be reached on Mon-Thru 6:45-4:15; Fri 6:45-3:15 or Alt. Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Usman Khan/

/David L. Ometz/
Supervisory Patent Examiner, Art Unit 2622

Usman Khan
08/07/2008
Patent Examiner
Art Unit 2622

Notice of References Cited	Application/Control No. 11/825,521	Applicant(s)/Patent Under Reexamination SOLOMON, NEAL	
	Examiner USMAN KHAN	Art Unit 2622	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2007/0236574	10-2007	Alon et al.	348/207.99
*	B	US-2007/0080280	04-2007	Havens, William H.	250/201.1
*	C	US-6,023,977	02-2000	Langdon et al.	73/629
*	D	US-2007/0002158	01-2007	Robinson, M. Dirk	348/335
*	E	US-6,508,764	01-2003	Thiele et al.	600/437
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11825521	SOLOMON, NEAL
	Examiner	Art Unit
	USMAN KHAN	2622

SEARCHED

Class	Subclass	Date	Examiner
348	222.1,231.99	07/24/2008	UK
348	224.1,273,342,208.11,333.08,335,340	08/07/2008	UK

SEARCH NOTES

Search Notes	Date	Examiner
EAST (Including databases: US-PGPUB, USPAT, USOCR, FPRS, EPO, JPO, DERWENT, IBM_TDB): See attached EAST search history	08/07/2008	UK
inventor name search	07/24/2008	UK
Examiners: Lin Ye	08/0/20084	UK

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11825521	SOLOMON, NEAL
	Examiner	**Art Unit**
	USMAN KHAN	2622

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	08/07/2008								
	1	✓								
	2	✓								
	3	O								
	4	O								
	5	✓								
	6	O								
	7	O								
	8	O								
	9	O								
	10	O								

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BIB DATA SHEET

CONFIRMATION NO. 6134

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/825,521	07/06/2007 RULE	359	2622	

APPLICANTS
Neal Solomon, Oakland, CA; UK

**** CONTINUING DATA ***************************
This appln claims benefit of 60/807,065 07/11/2006 UK

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
07/25/2007

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /USMAN A KHAN/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		CA	19 UK	10 UK	3 UK

ADDRESS

Neal Solomon
P O Box 21297
Oakland, CA 94620
UNITED STATES

TITLE

Digital imaging system

FILING FEE RECEIVED		
565	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	20	aberration ADJ correct$4 AND camera AND filtration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:34
S2	6	aberration ADJ correct$4 AND camera AND digital NEAR2 (filter OR filtration) AND integrated ADJ circuit	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:38
S3	0	aberration ADJ correct$4 With digital NEAR2 (filter OR filtration) AND camera	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:43
S4	0	aberration ADJ correct$4 same digital NEAR2 (filter OR filtration) AND camera	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:43
S5	39	aberration ADJ correct$4 AND digital NEAR2 (filter OR filtration) AND camera	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:43
S6	88	aberration ADJ correct$4 With (filter OR filtration) AND camera	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:44
S7	1049109	(image NEAR2 (pickup OR pick$1up OR pick ADJ up) NEAR2 device OR image ADJ sensing ADJ apparatus OR camera OR imager OR recording NEAR2 device OR taking NEAR2 device OR capturing NEAR2 unit)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:44
S8	111	aberration ADJ correct$4 With (filter OR filtration) AND S7	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/23 07:49
S9	1	"20080174678"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 08:02

S10	1	aberration ADJ correct$4 With digital NEAR2 (filter OR filtration)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 08:11
S11	26	aberration ADJ correct$4 With (filter OR filtration) AND integrated ADJ circuit	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 08:12
S12	27	"6023977"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 08:53
S13	23	"6023977" AND filter	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:33
S14	18	"6023977" AND filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:33
S15	7	"6023977" AND filter AND aberration AND (IC OR integrated)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:34
S16	7	"6023977" AND filter AND aberration AND (IC OR integrated OR ASIC)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:55
S17	10754	filter AND aberration AND (IC OR integrated OR ASIC)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:56
S18	1049785	(image NEAR2 (pickup OR pick$1up OR pick ADJ up) NEAR2 device OR image ADJ sensing ADJ apparatus OR camera OR imager OR recording NEAR2 device OR taking NEAR2 device OR capturing NEAR2 unit)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:57
S19	1345	filter AND aberration NEAR2 correct$4 AND (IC OR integrated OR ASIC) AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:57

S20	187	filter SAME aberration NEAR2 correct$4 AND (IC OR integrated OR ASIC) AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 09:58
S21	11	"3311519"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 10:19
S22	36	((NEAL) near2 (SOLOMON)).INV.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 11:15
S23	2	"20070002158"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 11:32
S24	2	"20060285002"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 11:33
S25	2227	microprocessor NEAR2 advantage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 12:43
S26	150	microprocessor NEAR2 advantage AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 12:44
S27	706	(348/231.99).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/07/24 13:05
S28	42606	ASIC SAME (CPU OR microprocessor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:24
S29	8392	ASIC SAME (CPU OR microprocessor) AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:25

S30	5879	ASIC WITH (CPU OR microprocessor) AND S18	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:25
S31	133	ASIC SAME (CPU OR microprocessor) AND S18 AND filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:25
S32	12	ASIC SAME (CPU OR microprocessor) AND S18 AND filter WITH aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:26
S33	15	ASIC SAME (CPU OR microprocessor) AND S18 AND filter SAME aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:28
S34	12	ASIC AND (CPU OR microprocessor) AND S18 AND filter WITH aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:29
S35	12	ASIC SAME (CPU OR microprocessor) AND S18 AND filter WITH aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:37
S36	133	ASIC SAME (CPU OR microprocessor) AND S18 AND filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:39
S37	47	ASIC SAME (CPU OR microprocessor) AND S18 AND digital NEAR2 filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:39
S38	30	ASIC SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:40
S39	1	ASIC SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter SAME aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:41

S40	1	(ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter SAME aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:41
S41	30	(ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:42
S42	1	(ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor) AND S18 AND digital ADJ filter AND aberration ADJ correct$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/07/24 13:42
S43	36	((NEAL) near2 (SOLOMON)).INV.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 06:58
S44	2	S43 AND aberration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 07:14
S45	0	aberration NEAR2 correction SAME (ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 07:17
S46	2	("5883830").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/04 07:18
S47	3	("6452632").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/04 07:18
S48	26	aberration NEAR2 correction AND (ASIC OR application ADJ specific ADJ intgrated ADJ circuit) SAME (CPU OR microprocessor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 07:26
S49	12	nano-grid	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2008/08/04 09:08

S50	793	(348/224.1,273,342).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/07 08:17
S51	1640	(348/208.11,333.08,335,340).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/07 08:25
S52	1632	(348/222.1).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2008/08/07 09:05

8/7/2008 9:07:02 AM
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/825,521	07/06/2007	Neal Solomon	

CONFIRMATION NO. 6134

Neal Solomon
P O Box 21297
Oakland, CA 94620

PUBLICATION NOTICE



Date Mailed: 07/24/2008

Title: Digital imaging system

Publication No.US-2008-0174678-A1
Publication Date:07/24/2008

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
11/825,521	07/06/2007	2873	565		10	3

CONFIRMATION NO. 6134

Neal Solomon
P O Box 21297
Oakland, CA 94620

UPDATED FILING RECEIPT

OC00000029273963

Date Mailed: 04/11/2008

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Neal Solomon, Oakland, CA;

Assignment For Published Patent Application

Solomon Research LLC, Oakland, CA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 60/807,065 07/11/2006

Foreign Applications

If Required, Foreign Filing License Granted: 07/25/2007

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 11/825,521**

Projected Publication Date: 07/24/2008

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****

Title

Digital imaging system

Preliminary Class

359

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/825,521	07/06/2007	Neal Solomon	

CONFIRMATION NO. 6134

Neal Solomon
P O Box 21297
Oakland, CA94620

Date Mailed. 04/10/2008

NOTICE OF NEW OR REVISED PROJECTED PUBLICATION DATE

The above-identified application has a new or revised projected publication date. The current projected publication date for this application is 07/17/2008. If this is a new projected publication date (there was no previous projected publication date), the application has been cleared by Licensing & Review or a secrecy order has been rescinded and the application is now in the publication queue.

If this is a revised projected publication date (one that is different from a previously communicated projected publication date), the publication date has been revised due to processing delays in the USPTO or the abandonment and subsequent revival of an application. The application is anticipated to be published on a date that is more than six weeks different from the originally-projected publication date.

More detailed publication information is available through the private side of Patent Application Information Retrieval (PAIR) System. The direct link to access PAIR is currently http://pair.uspto.gov. Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Questions relating to this Notice should be directed to the Office of Patent Publication at 1-888-786-0101.

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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/825,521	07/06/2007	Neal Solomon	

OIPE IAP6 AUG 06 2007 PATENT & TRADEMARK OFFICE

CONFIRMATION NO. 6134

Neal Solomon
P O Box 21297
Oakland, CA 94620

FORMALITIES LETTER

Date Mailed: 07/27/2007

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  Applicant must submit $ **150** *to complete the basic filing fee for a small entity.*

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee, or oath or declaration) as set forth in 37 CFR 1.16(f) of $65 for a small entity in compliance with 37 CFR 1.27, must be submitted with the missing items identified in this notice.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **$565** for a small entity

- **$150** Statutory basic filing fee.
- **$65** Surcharge.

08/07/2007 AAHMADI 00000030 11825521

01 FC:2011 150.00 OP
02 FC:2111 250.00 OP
03 FC:2251 100.00 OP
04 FC:2451 65.00 OP

- The application search fee has not been paid. Applicant must submit **$250** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit **$100** to complete the examination fee for a small entity in compliance with 37 CFR 1.27.

Replies should be mailed to: Mail Stop Missing Parts

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

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For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

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Office of Initial Patent Examination (571) 272-4000, or 1-800-PTO-9199
PART 1 - ATTORNEY/APPLICANT COPY

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
11/825,521	07/06/2007		0.00		10	3

CONFIRMATION NO. 6134

Neal Solomon
P O Box 21297
Oakland, CA94620

FILING RECEIPT

Date Mailed: 07/27/2007

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Neal Solomon, Oakland, CA;

Assignment For Published Patent Application

Solomon Research LLC, Oakland, CA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 60/807,065 07/11/2006

Foreign Applications

If Required, Foreign Filing License Granted: 07/25/2007

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US11/825,521**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

** SMALL ENTITY **

Title

Digital imaging system

Preliminary Class

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of

Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/825,521	07/06/2007	Neal Solomon	

CONFIRMATION NO. 6134

Neal Solomon
P O Box 21297
Oakland, CA 94620

FORMALITIES LETTER

Date Mailed: 07/27/2007

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  Applicant must submit $ **150** *to complete the basic filing fee for a small entity.*

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee, or oath or declaration) as set forth in 37 CFR 1.16(f) of $65 for a small entity in compliance with 37 CFR 1.27, must be submitted with the missing items identified in this notice.

SUMMARY OF FEES DUE:

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PART 3 - OFFICE COPY

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
11/825,521	07/06/2007		0.00		10	3

CONFIRMATION NO. 6134

Neal Solomon
PO Box 21297
Oakland, CA94620

FILING RECEIPT

Date Mailed: 07/26/2007

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Applicant(s)

Neal Solomon, Oakland, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 60/807,065 07/11/2006

Foreign Applications

If Required, Foreign Filing License Granted: 07/25/2007

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Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

** SMALL ENTITY **

Title

Digital imaging system

Preliminary Class

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The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the

Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

U.S. PTO
11/825521
07/06/2007

PTO/SB/05 (06-07)
Approved for use through 06/30/2007. OMB 0651-0032
U.S. Patent and Trademark Office. U.S. DEPARTMENT OF COMMERCE
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070607 17414 U.S. PTO

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	
First Inventor	Neal Solomon
Title	Digital Imaging System
Express Mail Label No.	EB632207087 US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450**

1. ☑ **Fee Transmittal Form** (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. ☑ **Applicant claims small entity status.** See 37 CFR 1.27.
3. ☑ **Specification** [*Total Pages* 59] Both the claims and abstract must start on a new page *(For information on the preferred arrangement, see MPEP 608.01(a))*
4. ☑ **Drawing(s)** (*35 U.S.C. 113*) [*Total Sheets* 19]
5. **Oath or Declaration** [*Total Sheets* _____]
   a. ☑ Newly executed (original or copy)
   b. ☐ A copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional with Box 18 completed)*
      i. ☐ DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ **Application Data Sheet.** See 37 CFR 1.76
7. ☐ **CD-ROM or CD-R** in duplicate, large table or Computer Program *(Appendix)* ☐ Landscape Table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission** *(if applicable, items a. – c. are required)*
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☐ **Assignment Papers** (cover sheet (PTO-1595) & document(s))
   Name of Assignee _____
10. ☐ **37 CFR 3.73(b) Statement** *(when there is an assignee)* ☐ **Power of Attorney**
11. ☐ **English Translation Document** *(if applicable)*
12. ☐ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449) ☐ Copies of foreign patent documents, publications, & other information
13. ☐ **Preliminary Amendment**
14. ☐ **Return Receipt Postcard** (MPEP 503) *(Should be specifically itemized)*
15. ☐ **Certified Copy of Priority Document(s)** *(if foreign priority is claimed)*
16. ☐ **Nonpublication Request** under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
17. ☐ Other: _____

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:*

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: .....

Prior application information: *Examiner* _____ *Art Unit:* _____

19. CORRESPONDENCE ADDRESS

☐ The address associated with Customer Number: _____ *OR* ☑ Correspondence address below

Name	Neal Solomon				
Address	P O Box 21297				
City	Oakland	State	CA	Zip Code	94620
Country	US	Telephone	415 433 5400	Email	

Signature	Neal Solomon	Date	7/6/07
Name (Print/Type)	Neal Solomon	Registration No. (Attorney/Agent)	

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/17 (06-07)
Approved for use through 06/30/2007. OMB 0651-0032
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070607
17 4 U.S. PTO

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL For FY 2007

☑ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 500 —

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	
Examiner Name	
Art Unit	
Attorney Docket No.	

METHOD OF PAYMENT (check all that apply)

☑ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☐ Deposit Account Deposit Account Number: _____ Deposit Account Name: _____

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☐ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☐ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	500
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims _____ - 20 or HP = _____ x Extra Claims _____ = Fee ($) _____ Fee Paid ($) _____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims _____ - 3 or HP = _____ x Extra Claims _____ = Fee ($) _____ Fee Paid ($) _____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims Fee ($) _____ Fee Paid ($) _____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets _____ - 100 = Extra Sheets _____ / 50 = Number of each additional 50 or fraction thereof _____ (round up to a whole number) x Fee ($) _____ = Fee Paid ($) _____

4. OTHER FEE(S)

Fees Paid ($)

Non-English Specification, $130 fee (no small entity discount) _____

Other (e.g., late filing surcharge): _____ _____

If the PTO did not receive the following listed Item(s) A check for $ 500.00

SUBMITTED BY

Signature	Neal Solomon	Registration No. (Attorney/Agent)	Telephone 415 733 5400
Name (Print/Type)	Neal Solomon		Date 7/6/07

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PATENT APPLICATION

DIGITAL IMAGING SYSTEM

Inventor(s): Neal Solomon

Assignee: Solomon Research LLC
P.O. Box 21297
Oakland, CA 94620

Entity: Small Entity

DIGITAL IMAGING SYSTEM

CROSS-REFERENCES TO RELATED APPLICATIONS

The present application claims the benefit of priority under 35 U.S.C. section 119 from U.S. Provisional Patent Application Serial No. US60/807,065, filed on July 11, 2006, the disclosures of which are hereby incorporated by reference in their entirety for all purposes.

FIELD OF THE INVENTION

The present invention pertains to imaging systems. The invention presents electronic methods to optimize optical processing, the digital capture of light and post-capture image organization of digital data sets. The system may be used in any device that captures, records, replicates, scans, reproduces, accesses, organizes, modifies, edits or stores images digitally. The invention applies to any imaging system that includes interaction between optics, digital image sensors, post-capture integrated circuits and digital storage components. The system includes self-organizing apparatus for optical image collection, electronic organization and optimization of digital data using integrated circuits and software applications. The system applies to consumer and professional still and video photography, including cinematography, to the processing of images with digital sensors, and to copying and scanning technologies. The system also applies to complex grids of multiple video cameras and satellites for surveillance and reconnaissance.

BACKGROUND OF THE INVENTION

The history of photography in the twentieth century is a story of finding solutions for optimizing optical problems. The main challenges have involved improving lens configurations to optimize image quality for film capture. As an example of this, lens aberrations have been reliably corrected by creating aspherical lens elements in wide-angle lenses and by creating apochromatic lens elements in telephoto lenses. The use of lens element coatings has also improved optical quality. Similarly, the evolution of zoom lenses has included improvement in optical quality via the combining of complex optical element configurations; as the optical quality of zoom lenses improved dramatically, their simplicity and utility led them to dominate

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Page 223

lens sales. Complex computer-aided design (CAD) software has been used to test a broad range of possible lens configurations so as to optimize the optical performance in terms of clarity and contrast of each lens type, as much as optically possible within economic constraints.

In the last twenty-five years, an additional revolution has occurred with the advent of auto-focus (AF) technology in still photographic and video cameras. Invented by Minolta in the early 1980s, AF technology was a photographic application of technology developed for the U.S. military. The AF system used an infrared light sensor to reflect light onto an object that allowed a camera's lens to focus on the object by employing a motor in the camera. Canon eventually developed improved methods of auto focus by using electronic means (viz., micro ultrasonic motors) to increase speed and accuracy. This AF technology was integrated with automatic exposure (AE) technology which developed complex algorithms in a "program" mode to combine shutter and aperture data to match each lens with particular subject matter, as well as an aperture-priority exposure mode and a shutter-priority exposure mode. Of course, the photographer could use manual focus and manual exposure at any time, but these improvements increased the creative process and the competitive advantages of camera makers and photographers that employed them. Ultimately, the combination of these developments allowed ordinary photographers to achieve high quality standards.

AE was improved by Nikon, particularly with the use of a "3D color matrix" system, which included a library of pre-programmed image types. The combination of the improved AF and AE subsystems allowed a dramatic simplification of photographic imaging because the photographer no longer labored over the time-consuming focus and the exposure variables. Automated film advance, in the form of built in motor drives, increased the working speeds of camera operation as well. Nearly all consumer and professional cameras became automated to some degree by the mid-1990s, including formats beyond the 35mm film standard.

In the last decade, a new technology of image stabilization (IS) has emerged to help correct the problem of vibrations caused camera shake that lead to image blur. This technology is implemented in lenses by the use of gyros to reorient the light plane to compensate for camera shake; when combined with the earlier automated camera technologies such as AF and AE, IS further improves the photographic experience, particularly for larger lenses.

In addition to these advances in camera automation, technologies improved in the category of artificial flash as well. With microprocessors and sensors employed to measure

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minute variances, the development of photographic flash systems allowed the photographer to control the lighting in an environment to some degree. Nikon's use of distance information in its flash system advanced the state of the art in flash photography. The combination of AF and AE with automated flash mechanisms provided increased efficiency and simplicity in image capture processes.

The last several years have witnessed a revolution in digital photography. Because of its simplicity, potential quality improvement, immediate feedback and cost savings, digital photography has captured an increasing market share relative to film-based cameras. Kodak holds a number of patents involving the charge coupled device (CCD) for converting and recording light into electronic format. A competing technology for digital capture is complementary metal-oxide semiconductor (CMOS) which, though developed by Fairchild Semiconductor over forty years ago, is predominantly used in photographic cameras by Canon. Although there are trade-offs in the application of CCD and CMOS digital sensors for image capture, they both find wide acceptance in the market.

In order to correct for digital artifacts in image capture mechanisms, anti-aliasing filters are placed in front of digital sensors. Despite this improvement, digital imaging still has some challenges to overcome in competing with the image quality of film.

At the present time, the most recent advances in digital imaging for professional still photography have come from Hasselblad, which offers a Phase One camera back with a 39 MP digital sensor from Kodak. This system uses software that automatically corrects for digital capture limitations to produce a quality image. Their "digital APO correction" (DAC) technology performs an analysis of meta-data to color-correct the digital capture resulting in moiré-free images.

At the limits of current technology, a Canadian company, Dalsa, has produced a 111MP (10,560 by 10,560 pixels) CCD digital sensor that measures four inches square. This technology must be mated with large format-type lenses with large image area, and may be used for satellite surveillance applications and for other astronomical applications.

With both the larger sensor surface area of a medium format camera system and the high-quality fixed focal-length lenses of Zeiss, Schneider and Rodenstock, the quality of even the top optics will be a limiting barrier to advanced digital sensors' ability to perceive maximum

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resolution. Without new improvements in optical and digital technologies, further progression of photographic camera systems will be limited.

Photographic Problems

Though every major advance in photography has solved an important problem, there are still remaining photographic problems to be solved in order to meet the goals of optimizing optical imaging quality while increasing simplicity and efficiency and lowering cost. Despite the advent and evolution of digital imaging, a number of problems have emerged in the digital realm in addition to earlier problems involving optics. Nevertheless, an opportunity exists to solve some of these problems via digital approaches. These problems are generally categorized as optical or digital.

Optical Problems

In the case of optics, lens aberrations are characterized according to lens type, with wide-angle lens problems differentiated from telephoto lens problems. Some of the problems affecting wide-angle lenses arose from the creation of the single lens reflex (SLR) camera. Before the SLR, the rear element of a lens could be placed in a rangefinder to protrude to a point immediately in front of the film plane in order to correct for aberrations. While the advantages of the mirror mechanism include ability to see exactly what one is photographing, because the mirror of the SLR flips up during exposure, the rear element of the lens must be placed in front of the mirror's plane of movement. This mechanical fact limits lens designs in most 35mm and medium-format camera systems and particularly affects wide-angle lens configurations.

It is very difficult to control the five aberrations of Seidel – spherical aberration, distortion (barrel distortion and pin cushion distortion), comatic aberration, astigmatism and curvature of field. In wide-angle SLR lenses as they are currently designed, these aberrations are particularly prominent.

For wide-angle lenses, optical vignetting affects peripheral illumination. Though optical vignetting will affect even retrofocus wide-angle lenses in rangefinders, it is particularly prominent in SLR cameras. According to the Cosine law, light fall-off in peripheral areas of an image increases as the angle-of-view increases. While optical vignetting can be reduced by

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stopping down the lens, the aberrations in rectilinear wide-angle lenses generally exhibit more distortion the wider the lens.

In the case of wide-angle lenses, the depth of field range is much broader, with close focusing causing aberrations without stopping down the aperture. To solve this problem, close-distance focusing is improved by the creation of floating groups of lens elements. The rear lens group elements float to correct close-distance aberrations. With wide-angle lenses that have wide apertures, floating lens elements improve lens aberrations in focusing on distance points also.

Modulation transfer function (MTF) curves represent a quantitative methodology used to assess the resolution and contrast of lens performance at specific apertures. Each lens type has a specific lens element composition, formula and behavior as measured by MTF. In general, MTF measures lens sharpness to 30 lines/mm and contrast to 10 lines/mm.

Because different colors of the visible light spectrum behave uniquely, the goal of lens design is to have all colors accurately hit a film plane or digital sensor plane. The particular challenge for telephoto lenses is that the red and green light colors strike the film plane at different times than blue light colors; thus a compensation must be made in the lens configuration to adjust for chromatic aberrations. Camera lens manufacturers have used extra low dispersion glass and fluorite glass elements in telephoto lenses primarily to adjust the red color light spectra to the film plane. In addition, telephoto lenses use carefully designed lens coatings to limit light diffraction-based aberrations.

Due to their construction, super-telephoto lenses are very large and heavy. While modifying the materials used in the lens barrels could reduce size and weight problems, a technological improvement in telephoto lens design was developed by Canon with the addition of diffractive optical (DO) elements, which behave as a sort of highly-refined fresnel lens magnifier. Though the MTF analyses of wide-angle lenses show dramatic latitude in performance of even high quality SLR lenses, with particular loss in resolution and contrast toward the edges of the image, high quality telephoto lenses show control of aberrations. However, the price of these lenses is prohibitively high.

In the case of zoom lenses, as many as four distinct groups of lens elements correct various optical aberrations. These lens element groups include (a) a focusing group, (b) a magnification variation group, (c) a correction group and (d) an image formation group.

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Modulating the focal length range of a zoom lens enables the lens to perform within the scope of operation, yet the zoom lens architecture has limits. In particular, the zoom lens configuration sacrifices resolution and wide potential aperture. Generally, the degree of resolution and contrast at the smaller angle of view is traded away in favor of competence at a wider angle of view, or vice-versa. This explains why MTF analyses of zoom lenses generally show a dramatic lowering in resolution and contrast relative to excellent fixed focal length lenses.

Digital Problems

Digital photography has built on the edifice of *film* camera systems. For instance, the size of the sensor is generally limited to the size of the optical circumference of a lens system. In the case of 35mm lenses that are designed for a specific angle of view, the largest that a digital sensor in a 35mm lens system could be, is 24mm by 36mm, with a corresponding maximum image circle of 43mm. In the case of medium format lenses, the largest digital sensors would duplicate the corresponding film plane size, whether 6x4.5 cm, 6x6 cm, 6x7 cm, 6x8 cm, 6x9 cm, 6x12 cm or 6x17 cm (which results in an effective image circle as large as 7 inches).

Digital sensors that are smaller than the limits of a corresponding lens system have been introduced. For example, Nikon digital sensors are smaller than 24mm x 36mm, or advanced photo system (APS) size. Efficient stacking of pixels allows a smaller sensor to eventually match the performance of a corresponding film system, while using the smaller circumference of the same lenses. Since the outside edges of the lens typically degrade resolution and contrast, this model using the smaller digital sensor can have an advantage of using primarily the centralized "sweet spot" of the image area. However, this smaller sensor size sacrifices the peripheral effects of a wide-angle lens, so a 14mm becomes a 21mm in a 1.5x conversion-sized sensor in a 35mm lens system. On the other hand, with telephoto lenses, the angle of view is limited to the center 65% of the image. This gives the appearance of upconverting a telephoto lens by 1.5x and thus provides an impression of increased magnification; a 400mm f/2.8 lens appears as a 600mm f/2.8 lens on a camera with a cropped digital sensor. Ultra-wide-angle lenses have been introduced with smaller image areas than 35mm to compensate for smaller sensor size.

Though invented over thirty years ago by Dr. Bayer, the charge coupled device (CCD) that is used in many digital cameras generally emulates the behavior of film. Specifically, since

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most photographic film has three layers of green, red and blue, with green representing fifty percent of the emulsion and red and blue twenty-five percent each, the CCD architecture also configured pixels to capture fifty percent of the green photonic visible light spectrum and twenty-five percent each for pixels recording red and blue light. Human eyes see more green than red and blue, so both film and digital sensors seek to emulate the way that we see. Each light color is captured by a different pixel in the CCD, just as there are three emulsion layers of film. In recent years, Foveon has developed a digital sensor for image capture that further seeks to emulate film by structuring the pixels into three *layers*, again with fifty percent capturing green light and twenty-five percent each capturing red and blue light.

Unfortunately, unwanted artifacts are also captured by the digital image capture process. These include banding and moiré effects that present false patterns and colors. Moiré patterns are created because the dot pattern of a sensor will intermittently overlap with the pattern of a subject to create a third pattern; these effects are optically-generated digital distortions that represent the effect of light hitting a pixel without correction. In order to compensate for these effects, digital sensors have employed low pass filters consisting of liquid crystal structures; however, these filters tend to have the effect of softening image resolution. Additionally, RGB or CMYG color filters are placed in front of digital sensors to ensure the accurate capture of colors.

CMOS digital sensors present an alternative to CCDs. By employing alternating positive and negative transistor networks, the CMOS sensors use less power. While they do not have the low noise ratio of the CCD, they do have greater light exposure latitude, in both range of ISO and dynamic range of detail in highlight and shadow. More importantly, CMOS sensors contain the circuitry, including analog to digital converter (ADC) and digital to analog converter (DAC), for post-processing digital images on the chip itself and enabling increased micro-miniaturization of the digital imaging process. An increase in the bit rate of the CMOS chip up to 32-bit makes possible a much richer color palate and level of detail than with earlier generation CCDs.

CMOS sensors can be full-frame, matching the lens specifications for the camera systems for which they are designed. A relatively bigger sensor has a wider depth of field capability, so the background can appear as a blur to set apart the main subject. Given these capabilities, one problem that emerges is that a digital sensor's enhanced capabilities to capture details may exceed the maximum optical resolution capabilities of many lenses. Nevertheless, CMOS

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sensors still require an anti-aliasing filter to be used in front of the sensor, which marginally degrades resolution.

Over the years, cameras have gotten smaller. While in the 19th century cameras were 11x14 or 8x10, literally capturing images on large emulsion plates, cameras of today are smaller and more automated. Yet the larger the film size, the bigger the enlargement potential and the increase in relative detail in the overall image. Similarly in digital photography, the larger the sensor, the more detail available and the bigger the output print can be enlarged. Because of this correspondence of digital sensor to film, the evolution of digital photography has been restricted to respective film camera systems, with 35mm and medium format systems dominating the field because well-developed lens systems have already been organized for these camera formats. The potential exists, however, to develop 35mm camera system digital sensors that rival film-based medium format or large format camera system quality or to surpass the limits of 35mm camera systems with medium format camera system digital sensors. The relative size, cost and automation advantages of 35mm camera systems generally show that these systems not only are competitive, but that these markets are increasingly accelerated relative to larger format systems. For example, the development of large aperture lenses, super-telephotos, rapid auto-focus, refined automated exposure and image stabilization systems in 35mm systems has solved various problems that have emerged in the last century and has improved image quality and camera system efficiency.

However, in the digital imaging realm additional problems have emerged, including the need to improve color (hue and saturation) quality, exposure highlight range, contrast range and other tonal adjustments. In addition, digital image capture brings its own set of aberrations, including moiré and banding effects and noise and ISO range limits. Additional aberrations are linked to the unique design of each type of digital sensor, with trade-offs presented between types of CCDs or CMOS chips. Moreover, there are still optical problems in the digital realm, namely, a range of optical aberrations created particularly by wide-angle and zoom lenses as well as the limits of very large, costly and heavy super-telephoto lenses.

In order to transcend the optical and digital limits of present camera systems, software systems have been developed that deal with the problems in post-production. While the most notable of these post-production digital editing software programs is Adobe Photoshop, each camera manufacturer has its own proprietary program. In the main, these post-production

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software programs are limited to color correction and sharpening/softening of images. Additionally, some of these software programs are able to emulate specific artificial filter techniques to produce creative modifications of an original image. Nevertheless, manipulating unfiltered RAW image files in post-production processes is time-consuming and expensive and requires considerable skill.

One unintended effect of using digital sensors to capture images in digital photography is that dust accumulates on the sensor surface and thereby obstructs a clear optical image. The vacuum behavior of increasingly ubiquitous zoom lenses moves dust in lenses that are not internally sealed and the existence of dust is a prevalent feature of digital photography. Dust on the sensor is a non-trivial problem that requires tedious post-production correction for each image. The existence of dust on a digital sensor is an inconvenient impediment to achievement of optical imaging quality.

What is needed to correct these various optical and digital aberrations and unfiltered image files is in-camera modification capability for each specific image problem. The present invention describes a digital imaging system to optimize optical results.

Applications of the Present Invention

The present invention has several practical applications. The digital imaging system applies to consumer and professional still and video camera technologies, to cellular telephones and to personal digital assistants (PDAs). Since video technologies are evolving into digital formats, including HDTV and its successors, the present invention would be applicable to these technologies. The present invention also applies to networks of remote camera sensors for surveillance. The system also applies to native digital cinematography and telecine conversion from analogue to digital media. The system may be applied to image scanning and image copying technologies. Finally, the present system may be applied to any optical digital capture, processing and storage sub-system technologies, including groups of sensors or satellites.

Advantages of the Present Invention

There are several important advantages of the present invention. The present system dramatically improves image quality. This digital imaging system eliminates, or minimizes, post-production processes. In addition, the system presents substantial cost savings as well as

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time savings relative to existing digital imaging systems because of the automation of integrated in-camera optical and digital corrections of aberrations.

With the present system, in-camera digital filters will largely replace optical filters. With less distortion, cost and weight/size than current optical filters and with far more control and quality results, the present system demonstrates that in-camera digital filtration out-performs better than external filters. The in-camera filter system is also an improvement over post-production digital filter systems which require substantial time, cost and skill to implement.

By using the present invention, users will be able to use lens apertures that are wider open, because lens aberrations will be corrected. In turn, this increased latitude will allow more efficient (2+ stops) use of available light and will allow slower lenses to achieve quality images that have traditionally been in the domain of expensive fast lenses. The process of photography will be made generally more efficient.

The present system allows camera manufacturers to design different, predominantly smaller, lenses. Moreover, with providing a system for digital corrections, camera lenses may use less expensive optics and still obtain good results. This process will, in turn, accelerate the adoption of low-cost digital photographic systems and, in the aggregate, increase the overall size of the digital photographic market. Similarly, there will be an increase in the effectiveness of zoom lenses, which are already becoming popular. With the present system, 35mm optics may obtain the quality typically recognized by 4x5 film camera systems. The present system will thus facilitate photographic digital imaging to supplant the film era.

Its application to digital scanning and copying will allow the present system to become ubiquitous as a system to improve imaging.

Because the system presents an integration of several critical subsystems that are centered on digital imaging processes, the system has applications to video photography, satellite systems and surveillance systems. The dynamics of the operation of the subsystems of the present digital imaging system reveal the refinement, efficiency and optimization of the digital photographic paradigm.

Importantly, since the present system uses apparatus and methods that are implemented with software processes, in-camera software can be constantly upgraded and remotely downloaded, while image files can be automatically uploaded, organized and published.

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If the goal of the evolution of photographic technology is to increase the number and quality of excellent images, the present system will revolutionize photography.

Solutions to Digital Imaging Problems that the Present System Presents

The present system provides in-camera digital corrections to both optical and digital aberrations. In the case of optical aberrations, distinct lens-specific imperfections are caused by wide-angle, telephoto and zoom lens types. In the case of digital aberrations, specific digital artifacts, such as aliasing and dust, must be corrected.

The present invention also designs specific improvements to digital sensor design. These hardware architecture modifications allow digital imaging to maximize both optical resolution and image exposure range.

Post-capture in-camera filtration is only part of the solution. There is also a need to modify the digital sensor, whether CCD or CMOS, with specific filtration in some cases, including a low pass anti-aliasing filter and a polarizing filter. This post-optic pre-sensor filtration works with post-sensor in-camera filtration processes.

In the context of specific complex processes, such as in zoom lens modifications of focal length and in full-motion video processing, additional corrections are performed using the digital imaging system which continuously optimizes performance.

Finally, the present system reveals approaches to improve network coordination and wireless external storage and publication capabilities for digital imaging systems.

BRIEF SUMMARY OF THE INVENTION

The present invention is divided into several main sub-systems: (1) digital filters to correct optical and digital aberrations; (2) digital sensor improvements and nano-grids; (3) digital system improvements that link multiple digital corrections; (4) dynamic digital imaging system improvements that apply to zoom lenses and video imaging; and (5) digital image network improvements. There are several distinct improvements for each category of sub-system listed.

DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic drawing of a digital imaging system.

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Fig. 2 is a flow chart of an analog to digital signal process.

Fig. 3 is an image of the vignetting corrective filter in an optical lens.

Fig. 4 is a list of wide angle 35mm lens types.

Fig. 5 is a flow chart of the digital corrective process.

Fig. 6 is a schematic diagram of different types of optical aberrations in different configurations of the same lens.

Fig. 7 is a flow chart of the process of digital image capture, processing and storage.

Fig. 8 is a flow chart illustrating the process of selecting filtration settings.

Fig. 9 is a pair of diagrams showing the varied depth of field optimization at different apertures.

Fig. 10 is a flow chart showing exposure optimization using digital correction in camera.

Fig. 11 is a flow chart illustrating the use of in-camera special effects filtration.

Fig. 12 is a flow chart showing the selective in-camera filtration of specific objects.

Fig. 13 is a flow chart describing the exposure adjustment of an image using in-camera filtration.

Fig. 14 is a flow chart showing the process of in-camera special effects filtration.

Fig. 15 is a flow chart showing the process of in-camera digital correction for sensor dust.

Fig. 16 is a diagram showing a digital camera with an ASIC array.

Fig. 17 is a diagram illustrating a digital camera with interchangeable CCD and CMOS sensors.

Fig. 18 is a diagram of a digital camera with a nano-grid before the sensor.

Fig. 19 is a diagram of a nano-grid.

Fig. 20 is a diagram showing the feedback loop connecting the processor and the nano-grid.

Fig. 21 is a diagram illustrating the tri-pixel architecture in a digital sensor.

Fig. 22 is a flow chart showing the pre-programmed modules for in-camera functionality.

Fig. 23 is a diagram showing the pre-sensor modification process in a digital camera.

Fig. 24 is a flow chart showing the integration of optical and digital corrections with feedback.

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Fig. 25 is a flow chart showing the interactive feedback mechanism of integrated corrections.

Fig. 26 is a flow chart describing the adaptive user pattern learning process to process images.

Fig. 27 is a flow chart describing the feedback process in filtering images.

Fig. 28 is a flow chart showing software privacy function in a digital imaging system.

Fig. 29 is a flow chart showing the dynamics of zoom lens corrections in digital imaging.

Fig. 30 is a diagram illustrating object tracking in dynamic changes in video corrections.

Fig. 31 is a flow chart showing object tracking of a digital imaging system.

Fig. 32 is a flow chart showing the caching process of an object in motion in a stationary scene.

Fig. 33 is a diagram showing network coordination of fixed sensor grid tracking multiple objects.

Fig. 34 is a diagram showing the wireless communication features of the digital imaging system.

Fig. 35 is a flow chart showing an image organization system.

DETAILED DESCRIPTION OF THE INVENTION

(I) Digital Filters to Correct Optical and Digital Aberrations

(1) Lens-specific digital correction of fixed focal-length lens for specific optical aberrations in camera.

Each lens has some sort of aberrations because of the trade-offs involved in producing lenses of usable size and practical commercial cost. The challenge of building lenses for SLR camera systems lies in accounting for particular restrictions and compromises, particularly for wide-angle and zoom lenses. In the case of wide-angle fixed focal length lenses, several main kinds of aberrations occur, including spherical aberration, distortion (pin cushion distortion and barrel distortion), astigmatism, curvature of field (manifesting as the reduced corner exposure of vignetting) and comatic aberration (a distortion evident with long exposures). The extremes of each of these aberrations have to be corrected in post-production.

In the case of vignetting, a type of aberration in which the corners of an image are exposed a stop less than the image's center area, software can digitally emulate a center-neutral density filter to compensate for the light fall-off on the edges. This operation identifies the

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degree of light fall-off for each specific lens and adjusts the brighter areas in the center of the lens by appropriate exposure compensation. A consequence of this digital equivalent of the traditional optical solution to vignetting is that the image will require exposure metering of the subject at a level consistent with the outside edges of the image rather than the typical inner section. In the present system, the camera will use pre-set calculations compensating (generally one stop) for the specific gradations of the curvature of the field for each lens, with an increasing compensation correlated to an increased angle of view. Similarly, barrel distortion and pin-cushion distortion, which also manifest in image corners, are corrected using processes of employing pre-set calculations, to compensate for optical distortion, particularly in wide-angle and zoom lenses.

In addition to integrating into the camera the traditional process of image correction for exposure gradations of vignetting, the present invention offers two further embodiments. First, instead of darkening the center to match the darker corners, the in-camera digital compensation system will lighten the corners to match the exposure of the center of the image. In the second embodiment, the in-camera digital compensation system will both lighten the corners somewhat and darken the center of the image somewhat, to produce a more pleasing and realistic effect. The in-camera digital corrections of the vignetting problem dramatically improve the traditional optical solution of a center-weighted neutral density filter, which typically degrades image quality as it evenly illuminates the full image.

Since each lens has specific aberrations, depending on manufacturer and even differences in the specimens themselves, the camera software system will have preprogrammed general corrections for each specific lens type. For instance, while a 20mm f2.8 lens varies among manufacturers, the general optical aberrations will be similar. An effective software solution is one which brings the optical image quality to a level consistent with a benchmark as measured by low MTF curves for each lens in its class in terms of both resolution and contrast throughout the image. To exemplify this benchmark, retrofocus rangefinder lens performance results of wide-angle lenses, which lack a shutter mechanism to design around, can be used for comparison. To accommodate the mirror in the SLR design type, the rear nodal point in SLR lenses are shifted forward, creating distortion. In contrast, the present system suggests applying a digital solution to compensate for this problem.

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In a general sense, this process of correction is similar to correcting an ocular astigmatism with reading glasses. However, rather than using an optical solution to an ocular problem, the present system reveals a digital solution to an optical problem.

In the process, the camera identifies a specific lens and refers to a database that matches the lens type with the specific aberrations. The aberrations are consistent throughout all images for each formula of a specific prime lens type and are thus corrected by adjusting for each specific aberration category. Generally, the larger the angle of view of a lens, the greater the distortion and the greater the need for in-camera digital corrections.

In addition to the kinds of distortions created in wide-angle lenses, other types of distortion occur primarily in large aperture telephoto lenses, most notably chromatic aberrations that require apochromatic corrections. Rather than employing large, heavy and expensive extra dispersion glass, such as fluorite elements, the present system allows each lens type to be digitally corrected for these types of aberrations. The in-camera digital process works by identifying a specific lens and comparing the lens pattern to an internal database. Mathematical calculations compensate for the shift in red and green light that apochromatic corrections require for very low MTF curves registering high standards of resolution and contrast by emulating the optical benefits of extra low dispersion glass elements.

Since lenses of the same focal length but with different maximum apertures represent completely different lens designs, modifications of their aberrations will vary relative to each specific lens type. For example, a 24mm f/2.8 lens will have a different optical formula than a 24mm f1.4 lens in a 35mm camera system. Similarly, a 28mm f/2.8 will differ from both a 28mm f/2 lens and a 28mm f1.4 lens and will thus each require different adjustments for vignetting, spherical aberration, pin cushion distortion, barrel distortion and coma. In other words, each lens with a unique optical formula will have specific aberrations, the corrections for which will be accessible in a database.

Another type of optical aberration that affects lenses involves flare, which is a sort of specific reflection of light sources. While improvements in lens coatings have been used to correct for flare, high refractive glass also eliminates flare. The present system uses digital processes to emulate these flare reduction functions on lenses even at maximum apertures.

In addition to the lens-specific types of corrections that are supplied by in-camera software, a function that optimizes contrast provided by limited reflected light is required. In

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general, lens hoods reduce reflected light. However, in the absence of a lens hood, scattered light will adversely affect contrast in all lenses. Thus, a general digital solution will optimize contrast from reflected light by emulating the effects of a lens hood.

Because the pixels on a digital sensor behave as neutral intermediaries to record light, the aberrations on specific fixed focal length lenses will be prominent. It is therefore necessary to filter out various optical impurities. In all cases, the digital in-camera software program emulates specific filters to effectively correct specific optical aberrations.

By digitally adjusting for optical distortions, the present system advances the state of the art for fixed focal length lens optics, beyond any opportunities available in film cameras. The following chart illustrates a list of optical distortions that are corrected by in-camera digital solutions.

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	Fixed Focal Length Lens Type		Zoom Lens Type		
Specific Aberrations	**Wide-angle**	**Telephoto**	**Wide-angle**	**Wide-to-Tele**	**Telephoto**
Spherical	X		X	X	
Comatic	X	X	X	X	X
Astigmatism	X		X		
Distortion (Pin Cushion and Barrel Distortion	X		X		
Curvature of Field	X		X		
Chromatic		X		X	X
Flare	X	X	X	X	X
Scattered light (Unpolarized)	X	X	X	X	X
Color Accuracy	X	X	X	X	X
No Lens Coatings	X	X	X	X	X

(2) Multivariate digital correction using matrix filter system in camera

Since typically several distinct aberrations exist in a lens, it is necessary to correct each of the aberrations. For this multi-dimensional problem there is a multivariate digital in-camera software correction solution. The problem of correcting multiple aberrations presents the additional challenge of requiring acceleration to complete multiple tasks rapidly. In most cases, the hardware employed in a camera's chip set will include an application specific integrated circuit (ASIC) which processes a particular program rapidly. It is appropriate to facilitate the combination of corrections to multiple simultaneous aberrations with an ASIC or multiple ASICs.

There is a need to optimize both resolution and contrast across the image area for accurate light reproduction. One way to do this is to stop down the lens to an optimum aperture of about f/8. However, this solution sacrifices the advantages of a fast lens design and capability, namely, limited depth of field and bokeh (smooth out-of-focus area). Though

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resolution is typically improved by stopping down a lens, digital sensors are generally still restricted in their latitude of contrast. Therefore, regarding both resolution and contrast, it is necessary to provide multiple adjustments of the native image with in-camera digital corrections.

While it is possible to produce mathematical algorithms for automatic correction of optical aberrations, it is also useful to have manually adjustable variables. Therefore, the present system includes a function whereby one may omit a specific correction in an image by using a lens with multiple aberrations in order to induce a particular creative effect. This factor may involve a lack of exposure compensation, a lack of correction for spherical aberration or an improperly or partially corrected apochromatic modification.

In one example of the use of multiple corrections, simultaneous application of multiple digital filters concurrently corrects multiple aberrations. In effect, this is like adding layers of different eye glasses to repair multiple types of astigmatisms for each specific ocular condition. The dynamics of correcting multiple simultaneous aberrations may be complex, but since the number and type of aberrations are constrained to a specific lens type, a centralized database may be accessed with specific corrections for each respective aberration. For example, lenses with multiple complex aberrations, such as in very wide-angle lenses, will require multiple corrections. These combinations of corrections become complex as focal length modes change in zoom lenses and as aperture changes.

The following is a list of filter types that provide digital methods of correcting image problems or creating specific effects. The list is not intended to be comprehensive or systematic.

Filter Type in Digital App.	**Most Common Uses**	**Other Filter Types**
UV (and Sky)	General Use	Polarizer
Color-enhancing (and warming)	17mm-200mm (in 35mm)	Close-up
Contrast	17mm-200mm (in 35mm)	Special effects filters
Black and White (Red, Orange, Yellow, Green)	17mm-200mm (in 35mm)	
Infrared	17mm-200mm (in 35mm)	
Color Graduated (Neutral Density)	17mm-200mm (in 35mm)	
Diffusion (Soft, mist/fog, star, streak)	24mm-135mm (in 35mm)	
Combinations (Neutral density and enhancing, Polarizer and UV)	17mm-200mm (in 35mm)	

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In the past, these optical filtration processes were added after the production process via editing software such as Photoshop. However, in the present system, these combinations of processes are performed in-camera by user-adjusted settings. In the case of artificial color changes to an image, digital processes emulate specific optical filters by adding a specific color or a combination of colors. On the other hand, in the case of diffusion filtration, the in-camera digital process creates an emulation of optical filters. The classic example of this diffusion approach is the soft filter, which is used for portraiture. In this case, various user-adjustable settings in the camera digitally manipulate soft filtration.

(3) Depth-of-field optimization using digital correction in camera

In addition to correcting optically-generated aberrations with in-camera digital processes, the present system allows in-camera depth-of-field (DOF) optimization by affecting the aperture of the lens that is used.

DOF in an image is dependent on the aperture setting in a lens, in which a moderate DOF range – allowing a subject to be isolated in an image – can be manipulated, that is, extended or narrowed, by the camera's digital processing capability. In the film paradigm, one obtains a specific aperture, and thus the corresponding DOF, that is preset by the photographer. However, in the digital paradigm, by contrast, one can *narrow* an image's surplus DOF range in-camera by manipulating the aperture. This process can only be done in the camera, because once the digital file is sent to post-production editing, the aperture and DOF is already set and incapable of being changed. The aperture is narrowed in camera by isolating the subject and shifting the field of view (forward from the rear range of DOF and backward from the front range of the DOF). Distance information is used to recalculate an optimal DOF. In another embodiment, the camera provides feedback from an internal computational analysis that results in a specification of less DOF and takes another image (or images) with a larger aperture to accomplish reduced DOF at a specific focus point.

The camera will effectively identify a type of subject and provide an optimal aperture for this subject. For instance, for a portrait, the camera will select a shallow DOF around the subject. In the case of a distant landscape, the camera will focus on a distance at infinity and provide a nominal aperture to correspond to shutter speed that will fit the available light as matched to a specific lens. A near landscape photographed with a wide-angle lens will, on the other hand, have a near focus and a maximum DOF; specific subjects will be highlighted with

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ample DOF. The camera will also have the capability to bracket exposures in several successive images based on DOF variations.

The DOF manipulation thus depends on a combination of data sets including the particular lens used (wide-angle lenses have greater DOF at moderate distances than telephoto lenses), the distance information and the unique combinations of aperture and shutter speed. DOF will narrow with less distance, with use of a telephoto lens and a fast aperture; contrarily, DOF will expand with a further distance, with use of a wide-angle lens and a slower aperture.

In another embodiment of this process, test images are taken and analyzed, then later images taken with new settings optimize DOF for each image type.

(4) Exposure optimization using digital correction in camera

One phenomenon that film currently records better than digital photo technology is exposure latitude. Film is capable of greater exposure latitude than either CCD or CMOS digital sensors, though each digital sensor type has strengths and weaknesses. For the crucial detail recorded in a scene, film provides far more depth of tonal range. Yet some of this problem – caused by the limits of digital sensors themselves and the way that photons are recorded by electrically charged pixels – can be digitally corrected and optimized in-camera.

The problem derives equally from the method of measuring exposure as well as the method of image capture by a digital sensor. In general, since there is less exposure latitude in digital sensors, as compared to film, the maximum scope is two or three stops in the image tonal range. Consequently, the camera must meter the image within constraints of the tonal range of the digital sensor, with the sacrifice of either shadow detail or highlight detail. In an image with broad exposure range, then, the image will generally be either too light or too dark because metering for one area sacrifices the other tonal category.

One way to solve this problem is to manipulate the lens aperture, because increased aperture within an optimal limit generally increases detail. An optimal aperture of f/8 provides more detail and clarity than at f/2 or at f/32. The in-camera processor may thus seek out more detail in the image by manipulating the aperture to the optimal range of f/5.6 to f/11, depending on the type of subject and the availability of light. With more detail in the original image, it is possible to interpolate the digital data in the image file by increasing both shadow and highlight detail and to gain an additional stop or two of tonal range.

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In another embodiment, the tonal range of an image data set is enhanced in-camera by using meta-data to sample the range of shadow and highlight detail. The data sets are interpolated to add requested shadow detail and/or highlight detail. Obviously, some subjects require more or less shadow or highlight (or both), which the camera can correspondingly adjust. These tonal range corrections are user-adjustable.

In an additional embodiment of in-camera tonal range corrections, exposure data are bracketed by manipulating the aperture and shutter speed to lower or raise the overall exposure in one-third to one-half stop increments. This bracketing method may be correspondingly limited to a specific image type. For instance, in a portrait, the extraneous background, which ought to be out of focus, is not emphasized in the exposure data, while the main subject is carefully nuanced for balancing an optimum of both highlight and shadow, or for an exclusive emphasis on either highlight or shadow.

The overall problem of limited tonal range in digital photography stems from mismatched exposure-metering mechanisms of digital sensors with substantially restricted tonal range capabilities. One interesting example of this problem occurs in scenes with two or more stops of difference, such as a landscape with sky on top and earth on bottom. A filtration process will operate on the key parts of such an image, as described above regarding the vignetting phenomenon; the overexposed top half of the scene will be gradually underexposed while the lower half of the scene will be gradually overexposed. This scene-specific adjustment of exposure greatly increases the tonal range of digital images and is made possible via analysis of the scene and comparison to a database of typical scenes categorized by the in-camera digital processor which effects correction using the methods described herein. In this example, the corrective process emulates the use of neutral-density optical filters.

(5) Special effects digital filtration of specific objects

Though there are several main categories of special effects optical filters, including color enhancing, infrared and diffusion, the use of diffusion filters appears to elicit the most dramatic effect. Diffusion filters are categorized as soft effect, mist/fog, black mist, gold diffusion, and star and streak, with various degrees of diffusion producing lesser or greater distortions. In effect, rather than removing optically-generated distortions, we are deliberately creating photographically desirable distortions. It is possible to reproduce these special effects by using

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the digital post-capture production processes in the camera. In this case, the camera digitally emulates the special effect by applying user-adjustable filter settings.

Portraits have traditionally used some sort of soft effect filtration approach which is producible in the camera using the methods described here. After the image is captured, the camera analyzes the image's meta-data and applies a correction by interpolating the data with specific filter emulation. In the past, specific camera lenses, such as the 135mm soft effects (also called "defocus control") lenses performed this function optically with an included adjustable lens element. This defocus control lens type will focus on the main subject and a lens element setting of the telephoto lens to produce a soft filter effect. In addition, because this lens type uses a nine blade aperture, the background that is out of focus has a pleasing bokeh in which the gradations of tone are evenly smooth. Nevertheless, a sophisticated digital camera is able to produce the same results with more information provided by a normal telephoto lens, using the method of emulating special effects in-camera.

Another novel special effect that is a further embodiment of the system is the ability of the in-camera digital corrective system to use complex data sets contained and analyzed in an image to create a three dimensional (3-D) representation of the image. The camera creates a 3-D image by arranging the DOF in a way that optimizes the aperture by using distance information and autofocus data to isolate a subject. By removing the foreground and background of the image as a center of subject focus, the DOF will emphasize the subject only as 3-D. The key to this effect is the application of specific exposure data as indicated above, because it is in the increased extension of the range of highlight and shadow that the subject in the image will attain a 3-D quality in contrast to its out of focus foreground and background.

An additional embodiment of the present system would extend the still photography in-camera special effects to video with full-motion ranges of filtration actions.

Finally, it is possible to *combine* different user-programmable special effects in-camera by adding the various types of diffusion methods for a specific image.

(6) Selective in-camera filtration of specific objects

The combination of sophisticated auto-focus technologies and in-camera auto-exposure systems provides the opportunity to isolate a subject by focusing on the subject and narrowing the DOF range by manipulating the aperture. In a further extension of the subject-isolating capabilities of these technologies, it is possible to digitally filter out specific objects in a scene

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in-camera while focusing on other selected objects that are in a specific range of DOF. In other words, one may apply filtration to correct aspects of a single object or only the background of a scene to the exclusion of an isolated object, rather than correcting a whole scene. Selective filtering of specific objects in an image by in-camera digital processing affords greater creative flexibility.

Because the camera uses distance information to isolate a specific object by focusing on the object within a range of DOF, it is possible to isolate a particular object for the purposes of applying a specific filtration preference, such as manipulating the color, correcting the optical aberration (say, if the object is in a corner of the image of a wide-angle lens), providing a special effect (such as a soft effect only on a specific object rather than the scene as a whole) or using some combination of these corrections. Once the camera isolates the selected object (using auto-focus mechanisms and distance information), the user selects programmable correction features to perform a corrective function only on the specific object (or only on the parts of the scene that are exclusive of the object). In a further embodiment, contrastively, once the object is isolated, only the background may be selectively manipulated with filtration, achieving pleasing effects. This in-camera corrective feature provides a powerful tool to rapidly manipulate an image without using post-production editing software tools.

These object-specific in-camera selective filtration capabilities are particularly dramatic with fast-moving action photography in which split-second timing produces the preferred complex effects. Selectively identifying a particular object for intensive combinations of filtration is a highlight of the present system.

(7) Digital correction in-camera of intermittent aberrations caused by dust on digital sensor

Dust on a digital sensor is a major concern for photographers. The use of zoom lenses compounds this condition, because as the zoom lens changes focal-length positions, air is transmitted, which results in the proliferation and diffusion of sensor dust. Unless photography is isolated to a clean room, the problem of dust on a digital sensor will remain prevalent. The present system provides a method to correct for this phenomenon.

In the case of dust on a sensor, a specific consistent pattern emerges on each image captured by the digital sensor. Consequently, information from various images is analyzed, and the pixels affected by dust are identified. Information from the consistent fixed pixel positions that are affected by the dust are then isolated. The specific positions with the dust are then

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analyzed by comparing the immediate areas surrounding the dust that are not affected by it. These unaffected areas are analyzed, and the affected areas are interpolated to provide a continuous tone. In effect, the images identify the locations with dust by using caching technology. The continuity of the location of the dust between multiple images provides information to the in-camera image processor to detect the specific pixel locations. The camera will then apply a corrective process to the isolated dust locations with adjoining exposures by interpolating these distinct locations for each specific image configuration.

In another embodiment of the present system, "hot" (too bright) or "dead" (too dark) pixels are interpolated out of the scene using the method described above. Unlike hot or dead pixels, dust is a similar but temporary version of the same problem of an artifact that requires in-camera modification. In effect, a map is built to discover, isolate and interpolate bad pixels, which are a permanent problem revealing a key limit in digital sensor technology. Separate maps are constructed for permanent pixel dysfunctions and temporary pixel aberrations (viz., dust). In both cases, the camera works from these maps to correct the aberrations on a pixel-level.

In a further embodiment of the present system, Monte Carlo analysis is applied to the problem of identifying the location of dust on specific pixels (or partial pixels) by randomly creating an initial map from information of at least two contaminated images.

In still another embodiment of the present system, the process of modifying pixel aberrations (either permanent or temporary) uses a sequence of operation which begins by correcting the major aberrations first, then repairing the minor aberrations, thereby maximizing efficiency. This is done by starting the corrective process in a specific location of the image and moving to other positions in an efficient pattern.

(8) Sequence of corrections for multiple (optical and digital) types of aberrations in camera

Since it is evident that multiple digital filtration approaches may be used for specific types of problems or aberrations or to achieve specific effects, it is clear that a combination of the techniques may be employed simultaneously on specific images. The present invention allows the various optical and digital corrections to be performed in camera in a sequence of actions. The user selects the various combinations of functions required to be performed, inspects the effects, and chooses the most effective combination of effects. Thus the invention offers a combinatorial optimization of the totality of corrective filtration approaches.

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After the images have been taken, it is possible to inspect them in the camera using the camera's image read-out. This makes it possible to create new files, or to adapt a RAW file, in real time, by manipulating the various corrections in sequence. This post-image-capture in-camera editing process allows multiple corrections to be applied to a range of optical and digital aberrations by combining various specific corrective techniques.

In some cases, the user can pre-set specific corrections. For instance, to correct for optical aberrations, a user may leave this function on permanently. In other cases, such as selective filtration of a specific object or optimization for DOF or exposure, there may be discriminating use of specific corrective functions. In the case of selective user choice, it is possible, by using the present invention, to select a priority sequence of corrections in layers. While specific select layers may be permanently activated, for example to automatically adjust specific optical aberrations, additional sets of layers may be manually selected in order to modify the specific aspects of each image, particularly to adjust or correct digital aberrations. This process can be performed with a single microprocessor, multiple microprocessors, multiple ASICs or a combination of microprocessors and ASICs.

An additional embodiment of the system provides multiple combinations of corrections and effects via multiple independent ASICs, which only perform specific functions, working in parallel. The various tasks are divided into specific-function ASICs for rapid processing. The advantage of this approach is accelerated processing speed in performing multiple simultaneous functions.

(II) Digital Sensor Improvement and Nano-grids

(9) Interchangeable digital sensor system using both CCD and CMOS to optimize best results

Because the main digital sensor types of CCD and CMOS, like film types, each have benefits and detriments, it is sometimes advantageous to provide the utility of both sensor types in a camera system. With the exception of a video camera, which employs three CCDs, the use of multiple sensors has not been adopted. Two generations ago, however, the idea of using a twin reflex camera for medium format photography was implemented. In this case, though focus was coupled between the lenses, one lens was used to see the subject, while the other lens took the picture. This method was used to obtain the benefits of a rangefinder camera with a single lens reflex camera.

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The use of two types of sensors in a camera is compelling, because the user benefits from the strengths of both. In the present invention, one sensor is selected from among at least two different types of sensors that are rotated to an active position by the user. One advantage of this approach is that if one sensor experiences a problem, there is a reserve sensor available at the push of a button.

This capability usefully exploits the strengths of each particular sensor. For instance, in situations in which high resolution is required, a CCD may be preferable, while in cases in which increased tonal range or low noise is preferable, a CMOS sensor may be preferable. With this approach, a customer does not need to choose between different types of sensors.

The process of interchanging the two chips is performed by placing the two chips on either façade of a plane that "flips" over (i.e., rotates 180 degrees) upon demand to obtain the requirements of the chosen chip type. This mechanism would fit behind an SLR's mirror and could easily be performed as long as the mirror is in the "up" position. In another embodiment, the chip exchange process can occur by sliding alternating chips into a sleeve from a single location and replacing the non-utilized chip(s) into the reserve compartment. In either event, the camera will detect the chip exchange and will automatically reprogram software functions and settings for the usable chip.

(10) Nano-grids for selected pixels on CCD or CMOS integrated circuits to optimize selective modifications of exposure, ISO and aberrations in digital photography

Digital sensors consist of arrays of pixels, arranged in rows, which behave as tiny buckets for converting photons to electrons. As the pixels fill up with light, they are able to discern slight differences in color and exposure and transfer the energy, in the form of electrons, to storage. Charge coupled devices (CCDs) have been the predominant form of digital sensor because they use a form of electronic charge which creates the behavior of a bucket brigade of transferring data, once the buckets in a row are filled up, to successive rows for digital data storage of the electronic charge sets. CMOS digital sensors may be structured with larger bucket pixels, which can increase the depth of the light captured and thus the latitude of light exposure that is stored. However, for the relatively larger buckets to provide increased photon capture capacity, it is necessary to control the width of the opening in the top and the width of the buckets so that the amount of light captured may be modulated.

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The present invention introduces a key advance in the ability of digital sensors, particularly CMOS sensors, to modulate the size of the openings of the pixels. Specifically, the present system provides for a nano-grid, or a very small matrix of filaments, which fits over the sensor. The nano-grid is carefully calibrated to match the rows of pixels on the sensor so as to limit the amount of light that each of the buckets may receive. Use of the nano-grid allows a selective closing of the large buckets in order for photons to be restricted. Selective modification of specific pixels on the neutral grid makes it possible to identify specific sets of pixels to correct for various exposure or lens aberrations.

In this embodiment of the present system, data about a specific lens are provided to the camera in order to correct specific lens aberrations, while exposure data is used to modify image capture using nano-grids for optimum image performance.

Nano-grids may be selectively switched at different pixel sites, akin to continuously programmable field programmable gate array (CP-FPGA) semiconductors, which modify architecture in order to optimize effective operation by constantly manipulating the chip's gates.

Nano-grids may be used for specific image modes, for example, nocturnal imaging, which requires more time to read a sufficient amount of light. In this case, a specific software module may provide lens and exposure data to the camera, which then determine the precise composition of nano-grid correction to provide to specific sets of pixels on the digital sensor. In effect, nano-filaments move to positions to effectively block out the full capacity of the pixel buckets and thus change the pixel effects. With use of preset nano-grid positions for particular applications, the identification of specific vectors of nano-filaments is performed, and exposure adjustments are made on specific images in hardware.

The nano-grid is overlaid over the surface of the pixel architecture. The nano-grid is used not only in specific pre-set positions, but it also provides feedback to the post-capture system for analysis and repositioning to achieve the desired effects. One effect of the nano-grid is to manually expand or narrow the range of a set of pixel buckets; this process in turn effectively modifies not only the exposure range but also sharpness at high ISO, thereby dramatically reducing noise. Consequently, it becomes possible, by modifying the pixel bucket width and height, to obtain extremely sharp images with excellent contrast and tonal range even in poor lighting, a feat heretofore impossible.

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The nano-grid performs these mechanical functions by moving the nano-filaments in an arc, like expandable windshield wipers. Though nano-grids are particularly useful in CMOS chips, they are also useful with CCDs. In fact, with the advent of nano-grids, CCD pixel size (and density in pixel-rows which will affect the overall sensor size) may be expanded and thus made substantially more versatile.

In a further embodiment of the present invention, multiple screens, or grids, would be placed over the digital sensor. The use of multiple nano-grids provides increased capacity to perform the function of closing off the pixel buckets and, in fact, to completely close off selected pixels to make the image effect completely dark. The combinations of nano-grids behave as multiple screens that move left and right to achieve the desired effect. Although there is a need to periodically calibrate the screens to effect their precise positions, this system will employ an electric charge to push the nano-filaments to the desired locations.

Nano-filaments move to block the space allowing photons to hit the pixel in order to limit the amount of light capacity available to the pixel. The complete darkening of the pixel will result in a total black color in the resulting image.

Exposure data feedback is provided to the digital sensor to effect the precise positioning of the nano-grid(s). In a further aspect of the present system, the camera's computer will anticipate the exposure data by statistically extrapolating from the pattern created by at least three data sets. A microprocessor (or ASIC) controlled nano-grid mechanism will use the feedback to anticipate specific nano-grid positions in order to optimize the exposure and corrective functions.

In one application of the nano-grid, the problem of vignetting in wide-angle lenses may be solved by activating nano-filaments in nano-grid(s) primarily in the corners to correct for the darkening from the limits of the optical aberrations, while still maintaining very low noise in a high ISO (low light) photographic situation. The use of the nano-grid would thus contribute to solving multiple problems.

Nano-grids will also be useful in accurately correcting for both color and exposure detail. In fact, with nano-grids, the capacity of digital sensors' range should be substantially increased, because the chips' pixel bucket sizes can be modulated. Therefore, not only will the lighting and color be accurate, but sharpness and optical aberrations will also be optimized, in ways not possible before.

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(11) Integrated nano-grids in digital sensor

In a further embodiment of the system, nano-grids may be integrated into the digital sensor. In this form of the nano-grid, the nano-filaments are constructed *within* the pixel buckets in order to increase their accuracy and responsiveness. The nano-filaments mechanically move in various directions to perform the main operation of modulating light into their respective pixels. This method of organizing nano-grids and nano-filaments increases the rapidity of response to feedback. In effect, each pixel has a mask, or flexible lid, contained in it, which may open and close, to allow more or less light into the pixel bucket.

The integrated nano-filaments are activated by oscillation between positive and negative charges. In the context of a CMOS sensor, the transistor networks oscillate between positive and negative charges. This architecture allows a "push-pull" design of nano-filaments in which the negative charge "pulls" and the positive charge "pushes" the activation of the nano-filaments. This charge-enabled nano-grid (CENG) advantageously allows modulating gates (i.e., filaments) integrated into the pixel to reduce spaces between pixels, thereby allowing more pixels to be packed on the same surface area. The net benefit of the use of integrated CENG filaments is that specific sets of nano-filaments will produce specific effects on-demand and allow far more tonal detail than has been possible before.

In a further embodiment of the present system, sophisticated digital sensors may contain combinations of nano-grids that appear on top of the sensor as well as nano-grids that are integrated into the digital sensor. This combination will provide maximum latitude for processing the greatest effect available.

(12) Combinations of nano-grids and digital corrections applied to digital imaging system

Whereas it is possible to exclusively implement nano-grids to control the amount of light penetrating specific pixels, and it is possible to exclusively provide digital corrections as specified above regarding correcting optical or digital aberrations, a further embodiment of the present invention combines the two processes in order to optimize imaging.

Combining these two complex processes makes it possible to modify pixel capacity to maximize exposure latitude, to expand exposure modification and to apply digital correctives for optical and digital aberrations. Hence selective exposure far beyond the limits of present film or digital photography is made possible. The restrictions of film can thus be transcended by using

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the present system, whereas use of a static and limited digital system would not be sufficient to facilitate these complex corrections.

The unique combinations of these processes also illustrate a complex system that provides feedback from both the environment and the photographer. The photographer may select preset exposure settings that will activate a range of options in both the nano-grids and the digital corrective system, while the lens aberration corrective system is automatically implemented. Once the camera detects specific conditions, such as a broad range of exposure latitude, from very bright to very dark, in the scene, it computes the precise number and location of nano-grids needed to modulate the pixels for optimum exposure with highlight and shadow detail and extreme sharpness, even in relatively low light. The dynamics of these multiple processes present trade-offs in selecting the best available set of selected modifications.

(13) Tri-well pixels

As indicated above, one of the key problems with current digital sensors involves dynamic range. There is a need to limit the scope of the space in the pixel well, into which light is captured, then converted into electrons. The challenge with current technologies is to balance details in shadow and highlight areas, particularly to acheive low noise at relatively high ISO speeds.

In addition to the concept of nano-grids, both in surface screen and integrated embodiments, as specified in (10) to (11) above, the present system introduces the notion of three side-by-side differentially-sized buckets within each pixel intended to optimize dynamic range for increased sensitivity. In the most common configuration, the three different-sized buckets are arranged with the largest bucket (in both width and height) in the center, with the second and third largest buckets on either side. The buckets are elliptical and concave in architecture to increase efficiency of fitting together in a round pixel structure. Their structures are semi-circular and elongated. The largest and tallest bucket will be tasked with maintaining the details in highlights, and the smallest will be tasked with maximizing the details in shadows, while the mid-sized bucket will be tasked with maintaining the middle range of exposure details. The pixel will have data from all three buckets available, but will select the data from one or more buckets depending on the exposure details.

The system is analogous to the high fidelity sound technology in speakers with crossovers, whose several frequencies are used by the tweeters, mid-range(s) and woofers; the

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crossover point at which the frequency changes from one component to another can be modified based on the specific mechanics of each component.

In the case of the multiple buckets in a single pixel, the buckets are connected by filaments to a central grid which captures and stores the electrons. When the photographic scene displays increased light, image data from the larger buckets are selected to be recorded by the processor, while in cases of darkness and increased need for sensitivity, the smaller buckets are selected to be recorded; the mid-sized bucket is used in normal light situations of most cases. Further, this multi-aspect architecture can use pixels in varying positions on the sensor differently, particularly to facilitate processing far more dynamic range and to produce uniform tonal range in scenes that vary more than two or three stops. This novel multi-aspect model solves a number of key problems involving exposure dynamics in digital photography.

In another embodiment of the system, there may be more than three buckets in a pixel, so as to divide out the functions further and create even finer tonal continuity. In a further embodiment of the system, several pixels in a super-pixel allow red, green and blue colors to be segregated by each sub-pixel. This approach will be useful particularly in CCD semiconductors because of limits of this architecture, which require coupling circuitry between pixels to pass a charge between rows of pixels. In this case, outputs will vary between the micro-pixels to facilitate the differential processing required.

While cases of two side-by-side pixels might solve these exposure latitude problems, they represent an inadequate solution, much as a speaker with only two components limits the dynamic range output dramatically in contrast with a speaker with five components. This is similar to comparing a diode and a transistor.

(III) Digital System Improvements that Link Multiple Digital Corrections

(14) Auto pre-programmed modules for specific functions in digital imaging system

To process the functions specified in this integrated digital imaging system, it is necessary for automated pre-programmed modules to detect the specific lens type and the specific digital sensor(s) used to assess the appropriate corrections or alterations. The purpose of the pre-programmed modules is to access a preset library of (a) typical corrections of lenses, (b) typical scene types with appropriate exposure modes, (c) specific effects that may be selected and (d) specific sensor functions. It is important to match a particular lens to a particular sensor

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type so that adjustments are calibrated to this pairing. The processing software is stored in either a microprocessor or an ASIC in order to process the images after they are captured by the sensor but before they are transferred to storage on a memory device.

In another embodiment, the system processes image corrections after the digital data is stored and constantly accesses the original stored data file in the production of a corrected file. This process allows for immediate data processing and storage which affords more time to accomplish specific corrective functions. There are thus cases when real-time correctives are neither necessary nor possible. Such increased processing capability may also facilitate a more complete corrective task.

In an additional embodiment, because similar correctives and effects may be provided to images that share the specific combination of lens and sensor, in order to accelerate the process of optimizing the images, batches of similar images may be processed together. This batch processing method may include the creation of duplicate images for each image captured, including a RAW image that contains no changes to the native image capture and a simultaneous auto-corrected image. The optimized image may be simultaneously compressed, to maximize storage capabilities, while the RAW image may be left uncompressed so as to maintain original detail.

(15) Apparatus and process for affecting pre-sensor optical and digital corrections in digital imaging system

Given the nature of light transmission, not all optical corrections are optimized by modification after the image is captured by the sensor. Though a range of important corrections and effects may be made after image capture, such as correction for optical or digital aberrations, there are several types of corrections that are required to be made before the light reaches the sensor. One example of this pre-sensor digital correction involves the use of a low-pass or anti-aliasing filter that resides in front of the digital sensor to minimize moiré and aliasing digital problems (although the use of this filter adversely affects image sharpness).

In the case of optical corrections, one class of filter that requires use before the digital sensor is the polarizing filter, because once light is captured on the digital sensor, the polarizing effect will not be available. Another type of correction that involves use of a filter or lens before the digital sensor is the close-up filter. This latter solution allows a lens's closest focusing plane to be closer to the front of a lens and has the effect of diminishing the rear plane of the depth of

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field. The close-up filter may be optimized for use with floating rear-element group lenses which allow increasingly close focusing. In one embodiment of the system, specific pre-sensor optical filters may be used to provide polarization and close up corrections. The use of in-camera optical (circular) polarization would help standardize this valuable process and eliminate the need to maintain several external polarizer filters for each lens mount.

Since the present system entails an embodiment which uses nano-grids to perform specific exposure modifications before the light hits the digital sensor, it is possible to use these nano-grids for the applications of polarization and close-up filter. These filtration capabilities occur between the lens and the digital sensor.

In order to optimize the use of pre-sensor filtration, an image is initially tested and analyzed before the optimized corrections are activated and the pre-sensor changes are made. This process is analogous to the use of automated flash photography in which a feedback mechanism is provided; a scene is evaluated, and the initial flash data analyzed and modified to correspond to the correct exposure before a final flash is produced.

Because the camera system processes post-capture data, in order to optimize images for optical and digital problems, as well as continuously makes changes to pre-sensor filtration, multiple ASICs work in parallel to make the conversion of the image after capture. The use of parallel ASICs to perform specific correction processes solves the problem of capturing images and making post-capture corrections while simultaneously adapting the pre-sensor filtration system.

As an alternative embodiment of the system, a microprocessor (and software) may perform specific pre-sensor adjustments while the ASIC(s) performs specific corrective functions. In another embodiment, the ASIC(s) may perform the specific pre-sensor adjustments while a microprocessor (and software) will perform the specific corrective functions.

(16) Integrated digital imaging system for optical and digital corrections with feedback dynamics

Because the present system consists of, and uses, complex sub-systems, including an auto-focus mechanism, an auto-exposure mechanism, a shutter mechanism, an automatic flash mechanism, a digital sensor mechanism, a digital processing mechanism and a digital storage mechanism, it is possible to realize interaction dynamics that contain feedback. The interactive process of operating these sub-systems involves a learning progression. The image is analyzed,

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solutions are tested and an optimal solution is selected and implemented, all in real time. By choosing a specific logic vector in a decision tree involving an initial variable, the process begins again with another key variable in real-time until the final image is captured and optimized.

In order to accomplish these complex processes, specific variables, such as aperture data, shutter speed data, lens data, digital sensor data and subject type are registered and analyzed by the camera. As environmental data changes, the camera mechanisms adapt to the environmental and the photographer's situation.

In order to accelerate these processes, the camera learns to anticipate the user's behaviors, the user's preferences and the subject's behaviors. By providing user-adjusted setting modifications for optical and digital corrections, the camera establishes a reference point for processing rapid image changes. In particular, the camera's software will analyze trends in the user's pattern of behaviors and preferences as well as pattern changes in the subject's behaviors. Anticipation processes are programmed into the autofocus and automated flash systems because of the extremely rapid reaction-time requirements of these specific mechanisms.

In one embodiment of the system, a method of processing a chain of rapid image captures is to employ computer-caching techniques in which a first image is processed in a normal way while later images are processed in an accelerated way. This is possible because the first image provides data to the system to analyze; these data then allow the system to anticipate further similar images and to use similar auto-focus and auto-exposure data. The optical and digital corrections are performed in a batch fashion by applying similar changes to near-identical image problems in order to dramatically accelerate the processing speed of a chain of images. This caching and anticipation approach is very useful in fast-paced action photography.

Another embodiment of the process of rapidly capturing a chain of images in sequence employs multi-threading techniques. Dividing the functions between specific subsystem ASICs allows multiple corrections to be performed in a parallel cascade for efficient task completion. One advantage of breaking down functions to specific processors is the acquired ability to start on one function and, while the system is in the process of completing a task, to begin other tasks. This process eliminates the lag between the specific subsystems.

(17) Adaptive user pattern learning with user-programmable functions in digital imaging system

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In order to optimize its functions, the camera needs to learn about the user's preferences. When the user uses the camera, the camera evaluates the use patterns. Since the camera is programmed with a database of common user patterns, it can identify common uses and anticipate common uses of similar users by employing a "collaborative filtering" mechanism (i.e., if you like this camera setting, you should like this other setting because similar users who have liked the first setting have also liked the second setting). By anticipating common uses of each camera user, the camera optimizes its functions for each use and for each user. In effect, the camera's learning of user preferences is a sort of guided process of experimentation. Evolving algorithms learn about the user from actual use patterns.

One positive effect of this learning process of the camera about the user's patterns of behavior is that the filtration process becomes adaptive. The camera builds an initial map of the user's preferences from the user's actual selections. From the starting point of common types of personal selections, the camera uses standard templates of main types of uses that are fulfilled for each user's applications. For instance, if a photographer typically takes portraits with a traditional portrait lens, the camera will be aware of this and will activate filtration processes that are optimal for this type of portraiture photography, such as instilling limited depth of field on a subject and out-of-focus foreground and background. Contrarily, if landscape images are selected, depth of field will be increased substantially and the lens focused on either infinity or a medium point depending on the specific type of subject matter. The camera builds a model for each user based on the accumulation of experience.

In order for the camera to learn about the preferences of a specific user, the camera must adjust to each particular user, much as each individual identity must log onto a computer network privately.

Since the dynamics of the combined subsystems are complex, and adaptive, it is necessary that automated adjustments be interactive. Once detection of the lens type, the sensor type, the exposure settings, the user and the subject is made, optical and digital distortions are identified and specific combinations of corrections are applied both before and after the digital sensor in order to optimize the image. All of this is accomplished in less time than the blink of an eye.

(18) Software privacy function in digital imaging system

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Because digital camera systems are able to use software and wireless mechanisms for their operation, it is possible to activate aspects of the camera remotely. Conversely, it is possible to disable operations of the camera remotely.

The present invention embodies a capability to externally disable the camera remotely in specific locations that require privacy, such as secret government areas (courthouses), private homes or businesses that are image-free zones. In these cases, a signal from an external source is provided to disable the shutter from firing. This black-out capability will allow external control of access to specific sites. As a condition of access, only a camera with this feature may be admitted to public buildings, so that even if the camera is permitted to operate, permission is only conditional. For instance, the owner of the building may allow the camera to function only in a specific set of rooms but not in others. Cameras without this feature may not be allowed in private spaces where control must be externally restricted.

This blocking feature will require the addition of specific blocking software, which may be automatically downloaded as one enters specific buildings. Similarly, in order to be granted permission to access the camera, or specific functions of the camera, the downloading of a "key" may be required.

Moreover, a further embodiment of the system may make it necessary to download software keys to get access to filtration capabilities in the camera in order to obtain optimum images. For example, the user may be required to pay a fee to download software in real time that will permit her to access a particular function in the camera to obtain a critical image. A spectrum of quality and complexity in filtration capabilities may be made obtainable for a range of fees on-demand. Therefore, the external downloading of software for the camera need not be limited to a black out function.

(IV) Dynamic Digital Imaging System Improvements that Apply to Zoom Lenses and Video Imaging

(19) Dynamics of zoom lens corrections in digital imaging system

Whereas the optical aberrations of prime (fixed focal length) lenses were discussed above, the modulation of optical aberrations of zoom lenses is another problem to consider. As a wholly different species of lens, zoom lenses have become extremely complex optical mechanisms consisting of multiple groups of lens elements. The general problem with zoom

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lenses is the trade-off that must be made: To minimize the distortions of the widest possible focal length, distortions become maximized at the longest possible focal length, and vice-versa. Consequently, zoom lens architecture is inherently compromised on image quality. Over the years, lens designers have developed lens formulas that have dramatically improved image quality and that compete with typical prime lenses. As an example of this evolution in quality, the class of 70-200 f/2.8 35mm zoom lenses, now in their sixth generation, has supplied substantial improvements over earlier telephoto zooms. However, in general, zoom lenses have more aberrations than primes and thus require increased optical corrections. The need to solve the problem of zoom lens aberration correction is accentuated by their increased use in photography because of their simplicity and versatility.

The dynamics of the zooming process present specific difficulties for the purposes of correcting optical aberrations in digital imaging systems. With fixed-focal length lenses, the camera can detect the lens and provide an immediate consistent modification for a varying range of apertures. In the case of zooms, however, where the focal-length is not fixed, the adjustments must correlate to the changes in the focal length. In effect, this condition presents a continuous resampling process. When combined with changing scenes, the zooming process requires far faster responses to changing inputs by the camera system. This process resembles the tracking of a kaleidoscope's changing image structures as the wheel on the device is constantly turned.

In order to solve the problem of distortion at the wide-angle part of select zoom lenses, manufacturers have been using aspherical elements which are complex shapes that require special production techniques. On the other hand, in order to solve the problem of chromatic aberration in select telephoto lenses, manufacturers have used extra low dispersion glass elements, particularly at the front of the zoom lens. Since there are generally three main classes of zoom lenses – wide-angle to wide-angle, wide-angle to telephoto and telephoto to telephoto – aspherical elements have been used in wide-angle zoom lenses, while extra low dispersion glass has been used in the telephoto zoom lenses and both kinds of lens elements have been included in the wide-angle to telephoto zoom lenses.

The changing focal lengths of zoom lenses add a variable to the complex set of variables of the interacting sub-systems in the digital imaging system. The digital camera system must therefore track the movement of the changes in the focal lengths in zoom lenses and continuously make modifications to the varied optical aberrations in these types of lenses.

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Unlike in fixed focal length lenses, the aberrations change at different focal lengths in zoom lenses, and the camera must track these changes.

The present system is designed to make the corrections to these changing aberrations in zoom lenses by noting the changed focal length at specific times of each lens. For a fixed focal length lens, the camera refers to a database of information to provide information to correct specific types of aberrations; for a zoom lens, the camera's database contains multiplex information for each focal length in each respective zoom lens type. This is as if each zoom lens contains a combination of multiple lenses of specific focal lengths. When the zoom is moved to a new focal position, the camera reads the lens as a specific focal length and makes corrections to aberrations based on this specific setting. Although the camera reads the zoom lens at a specific moment in time and adjusts the necessary modifications to correct for aberrations at that specific focal length at that time, overall the zoom lens requires the camera to rapidly make these adjustments.

Since zoom lenses employ dynamic processes of change, it is possible to track a moving subject in real-time by changing focal length from a stationary vantage. These changed focal length positions are tracked by the auto-focus system, but also by the auto-exposure system in the camera. The present system thus allows for zoom tracking in order to anticipate the direction of zoom lens changes, much as the focus on the moving subject involves focus tracking mechanisms. These systems use fuzzy logic and evolutionary algorithms to anticipate the movement of the subject and thus of the focal length change of zoom lens. In this way it is possible to accelerate the lens aberration correction process using zoom lenses.

Because the zoom lenses typically increase aberrations precisely because of the lens design compromises, these types of lenses are ideally suited to the present digital imaging system. The present system allows the zoom lens to be used at high quality without needing to stop down the aperture, thereby resulting in superior photographic opportunities.

(20) Dynamic changes in video corrections of digital imaging system

While the zoom lens presents the need to provide a dynamic solution to the process of making corrections to optical aberrations, video photography provides another case of a process that requires dynamic solutions. The same principles that apply to still photography apply to video; auto-focus variability, aperture and depth-of-field variability aspects, shutter speed variability aspects, differences in lens focal length and artificial lighting variability suggest that

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video be viewed as merely a very rapid (30 to 60 frames per second) application of still photography. Nonetheless, video presents new classes of dynamic problems, most notably regarding the matter of tracking changing subjects in real time.

The process of shifting subject positions, even if the camera is stationary, presents a change of multiple variables that require the automated subsystems (auto-focus, auto-exposure, auto-flash, etc.) to be integrated. Feedback is presented by subjects in the external environment with changing focus and exposure variables. In these cases, even with a modulating shutter speed, the three main variables of change are a zoom lens to continuously change the focal length, auto-focus to track a subject and aperture modifications to continuously change depth-of-field.

The unique dynamics of these complex sub-systems presents particular challenges for a digital imaging system to produce rapid results with the use of advanced ASICs and microprocessors. By incorporating techniques that track objects with advanced auto-focus mechanisms, anticipate zoom lens changes and predict optimal exposures as well as make automatic corrections to both optical and digital aberrations in real time, the present system continuously optimizes the video imaging process.

(21) "Stationary-scene object-motion" caching process, with application to video, in digital imaging system

Because video imaging processes employ full motion activity, particularly of subjects in the environment, tracking a subject in a video system is problematic. Once a subject is identified and selected, the subject is automatically tracked with auto-focus and auto-exposure mechanisms by a zoom lens apparatus. There is a particular need to identify and track a subject within a broad stationary scene.

The present system accomplishes this task by using anticipatory object-trajectory tracking. The parts of the stationary scene that are not being tracked are cached. In other words, precisely because the background of the scene is stationary, this part of the scene is not tracked for focus or exposure. On the other hand, the object in motion is identified and tracked by subtracting the extraneous data of the stationary scene. Multiple objects are tracked by comparing data about these combinations of objects and their relations and determining the appropriate exposure and focus settings.

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While Monte Carlo processes use random settings to self-organize an initial map, which are useful as a baseline for the purpose of anticipating tracking data sets, the present system subtracts the known information about the specific object(s) being tracked from the stationary background in the environment. In other words, the background data is "blanked out" in a caching process while the main subject(s) are tracked. By so using these techniques, the camera system can efficiently calculate the modifications needed to optimize the video scene.

In a further embodiment of the system, a chip-set is enabled in video display devices (i.e., video monitors) to implement select corrections for optical and digital distortions. The user may modify settings for automating the process of achieving optimum video images.

(V) Digital Image Networking

(22) Network coordination of fixed sensor grid to track multiple objects in digital video imaging system

While the previous discussion has focused on employing a single camera to capture images, the present system is also useful for networking sensors in a sensor grid in order to track multiple objects. Specifically, the present system may be used in surveillance and reconnaissance situations to track objects over time. Using a grid of image sensors with overlapping range parameters makes it possible to organize a complex network of sensors for surveillance activities.

After selecting specific objects to track, the system follows the objects as they move from location to location, appropriately modulating the focus, the lens focal length, the ISO and the exposure settings. As the subject moves from one section of a grid to another, the sensors are coordinated to "hand off" the object to other sensors on the grid, much like a cellular phone network hands off calls between cells.

In another embodiment of the present system, the cameras in the network may be mobile instead of stationary in a fixed sensor grid. In this case, self-organizing aspects of the mobile sensor grid track mobile objects in real time. One application of this complex system, which draws on earlier work in collective robotics, is in cinematography, which requires multiple transportable perspectives of mobile subjects. The complex dynamics of a mobile sensor network provides complex feedback in this manifestation of the present system.

(23) Automatic wireless off-porting of back-up images to external data bank

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Because the present system uses digital files, it is possible to move these files to an external site for storage. The present system has capabilities to off-port images to an external data bank automatically. This feature is valuable in order to preserve on-board storage capability.

Whether implemented in a local area network (LAN) or a wide area network (WAN), by using a built-in wireless router, the present digital imaging system may be set to send data files directly and automatically to hard-drive storage either in a device in the same room or uploaded to the Internet for storage around the world. This capability is critical for managing massive files of large sensor data sets and preserving valuable in-camera storage space. When automatically sending data files to a nearby computer, the computer may act as a data-port relay to automatically resend the images to an Internet site for storage. The system will maintain the option of keeping some images in the camera and sending duplicate copies of digital files of images to another site for storage as a backup. This automatic back-up process provides insurance for the photographer.

In another embodiment of the system, just as image files are off-loaded to external storage, software files are periodically downloaded to the camera in order to update the camera settings and the database system. For example, as the camera manufacturer provides new lenses for the camera, it becomes necessary to load new updated settings to accommodate corrections for the new lenses. Similarly, as the camera requires new software updates with improved algorithms to further optimize the corrective functions of both the optical and digital mechanisms, the camera will automatically accept these. This feature is particularly important to both manufacturer and user because the ability to update software capability periodically will protect a user from needing to upgrade major hardware such as with a lens replacement.

(24) Image organization system

The present digital imaging system does not merely allow for the storage of image data files on external storage. Because of the problems of protecting storage and the need to make multiple back-ups in the digital sphere, it is also necessary to store digital image files in multiple database locations. The images are organized in a main database by various criteria, such as time, location, subject-type, etc., and then rerouted to various locations around the world for safe storage. While specific sets of images may be stored together, the need to identify the locations is less important than the need to have control of the main database list which identifies the

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locations.

In order to maintain security, the digital imaging files may periodically be rotated randomly between locations. Only the main database list, which is constantly updated, maintains information on their location. In fact, specific digital bits of a single image may be maintained at different locations in order to maintain further security. Thus, on many computers around the world bits of each image may be stored, and continuously rotated, with constantly updated registries maintaining their complex hybrid whereabouts. These rotation storage functions are performed by a randomizer logic engine.

In a further embodiment of the present system, once the digital files are off-loaded from the camera system to external storage, specific images may be automatically identified and further specific corrections automatically provided.

In yet another embodiment of the system, the images that are off-loaded from the camera to the external storage system are organized according to various criteria, such as accuracy of focus or exposure or quality of image type, in order to be automatically prioritized. The camera, with the assistance of an initial setting of user priorities, will automatically order new images with a higher or lower priority relative to other images and camera settings. Thus, at the end of a day, the images may be displayed in an order preferred by the user. Lesser images will be automatically routed to a lower position as they do not meet specific criteria, and better images will be routed to a relatively higher position in the organization of files. This feature of automatically assisting in the organization of the digital image files is a very useful one which will save photographers time.

(25) Wireless digital image system automatically generating prints from image capture

The present digital imaging system not only automatically off-loads digital image files to remote locations for storage; the system also will allow one to photograph an image (or sequence of images) in one location (i.e., Paris) and instantly print it in another location (i.e., Los Angeles) for publication in real time. In addition, an image may be captured by the camera and instantly uploaded to a pre-programmed Web site for publication by using wireless technologies. In addition, it is possible to automatically print the digital image file anywhere in the world virtually the moment the image is taken. This system makes this instantaneity particularly possible precisely because the image corrections are automated in-camera. Since there is no

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need in most cases to further edit the image files, they are thus generally ready for immediate release.

General Architecture and Dynamics

Fig. 1 illustrates the overall structure of the system. Object data (100) in the domain of objects being photographed by the camera constantly change. In some cases, the lighting changes, while in other cases, the positions of the objects change. At 120 the flash will artificially light the objects. Flashes may be either on the camera or remote from the camera. A camera sensor (130) will detect external data changes. An optical lens (110) feeds analogue imaging data to the digital sensor(s) (175 and 180). In some cases, a mirror (170) will swivel in order to directly input imaging data to the digital sensor after the shutter (150) is fired. In some cases, a filter (160) stands between the lens and the digital sensor(s). A digital signal processor (DSP) (195) is connected to at least one sensor (A or B). A database (190) is connected to at least one sensor (A or B) as well. The digital sensors are connected to an ASIC (195) and/or a microprocessor (193) in order to process the image and control the camera. The digital image data is passed from the digital sensor to either the ASIC or microprocessor and then stored in memory (197). The presence or absence of specific elements of this mechanism is not required for the correct functioning of this system. Consequently, a number of the drawings contained herein will focus only on specific sub-assemblies of the overall digital imaging system mechanism.

The present invention is intended to operate with a spectrum of camera types. These camera categories include digital still cameras without a mirror mechanism or without an optical interface. The present system applies to cameras with single lens reflex mechanisms. In addition, the present system applies to video cameras, both with or without mirror mechanisms, including camcorders. Finally, many of the functions disclosed in the present system are integrated into specific imaging sensors. The system applies to image sensors that are integrated with complex system functions, including those described herein, with "system on a chip" (SoC) capabilities in a single microelectronic integrated circuit. The invention also applies to networks of sensors, networks of cameras or integrated networks of both sensors and cameras.

Fig. 2 describes digital image signal processing. After an analog signal (200) is captured, it is converted to a digital signal by an analog-to-digital converter (210). The signal is then

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forwarded to the digital signal processor (220) and filtered (230). The digital signal is then stored in memory (240).

In fig. 3, the correction to the optical vignetting problem is shown. In vignetting, the lens (300) makes the edges of the image significantly darker as the light falls off, a phenomenon particularly prominent on wide angle lenses. As represented here, the concentric circles of filtration correction are darker in the middle (310) of the image in order to counteract the vignetting effect. The overall image aperture is reduced from one half to two stops in order to compensate for the maximum light fall off depending on the amount of vignetting effect from each lens type.

Fig. 4 shows a list of several different wide angle lenses in a database. In the 35mm domain, the 14mm (400), 20mm (410), 24mm (420), 28mm (430) and 35mm (440) lenses, each with f/2.8 apertures are listed in the database. Each lens type presents a distinct formulation involving different sets of optical data that require different aberration corrections.

The digital corrective process is described in fig. 5. After a specific lens type is identified (500) and a database is referenced (510), the lens type is matched with the specific optical aberrations (520). The digital filter then applies a correction to specific optical aberrations (530). As an example, the vignetting effect is corrected by gradually darkening the center of the image in concentric rings (540).

Fig. 6 shows the database configuration of several different types of 24mm f/2.8 lenses (600 to 630) with different optical configurations. Each lens type has a different set of manifestations of optical aberrations including vignetting (640), spherical aberration (650), pin cushion distortion (660), barrel distortion (670) and comatic aberration (680). For each lens, there will be a unique combination of optical aberrations compared to each lens type from different optical configurations. The database is accessed to provide the multi-objective optimization solution for correcting several different optical aberrations for each specific lens formula.

In fig. 7, after a camera captures an image (700) and uses a digital sensor to create a digital file (710), the digital file is forwarded to the digital signal processor semiconductor (720). The DSP applies the filtration (730) to correct the optical aberrations from the lenses. The revised digital file is then sent to storage (740).

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Digital filtration is performed by employing the DSP hardware as well as specific software in order to attain specific aberration corrections. In an optical filter, which typically sits at the front of a lens and performs a single function of modifying the optical characteristics of the lens, the electronic filter will process the image after it is converted from an analogue representation to a digital signal. Common digital filters include a low pass filter or anti-aliasing filter. In most cases digital imaging filtration is a discrete time application and is processed in a time-signal sequence.

One example of a digital filtration process is a fast Fourier transform (FFT). The digital signal is modified by applying an algorithm to extract the frequency spectrum. The original function is then reconstructed by an inverse transformation of the original signal. The signal can be manipulated to perform various conversions. This process is used to sharpen or soften an image. For instance, by differentiating the frequency spectrum, the high frequency can be emphasized by limiting the low frequency, as in a high pass filter. Digital filtration is typically performed by the DSP after the image is captured and before the image file is stored. However, in the present system, there is some filtration before the digital sensor that captures the image as well as some filtration processing after the sensor sends the file to the DSP.

In order to accelerate the filtration process, the digital file will be broken into parts, with each part processed simultaneously. Filtering a one-dimensional image will treat data from each column of a digital sensor separately. When the data is treated like a two dimensional image, the data file may be treated with different techniques. For instance, different quadrants of the image may be analyzed and filtered separately. In addition, the highlights and the shadows in the varied frequency range may be analyzed and filtered separately as well. Similarly, a two dimensional image file may be analyzed by starting in a corner and working in each contiguous quadrant in a circular (clockwise or counterclockwise) order. Further, the filtration process may begin in the corners and work inwards or begin in the center of the image and work outwards. For instance, in wide angle lens filtration to correct optical aberrations, the outer edges will be the most prominent distortions that will require the most corrections; therefore, the filtration process will work by starting on the corners first.

The present invention also addresses the multi-functional corrections in an image by applying multiple simultaneous techniques. This is done either by performing a sequential

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filtration process or a simultaneous filtration process. In either case, the image is re-filtered to make more than one pass in order to correct different types of aberrations.

Different types of aberrations require different types of filtration. In the case of pin cushion distortion and barrel distortion, which are inverse appearing aberrations, the filtration process will adjust the edges of affected digital files captured with wide-angle lenses. The optimized images will be accessed by the database and compared to the actual image files. The filtration will be applied to each image file to closely correct the distortions bit by bit. In effect, the corrected digital images will be reverse engineered to discover the unique distortions as they establish a pattern by comparing the input digital images and the database of optimized images. The digital image correction will be applied once the aberration is assessed.

Each lens provides data to the camera microprocessor and DSP about its unique characteristics. The lens is pre-programmed with aberration data pertaining to that lens type and even to each particular lens (ascertained through a testing process). The lens then provides this specific data to the camera for processing of optical aberrations. In one additional embodiment, the lens will also contain software to correct its aberrations that will also be sent to the camera processors in order to be applied to specific digital file filtration. As information and techniques are made available, new software to ascertain and correct each lens's unique optical aberrations will be forwarded to the camera and stored in the lens, thereby providing an upgrade path to continuously improve the optical qualities of lenses by employing a sort of after-manufacture digital correction.

Fig. 8 shows the process of selecting filtration settings. After the user selects the specific filtration settings (800), the user marks the specific filtration setting and accepts the setting (810). The user may continue to select multiple settings. When the user has selected all preferences (820) and accepts the settings the user returns to the main menu.

In Fig. 9 varied depth of field optimization at different apertures is described. In the first drawing, the object (930) has a depth of field (940) that has a broad range of clarity around the object. The camera (900) evaluates the distance data (920) and the object to establish an optimal depth of field range between f/8 and f/11. In the second drawing, the object (980) has a narrower depth of field range (990) based on distance data (970) and object data from the camera (950) to determine an optimal depth of field range between f/2.8 and f/5.6. The camera's automatic alteration of the aperture to narrow the depth of field is based on a range of factors, including the

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focus on the object, the object's motion, the distance to the camera, shutter speed constraints and the light on the object. Modulating aperture automatically in the camera provides a blurring of the background and the foreground so that the object can stand out without distraction.

Exposure optimization using digital correction is shown in fig. 10. After the camera assesses an object's distance from the camera (1000) and identifies the optimal aperture of the image to maximize the dynamic range (1010), the aperture is either increased (1020) or decreased (1030) and the correction applied (1040).

In-camera special effects filtration is illustrated in fig. 11. Once the image exposure is assessed by using the camera exposure meter (1100), the camera corrects the image by either underexposing the image by one third stops to one stop if the image is overexposed (1110) or overexposing the image by one third stops to one stop if the image is underexposed (1120). The camera finally takes a picture and stores the image (1130).

Fig. 12 shows the selective in-camera filtration of specific objects. After the camera identifies specific objects (1200), the camera assesses distance to the objects (1210). This is done by sending out an infrared light signal, bouncing it off the object, and measuring the distance data from the camera to the object. The camera isolates the objects on a one-dimensional Euclidian plane (1220) and then selects the optimum aperture to isolate objects and to blur the background and foreground (1230). The camera tracks the motion of objects (1240) and activates a digital sensor (1250) thereby capturing the image. The image data is sent to a post-sensor processor (1260) where the camera applies specific filtration only to the designated objects (1265) and stores the file in memory (1270). Alternatively, the camera will apply specific filtration only to the background (not to the objects) (1275) and then stores the file in memory (1280). The effect of only applying filtration to an object or to its background is to isolate the subject. The type and degree of special effects, which are selected by user-adjustable in-camera software, will be determined by the user's palate of filtration choices.

Image exposure adjustment using in-camera filtration is described in fig. 13. Once the camera assesses a two stop difference in parts of the image (1300), the camera's microprocessor accesses the database of similar scenes (1310) and then selects the optimal metering for the image and the user activates the digital sensor (1320), capturing an image. The camera provides the filtration to part of the image by adjusting the exposure in the processor (1330) and then stores the image (1340). In scenes such as sky on top, a neutral density filter is often required to

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remove the two stop difference between the bright top of the image and the darker bottom of the image. By reducing the brightness at the top, the exposure is evened out. By using the present system, this process is accomplished in the camera.

In-camera special effects filtration is described in fig. 14. After a user selects a special effects filtration technique (1400), the camera assesses image meta-data (1410), analyzes image data (1420) and the user captures the image (1430). The camera's post-capture processor applies special effects filtration technique to part of the image (1440) and the camera stores the image in memory (1450).

Digital correction for sensor dust is described in fig. 15. The pattern of dust on the pixels of a digital sensor (1500) is assessed. The specific pixels that are obscured by the dust are identified (1510) and a map is built of a digital sensor pixel frame by comparing information from at least two image samples to identify obscured pixels (1520) and the camera takes an image (1530). Information from pixels that are adjacent to dust-affected pixels are used to interpolate data on affected pixels (1540) and image data is processed and stored in memory (1550).

Fig. 16 shows an ASIC array in a digital imaging system. Once the digital sensor (1620) captures an image, the digital file is sent to multiple application specific integrated circuits (1630, 1640, 1650 and 1660) for processing of several digital signals simultaneously. In one embodiment of the invention, each ASIC corrects a single optical aberration. In another embodiment, the ASICs will divide the digital file and perform specific functions on parts of the image file and reunite the file before storing the completed image in memory (1670).

In fig. 17, the camera is illustrated with multiple interchangeable digital sensors. The CCD (1720) is shown in the forward position capturing the digital image in this drawing. However, the CMOS (1730) digital imaging sensor may swivel around (1740) to replace the position of the CCD in order to be used to capture the image. The image is then processed (1750) and stored in memory (1760). The advantages of interchanging the digital sensors are to have the opportunity to benefit from the strengths of each sensor type without sacrificing the weaknesses of either. In some cases, the scene will be optimized for the exposure range of a CMOS digital sensor, while at other times, the scene will be optimized for the detail of the CCD.

In fig. 18, the nano-grid (1820) appears in front of the digital sensor (1830). The lens will send analog image data to the sensor through the nano-grid. Once the digital data from the

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sensor is processed (1840) it is sent to memory (1850). Fig. 19 shows a nano-grid (1900). Nanofilaments are shown at 1920. The modulation effects of the nanofilaments are shown at 1910. Nanofilaments will change their position in order to allow more or less light through the system. Nano-grids fit before, or in some cases, adjacent to and on top of the digital sensor. Nano-grids behave as adjustable screens and may be used to polarize light between the lens and the digital sensor. Nano-grids are activated by electrical charge pulses sent to nanofilaments.

In fig. 20, the feedback loop connecting the processor and the nano-grid is shown. Analog optical data passes through the nano-grid (2020) to the digital sensor (2030) to the processor (DSP) (2040). A feedback loop (2050) is created by analyzing the data at the processor and modulating the performance of the nano-grid. For example, the image may be very bright initially, but the DSP will require that the image needs to be darker in order to be properly exposed. In this case, it will activate the nano-grid to modulate its grid structure in order to darken the image so as to let less light through the filaments by adjusting the filament structure. Once properly exposed, the camera will capture a digital image and send the file to memory (2060) for storage.

In fig. 21, a tri-pixel architecture is described. The large (deeper) oval bucket in the center (2110) will capture highlight exposure, the medium sized oval bucket at the right (2120) will capture a normal exposure range and the small (shallower) oval bucket at the left (2130) will capture the shadow exposure range. These three separate wells are contained within each pixel. In most cases, a pixel well is like a bucket, capturing light data and passing the data sets to the digital processor. By splitting the exposure range into three distinct wells within each pixel, the data is more accurately captured and organized in order to accommodate the broader range of exposure data. This system will be able to increase the range of digital imaging up to four stops, from the typical two stops. By maximizing the range of exposure data, the image collection will display more tonal range that is more associated with films' broader exposure range.

Fig. 22 shows the pre-programmed module for in-camera functionality. After the camera detects the lens type and the sensor type (2200), the camera focuses on an object (2210) and the processor accesses the library of scene and filter types (2220). The user pre-selects specific in-camera modifications (2230) and activates the camera to capture an image (2240). The processor makes filtration adjustments after the sensor takes the image (2250) and the image file is stored (2260) in memory.

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Much like the nano-grid that is present before the digital image sensor, the pre-sensor modification to an image is shown in fig. 23. An optical filter (2320) such as a polarizer filter is shown in a position between the lens and the digital sensor (2340). The image is captured and the optical filter is activated by the processor (2350), which determines whether to activate the filter after analyzing a particular scene. Other filtration (2330), such as the use of the nano-grid, is also interchangeable with the optical filter in a position before the digital sensor. In another embodiment of the present invention, the filter assembly is sequential, with both, or multiple, filters being activated in order so as to obtain the maximum filtration effect. The DSP will compute the optimal combination of filtration resources based on the available resources in the camera. In another embodiment, the optical filter assembly will fit out of the line of sight between the lens and the digital sensor and will be activated by the DSP on-demand to swing into the optical image path much like a mirror mechanism.

Fig. 24 shows the integration of optical and digital corrections with feedback. Once the camera meters a scene (2400), the camera auto-focuses and obtains distance data to the object (2410), analyzes the lens data, the aperture data and the shutter speed data and accesses the library of images (2420). The camera assesses the optical aberrations (2430), activates the digital filters to correct aberrations (2440) and takes the picture (2450). The camera analyzes the image and optimizes the image using the processor (2460). This is performed by comparing the image data to the library of images and assessing the needed filtration required to optimize the image. The image is then stored in memory (2470).

The interactive feedback mechanism of integrated correction is described in fig. 25. After an analysis of the initial image (2500), the identification of optical aberrations (2510) is made. The camera's database is accessed to retrieve the corrections (2520) and the interactive feedback mechanism is activated (2530). Corrections to filters are applied before the sensor captures the next image (2540). In addition, correction to the image signal via the DSP is made after the sensor data is captured (2550) and the image is stored in memory (2560).

The adaptive user pattern learning process is shown as images are processed in fig. 26. A batch of images (2600, 2610, 2620 and 2630) is shown. The first image is processed (2640) and data from image 1 is analyzed and metadata is mapped (2650). Image 2 is then analyzed and its metadata is compared to the image 1 metadata (2660). Similar metadata in images 1 and 2 programmed in the processor (2670) and image 2 is rapidly processed by using similar metadata

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from image 1 (2680). Images 3 and 4 are analyzed and their metadata are compared to image 1 and rapidly processed (2690).

In fig. 27, the feedback process of filtering images is shown. After the camera analyzes the user behaviors, user preferences and subject behaviors (2700), the camera's processor analyzes trends in the pattern of user behavior and preferences and creates a map (2710). The camera's processor anticipates the user behavior and subject behavior (2720) by applying evolutionary computation and fuzzy logic algorithms. The camera's processor then applies a collaborative filtering process to a new image (2730) and the user takes and optimizes the image (2740).

Fig. 28 shows a software privacy function in a digital imaging system. The camera automatically downloads software as it enters a building or specified area (2800). The camera's features are deactivated in specific locations by the software (2810) while allowing the camera to perform specific camera functions by accessing software keys (2820). The camera then performs specific functions (2830) that are available in the restricted area while other specific functions are disabled (2850).

In fig. 29, the dynamics of zoom lens corrections are described. After a lens detects a zoom lens type (2900), the camera detects a particular focal length setting of the zoom lens (2910) and accesses a data library in the database to modify aberrations to optimize the zoom lens at a specific focal setting (2920). The camera applies a correction to a lens setting (2930) and continuously tracks the lens changes in the lens focal length (2940). The camera then applies the changed corrections to the changed focal lengths in the zoom lens (2950) and analyzes patterns of the user and subject behaviors (2960). Using fuzzy logic and evolutionary computation, the camera anticipates behaviors and rapidly optimizes image corrections by applying digital filtration (2970).

Fig. 30 shows object tracking in the dynamic changes of video corrections. An object moves from position 1 (3010) to position 6 (3060) in sequence. The camera (3000) is stationary, yet it records the object's motion as it is moving within the field of vision.

In fig. 31, object tracking is described. Once the camera tracks an object with auto-focus mechanisms and supplies distance information (3100), it tracks the user's zoom lens use patterns, anticipates the focal length changes (3110) and, using evolutionary computation and fuzzy logic

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algorithms, predicts optimal exposures (3120) and captures images in real time, continuously tracking the object (3130).

Fig. 32 shows the caching process of a moving object in a stationary scene. After the main objects are tracked by the camera (3200), the background of a stationary scene is cached in the camera (3210). The camera subtracts the data about objects from the background of the scene (3220). The background scene is then "blanked out" and cached in memory (3230) and the main objects are optimized by applying digital filters.

Fig. 33 describes the network coordination of a fixed sensor grid tracking multiple objects. The object in motion is represented in positions A through D (3370, 3380, 3390 and 3395). The fixed sensors are at positions 1-6 (3300, 3310, 3320, 3330, 3340 and 3350). The image data is fed remotely into the central imager (3360). The sensors track the object by taking image data at each fixed sensor position in the network. As the object moves through the field of the network, each sensor records the object.

In fig. 34, wireless communication features of the digital imaging system are described. The camera (3400) sends digital image data files wirelessly to a computer (3410). Files are also uploaded from the camera to the Internet in accessible locations (3450), while software files are downloaded from the Internet to the camera, both automatically and through manual intervention. Files are automatically downloaded if the user sets the camera to receive automated software updates. One advantage of loading files automatically to the Internet is that the images are then automatically published (3460) at a remote location, or locations, for viewing.

Fig. 35 describes an image organization system. After images are captured by the camera (3500), the image files are organized according to metadata in an external computer database (3510). The image files are then sorted by category and sent to the database of a distributed network (3520) for off-site storage.

Reference to the remaining portions of the specification, including the drawings and claims, will realize other features and advantages of the present invention. Further features and advantages of the present invention, as well as the structure and operation of various embodiments of the present invention, are described in detail below with respect to accompanying drawings.

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It is understood that the examples and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to persons skilled in the art and are to be included within the spirit and purview of this application and scope of the appended claims. All publications, patents, and patent applications cited herein are hereby incorporated by reference for all purposes in their entirety.

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WHAT IS CLAIMED IS:

1. A digital imaging system comprising:

A digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, an application specific integrated circuit, a digital signal processor, system software, a database management system and a memory storage sub-system;

wherein the optical lens mechanism is a fixed focal length;

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;

wherein a microprocessor is used to provide digital and optical data to the digital signal processor;

wherein the system software is organized to identify specific optical aberrations and to access the database to identify specific corrections to the aberrations;

wherein the system software forwards the data file from the digital sensor to the digital signal processor;

wherein the digital signal processor selects a specific procedure to optimize the image and corrects the aberrations and;

wherein the modified digital file consisting of the digital data optimized from the aberrations that are corrected from the original optical image is stored in memory.

2. A digital imaging system comprising:

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;

wherein the optical lens mechanism is a fixed focal length;

wherein image depth-of-field is optimized by forwarding the digital file from the digital sensor to the microprocessor;

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wherein system software accesses a database to determine the optimal aperture by comparing the distance data to similar images in the database;
wherein a microprocessor is used to provide digital image data to the digital signal processor;
wherein the digital signal processor optimizes the digital file aperture setting by comparing it to the database data;
wherein the microprocessor adjusts the camera's aperture setting;
wherein the digital sensor captures the image and the application specific integrated circuit forwards the image data file to the digital signal processor to make modifications to the digital file and;
wherein the digital file is stored in memory.

3. A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor are special effects;
wherein the data file is forwarded from the digital sensor to the digital signal processor by an application specific integrated circuit;
wherein the digital signal processor applies a fast Fourier transform to the digital file in order to satisfy a user specified special effects function;
wherein the digital signal processor modifies the digital file by applying the special effects function and;
wherein the digital file is stored in memory.

4. A system as claimed in claim 1 in which the type of filtration applied by the digital signal processor are applied only to specific objects;
wherein the digital file is forwarded from the digital sensor to the microprocessor and to the digital signal processor;
wherein the digital file is analyzed by the microprocessor to separate specific objects in the image using the differentiation of the depth-of-field;
wherein the digital signal processor applies filtration only to specific objects in the image and;

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wherein the digital signal processor forwards the modified digital file to storage in memory.

5. A digital imaging system comprising:
A digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a nano-grid mechanism, a digital signal processor, system software and a memory storage sub-system;
wherein the nano-grid mechanism is between the optical lens mechanism and the digital sensor;
wherein the nano-grid mechanism is comprised of an array of nano-filaments;
wherein the nano-grid mechanism receives an electrical signal from the microprocessor and modifies its filament structure by modulating the filaments;
wherein the nano-grid mechanism performs a function to provide filtration to the image before the digital sensor captures the image;
wherein the image is captured by the digital sensor and the digital image file forwarded to the digital signal processor and;
wherein the digital file is stored in memory.

6. The system of claim 1;
wherein the digital sensor contains a tri-pixel configuration;
wherein three differentiated sub-pixels in each pixel in which one of the sub-pixels is in the center of the pixel and is the largest and deepest of the sub-pixels;
wherein the other two sub-pixels are smaller than the center sub-pixel and are on the sides of the center sub-pixel;
wherein the sub-pixels forward image data to the filament on each row and;
wherein each row forwards the image data to the digital signal processor.

7. The system of claim 1 comprising:
wherein the lens type is a zoom lens and;
wherein the lens focal length alternates from specific fixed focal length lens settings in a succession of steps and;

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wherein optical aberrations are corrected with digital filtration to modify multiple images from different focal lengths in a succession of data files.

8. The system of claim 1:
wherein the imaging system is integrated into a video camera.

9. The system of claim 1;
wherein the system uses a video camera to capture moving objects;
wherein the type of filtration applied by the digital signal processor is applied to specific moving objects;
wherein the digital image that is captured is forwarded from the digital sensor to the microprocessor and to the digital signal processor;
wherein the digital file is analyzed by the microprocessor to separate specific objects in the image using the temporal differentiation of caching in which successive images share geometric elements;
wherein the digital signal processor applies filtration only to a specific continuous object that is isolated and is in motion and;
wherein the digital signal processor forwards the modified digital file to be stored in memory.

10. The system of claim 1;
wherein a network of digital imaging sensors is linked together in a fixed structure;
wherein the network is coordinated to track specific objects that are within its collective field of vision;
wherein the network captures images of objects using the digital imaging sensors;
wherein the individual digital imaging sensors forward the imaging data to a central digital signal processor and;
wherein the imaging data file is forwarded to storage in memory.

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DIGITAL IMAGING SYSTEM

ABSTRACT OF THE DISCLOSURE

A system is disclosed for the automated correction of optical and digital aberrations in a digital imaging system. The system includes several main parts, including (a) digital filters, (b) hardware modifications, (c) digital system corrections, (d) digital system dynamics and (e) network aspects. The system solves numerous problems in still and video photography that are presented in the digital imaging environment.

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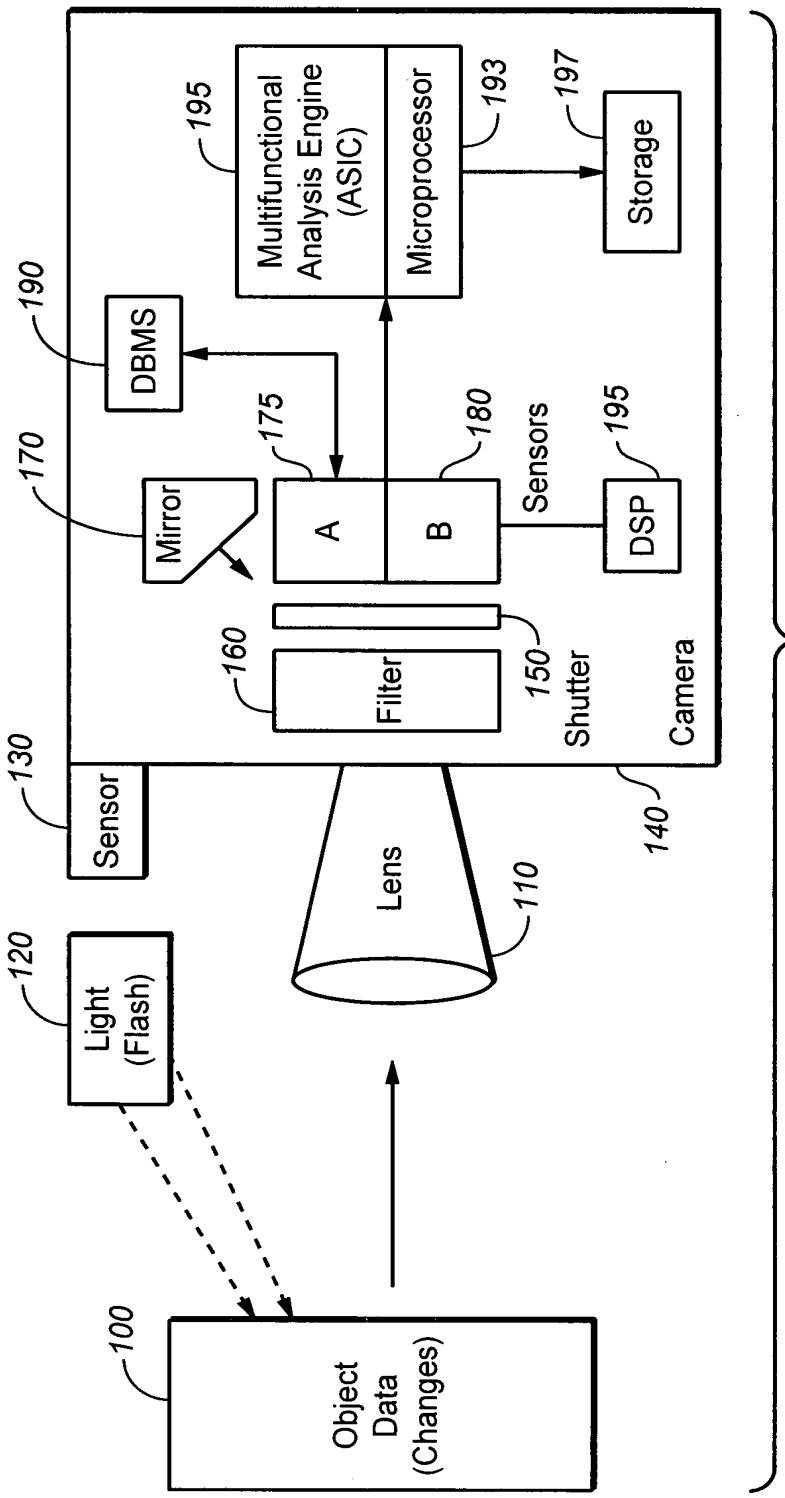

Object Data (Changes)
100
Light (Flash)
120
Lens
110
Sensor
130
Camera
140
Shutter
150
Filter
160
Mirror
170
A
175
B
180
Sensors
DSP
195
DBMS
190
Multifunctional Analysis Engine (ASIC)
195
Microprocessor
193
Storage
197

FIG. 1

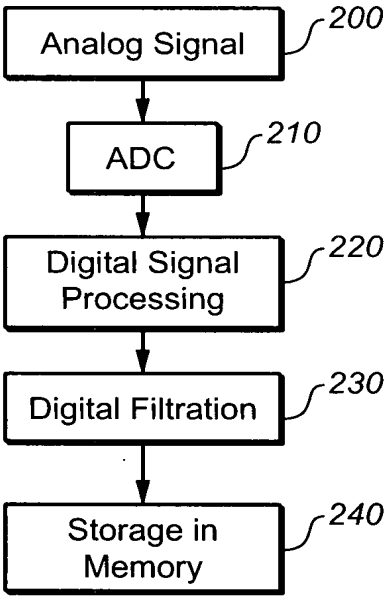


FIG. 2

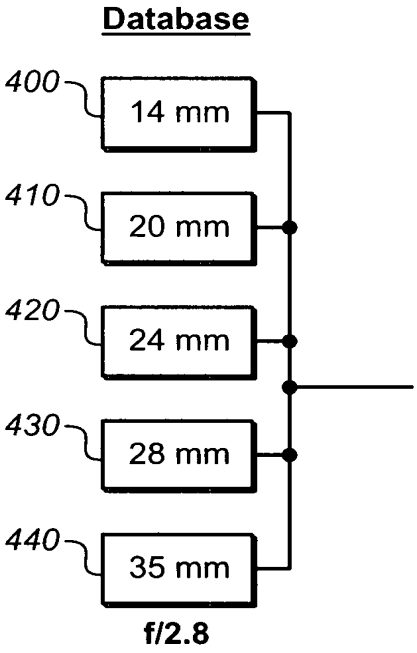


FIG. 4

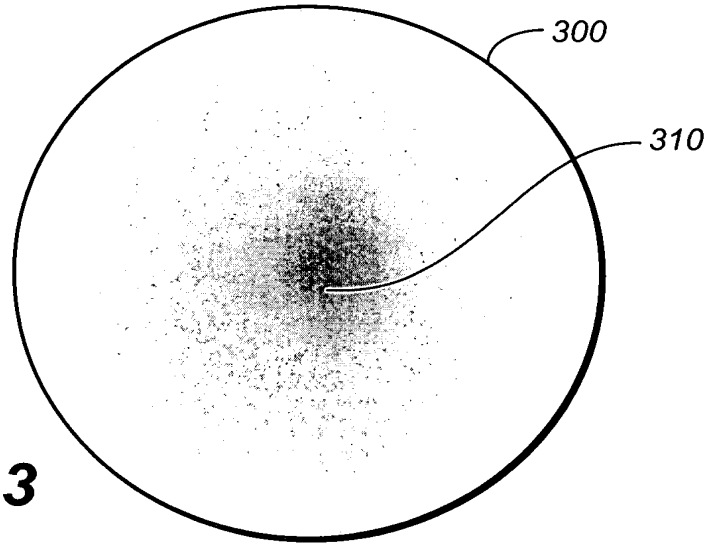


FIG. 3

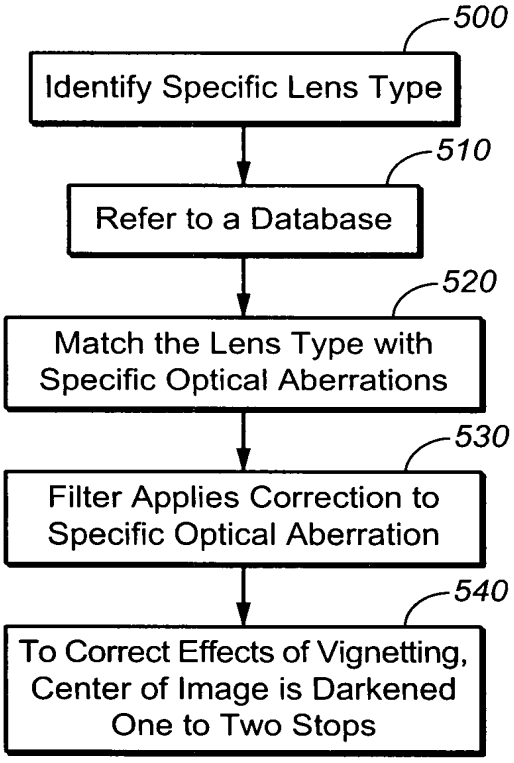


FIG. 5

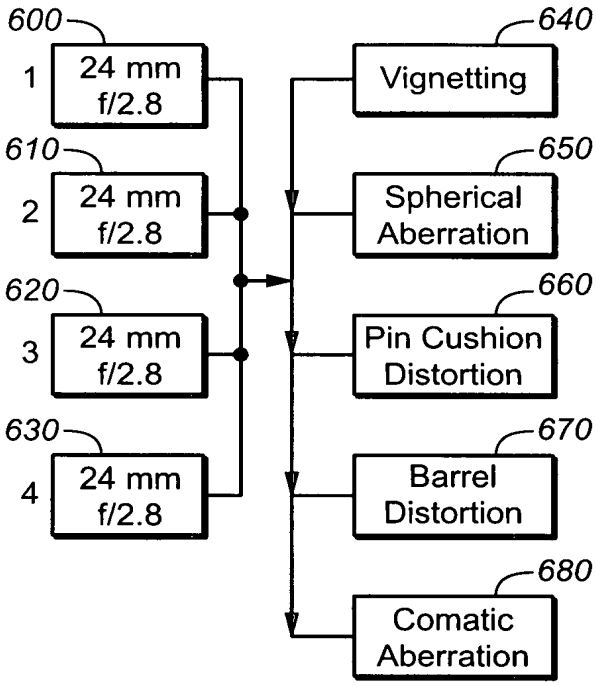


FIG. 6

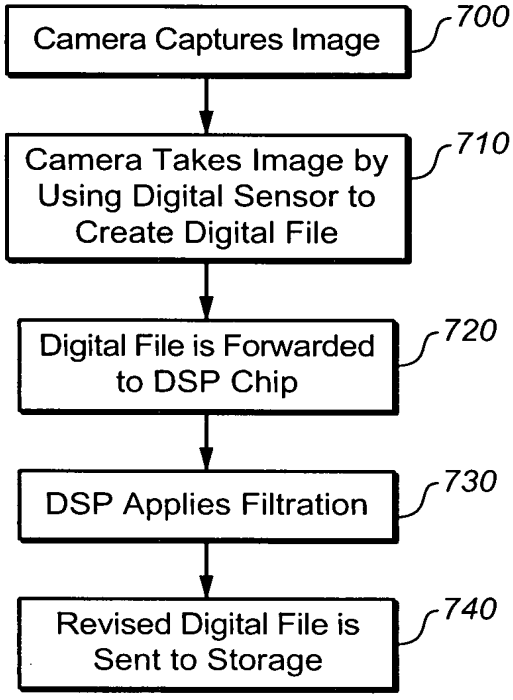


FIG. 7

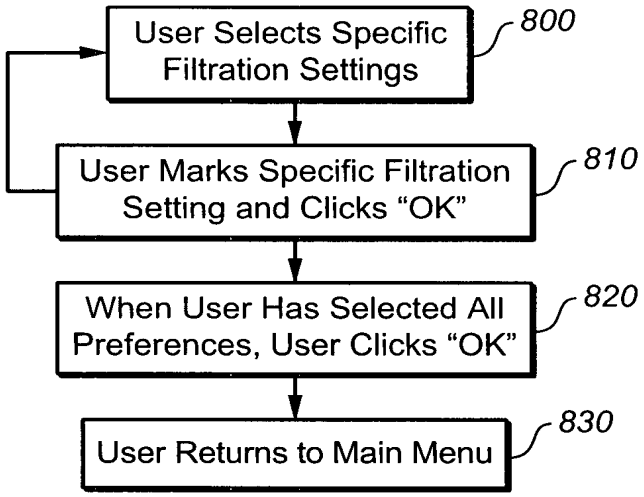

User Selects Specific Filtration Settings
800
User Marks Specific Filtration Setting and Clicks "OK"
810
When User Has Selected All Preferences, User Clicks "OK"
820
User Returns to Main Menu
830

FIG. 8

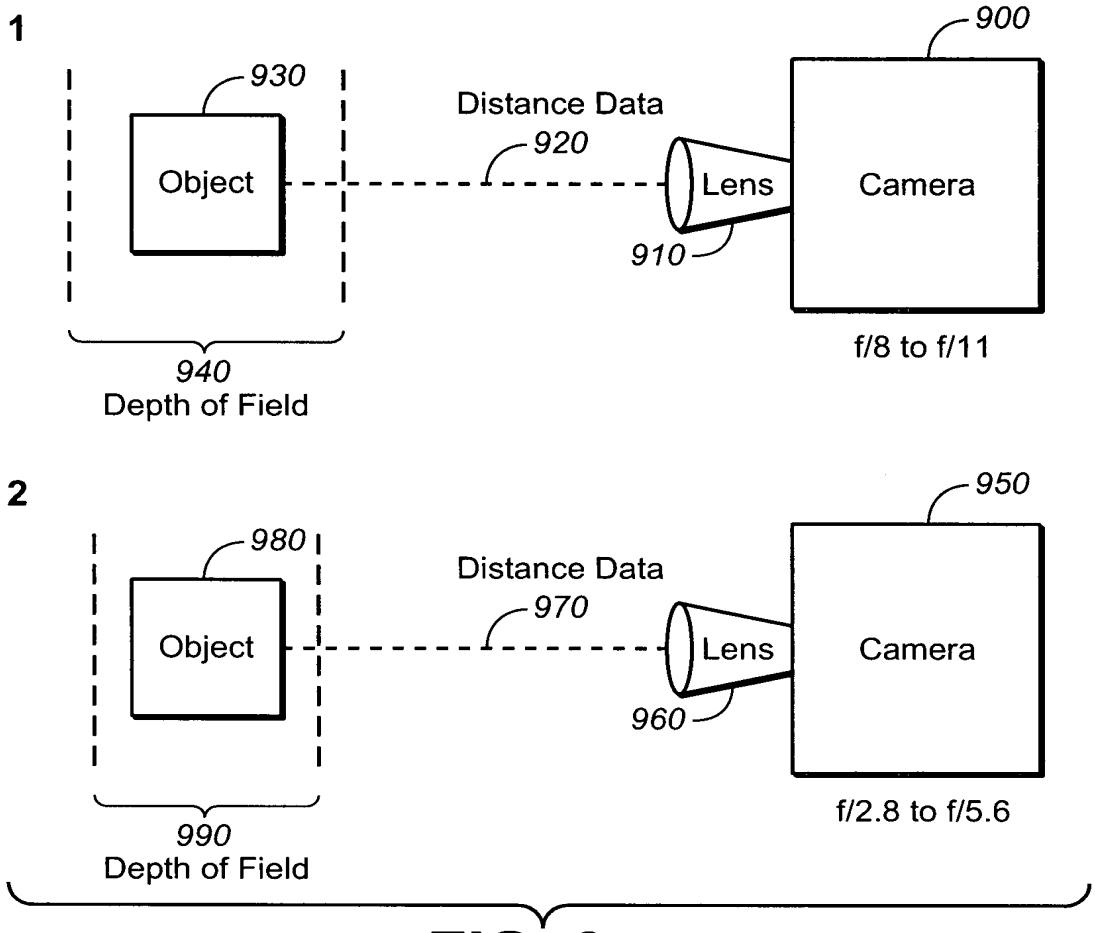

1
900
930
Object
Distance Data
920
Lens
Camera
910
f/8 to f/11
940
Depth of Field
2
950
980
Object
Distance Data
970
Lens
Camera
960
f/2.8 to f/5.6
990
Depth of Field

FIG. 9

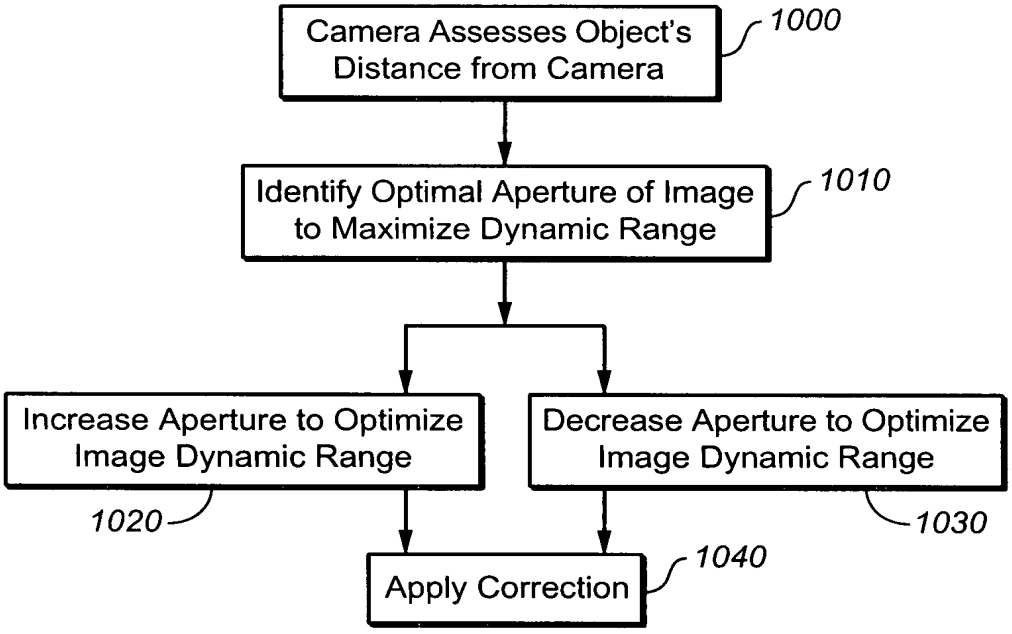

Camera Assesses Object's Distance from Camera
1000
Identify Optimal Aperture of Image to Maximize Dynamic Range
1010
Increase Aperture to Optimize Image Dynamic Range
1020
Decrease Aperture to Optimize Image Dynamic Range
1030
Apply Correction
1040

FIG. 10

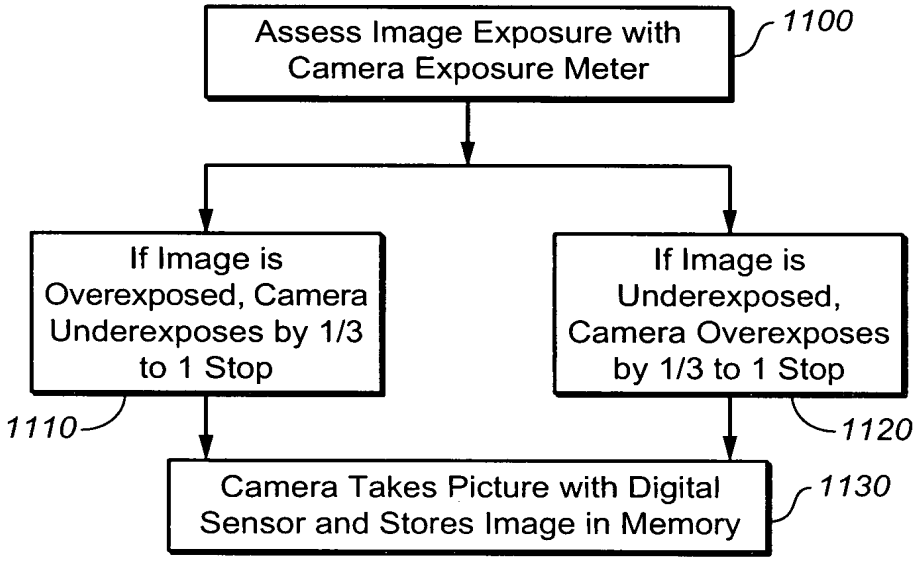

Assess Image Exposure with Camera Exposure Meter
1100
If Image is Overexposed, Camera Underexposes by 1/3 to 1 Stop
1110
If Image is Underexposed, Camera Overexposes by 1/3 to 1 Stop
1120
Camera Takes Picture with Digital Sensor and Stores Image in Memory
1130

FIG. 11

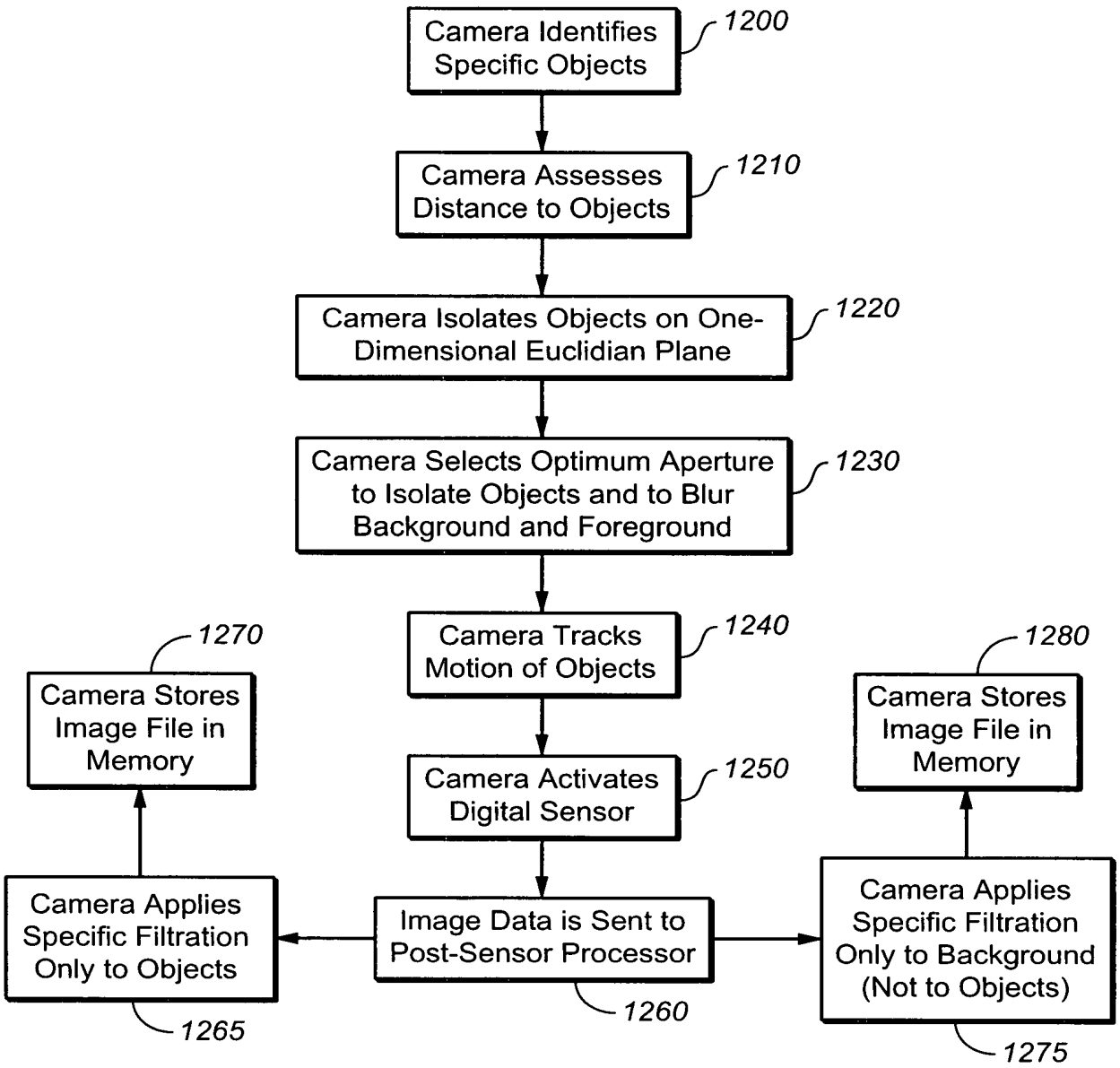

Camera Identifies Specific Objects
1200
Camera Assesses Distance to Objects
1210
Camera Isolates Objects on One-Dimensional Euclidian Plane
1220
Camera Selects Optimum Aperture to Isolate Objects and to Blur Background and Foreground
1230
Camera Tracks Motion of Objects
1240
Camera Activates Digital Sensor
1250
Image Data is Sent to Post-Sensor Processor
1260
Camera Applies Specific Filtration Only to Objects
1265
Camera Stores Image File in Memory
1270
Camera Applies Specific Filtration Only to Background (Not to Objects)
1275
Camera Stores Image File in Memory
1280

FIG. 12

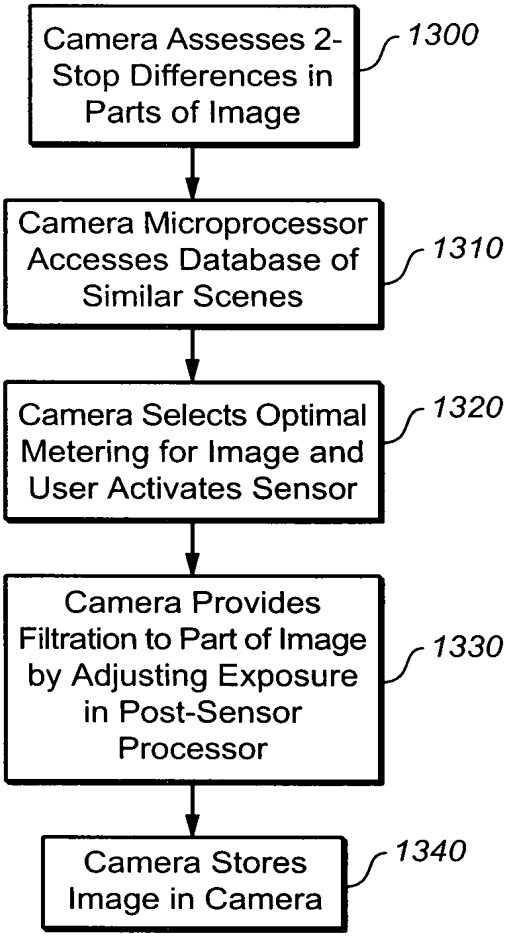

Camera Assesses 2-Stop Differences in Parts of Image
1300
Camera Microprocessor Accesses Database of Similar Scenes
1310
Camera Selects Optimal Metering for Image and User Activates Sensor
1320
Camera Provides Filtration to Part of Image by Adjusting Exposure in Post-Sensor Processor
1330
Camera Stores Image in Camera
1340

FIG. 13

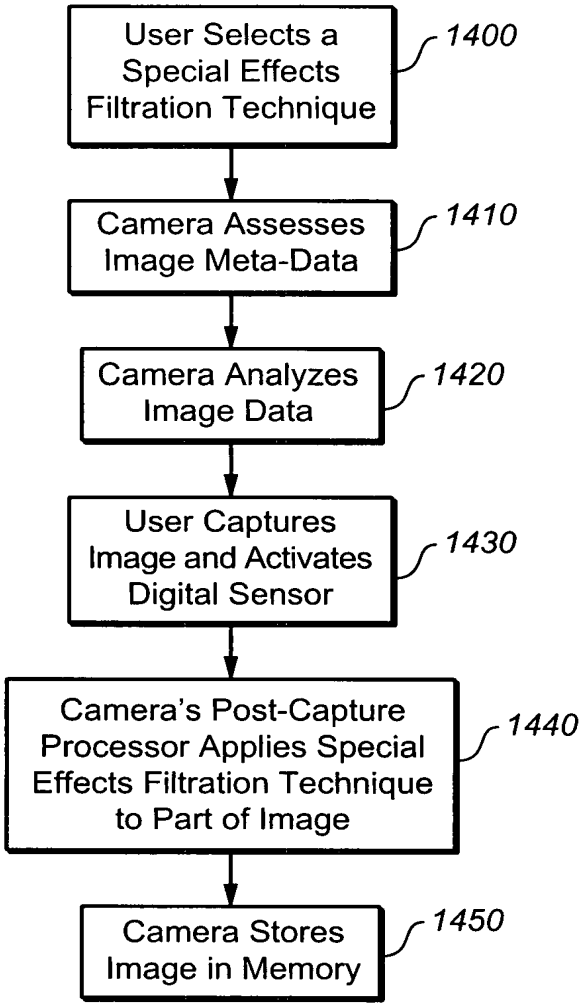

User Selects a Special Effects Filtration Technique
1400
Camera Assesses Image Meta-Data
1410
Camera Analyzes Image Data
1420
User Captures Image and Activates Digital Sensor
1430
Camera's Post-Capture Processor Applies Special Effects Filtration Technique to Part of Image
1440
Camera Stores Image in Memory
1450

FIG. 14

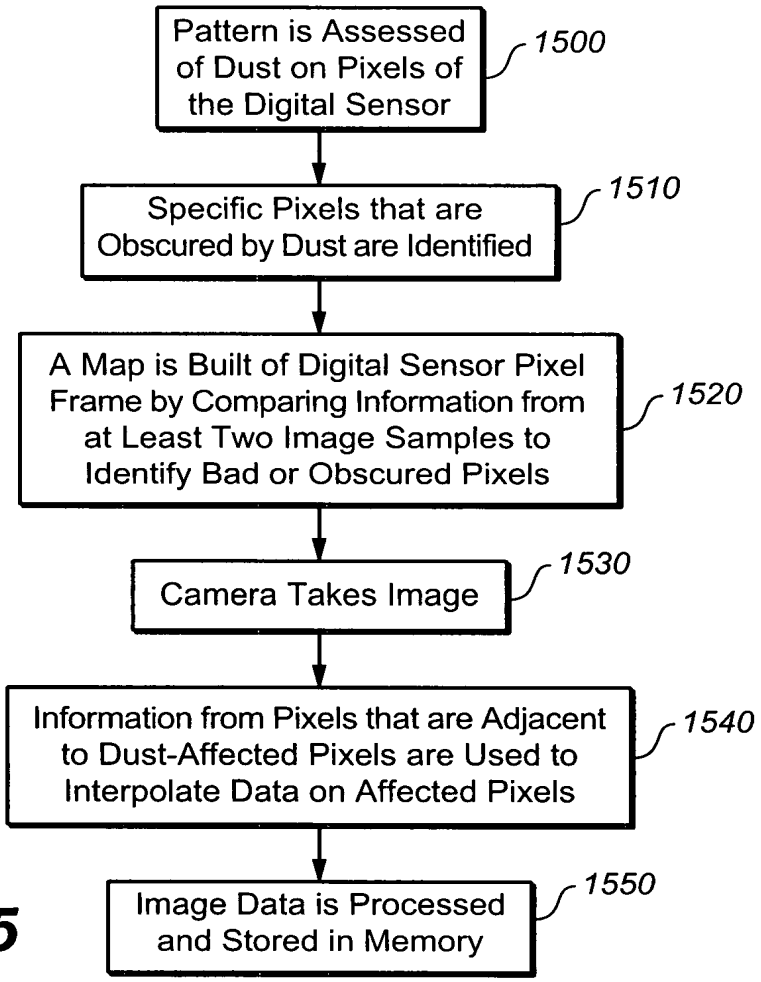

Pattern is Assessed of Dust on Pixels of the Digital Sensor
1500
Specific Pixels that are Obscured by Dust are Identified
1510
A Map is Built of Digital Sensor Pixel Frame by Comparing Information from at Least Two Image Samples to Identify Bad or Obscured Pixels
1520
Camera Takes Image
1530
Information from Pixels that are Adjacent to Dust-Affected Pixels are Used to Interpolate Data on Affected Pixels
1540
Image Data is Processed and Stored in Memory
1550

FIG. 15

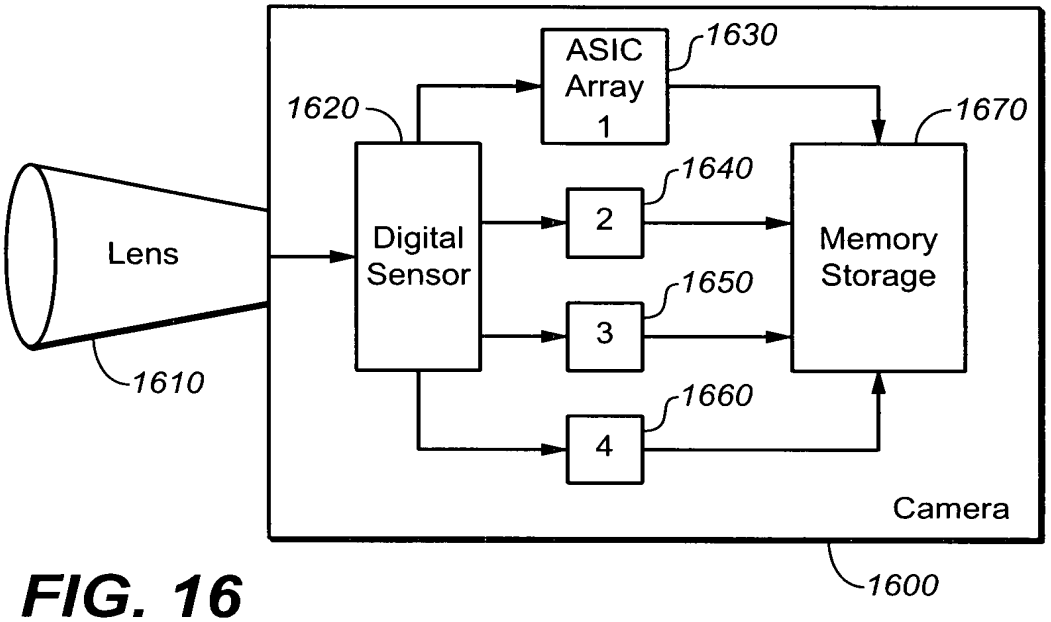

ASIC Array 1
1630
1620
1670
1640
Lens
Digital Sensor
2
Memory Storage
1650
3
1610
1660
4
Camera
1600

FIG. 16

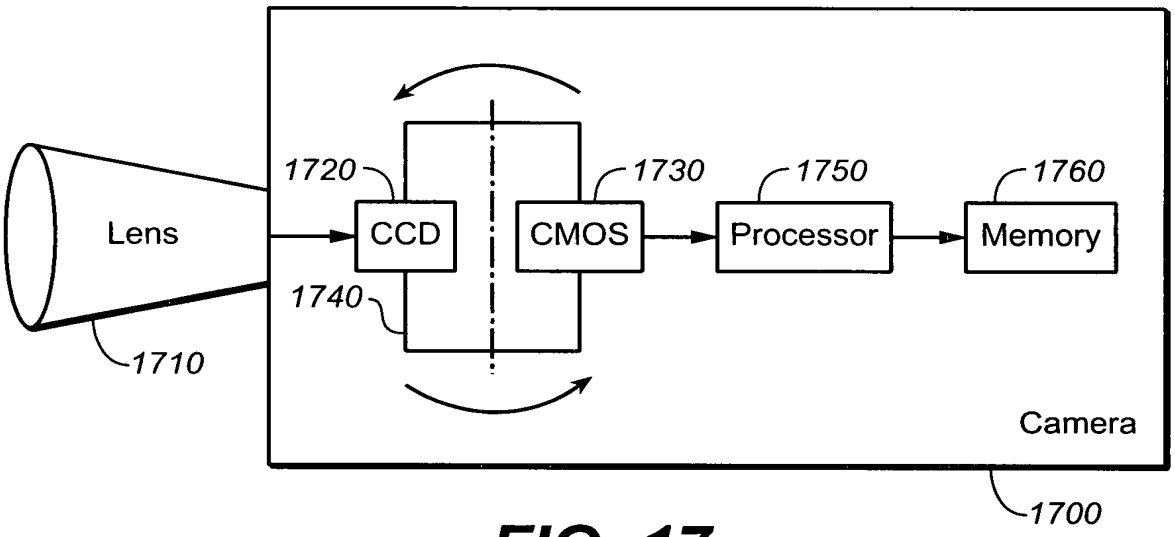

Lens
1710
1720
CCD
1740
1730
CMOS
1750
Processor
1760
Memory
Camera
1700

FIG. 17

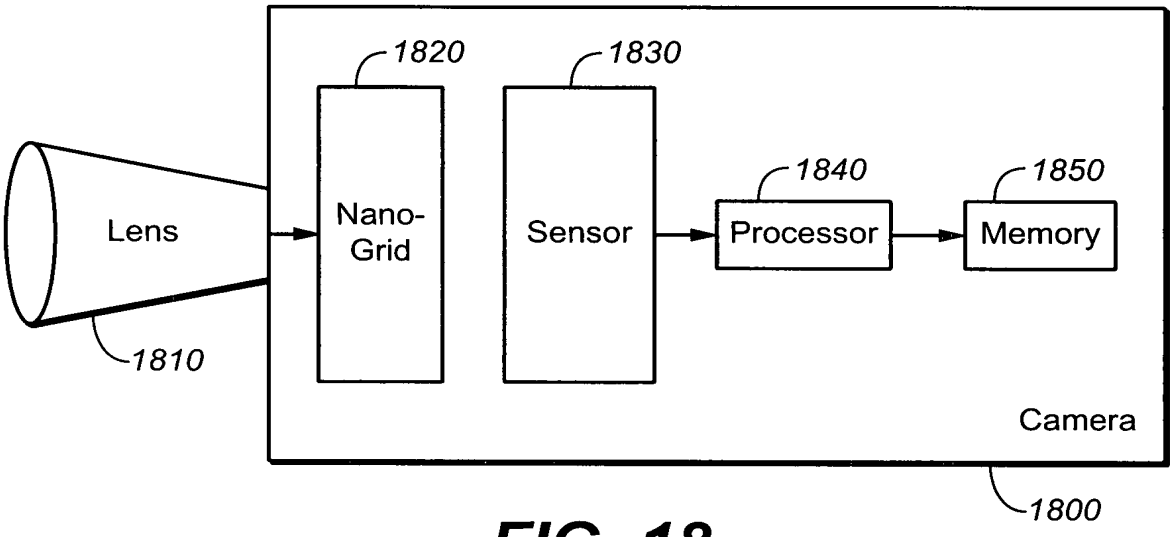

Lens
1810
1820
Nano-
Grid
1830
Sensor
1840
Processor
1850
Memory
Camera
1800

FIG. 18

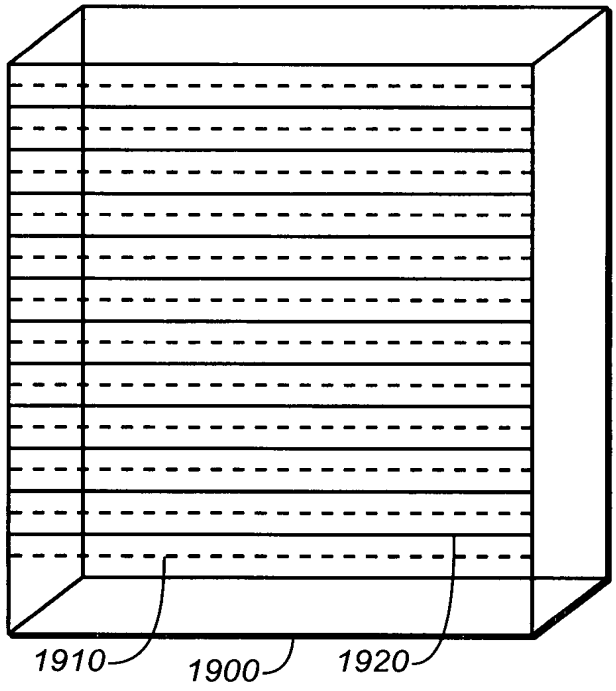

1910
1900
1920

FIG. 19

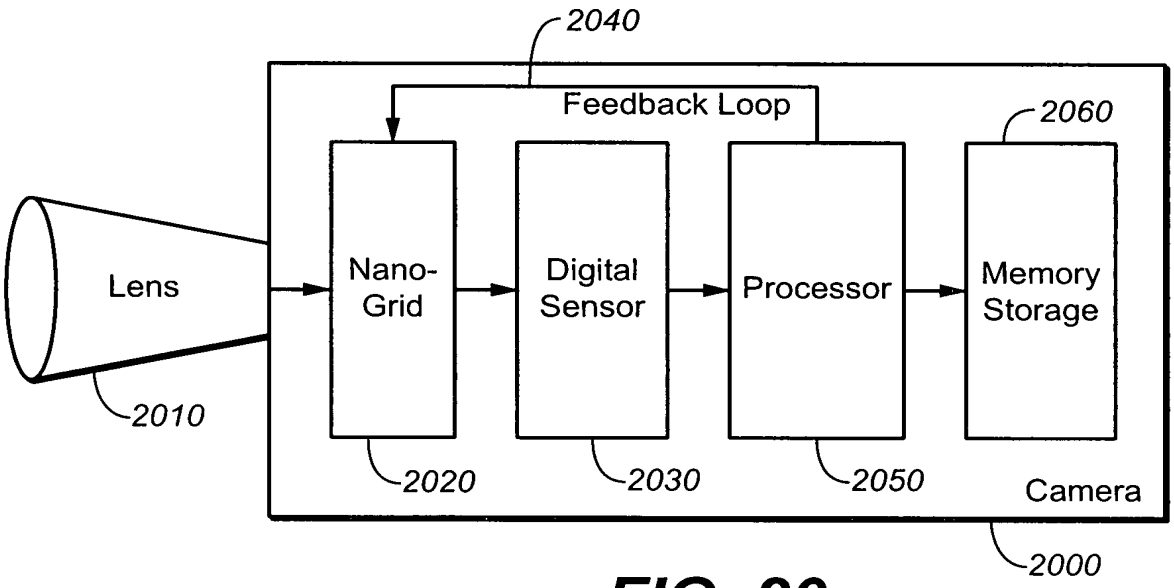

2040
Feedback Loop
2060
Lens
Nano-
Grid
Digital
Sensor
Processor
Memory
Storage
2010
2020
2030
2050
Camera
2000

FIG. 20

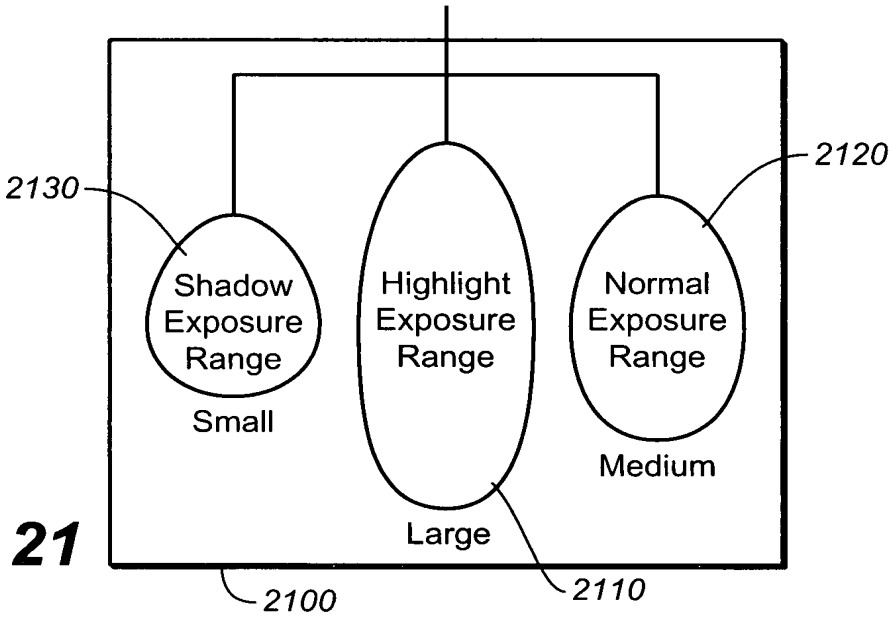

2130
2120
Shadow Exposure Range
Small
Highlight Exposure Range
Large
Normal Exposure Range
Medium
2100
2110

FIG. 21

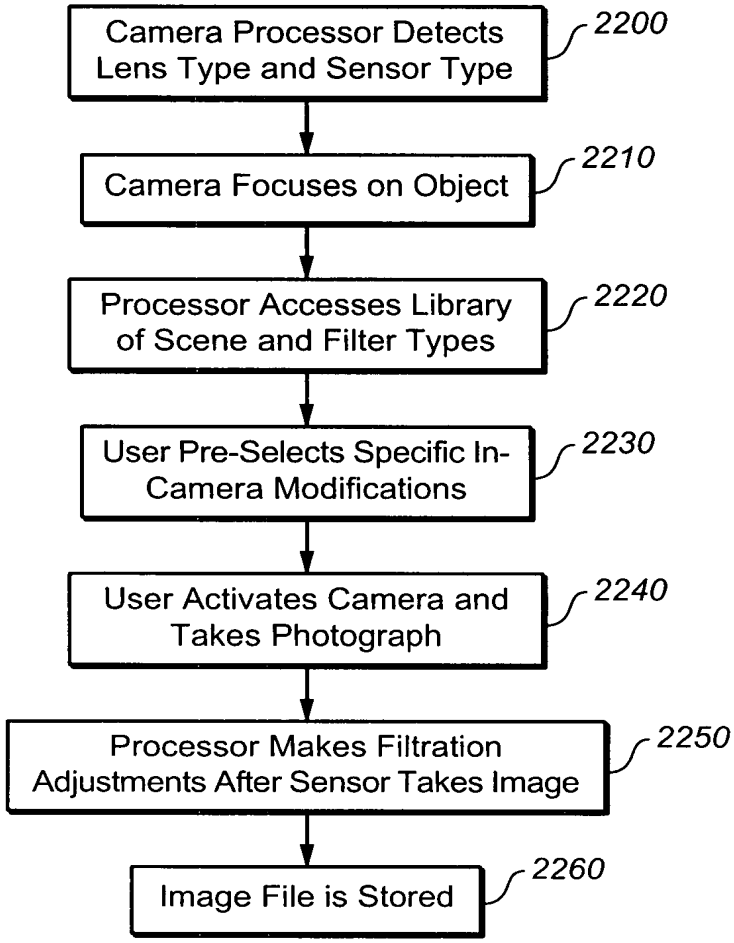

Camera Processor Detects Lens Type and Sensor Type
2200
Camera Focuses on Object
2210
Processor Accesses Library of Scene and Filter Types
2220
User Pre-Selects Specific In-Camera Modifications
2230
User Activates Camera and Takes Photograph
2240
Processor Makes Filtration Adjustments After Sensor Takes Image
2250
Image File is Stored
2260

FIG. 22

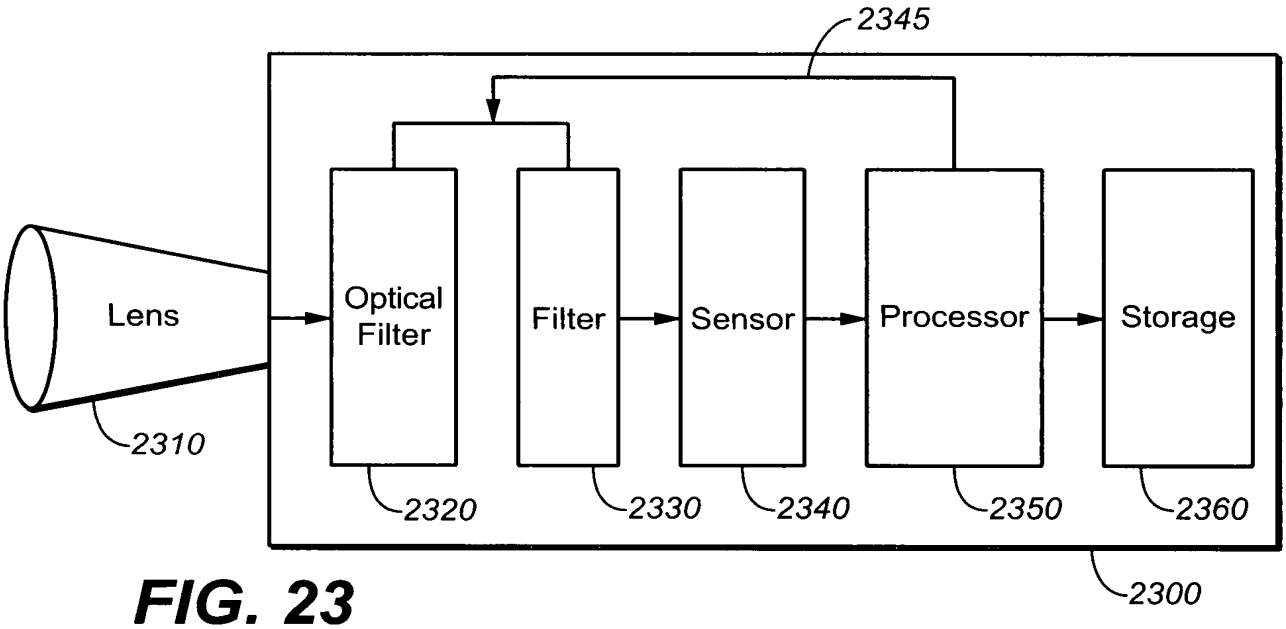

2345
Lens
Optical Filter
Filter
Sensor
Processor
Storage
2310
2320
2330
2340
2350
2360
2300

FIG. 23

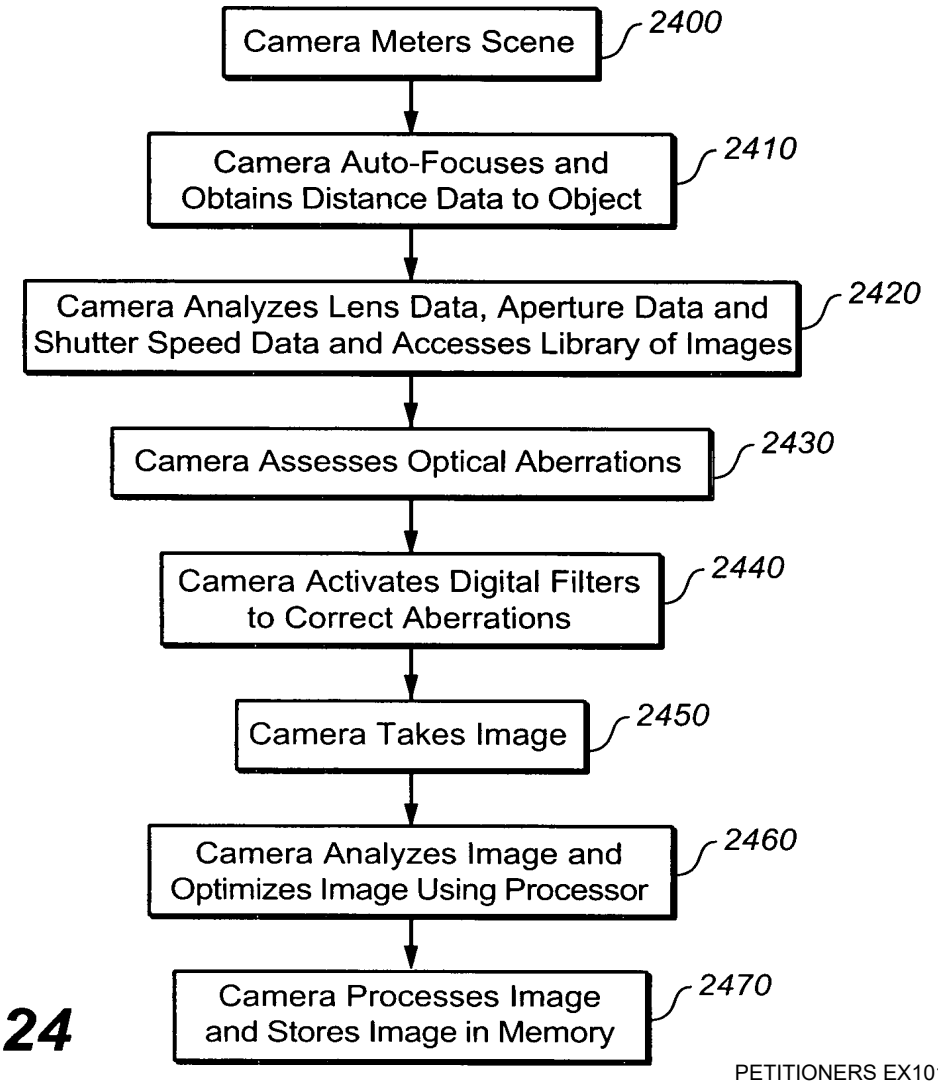

Camera Meters Scene
2400
Camera Auto-Focuses and Obtains Distance Data to Object
2410
Camera Analyzes Lens Data, Aperture Data and Shutter Speed Data and Accesses Library of Images
2420
Camera Assesses Optical Aberrations
2430
Camera Activates Digital Filters to Correct Aberrations
2440
Camera Takes Image
2450
Camera Analyzes Image and Optimizes Image Using Processor
2460
Camera Processes Image and Stores Image in Memory
2470

FIG. 24

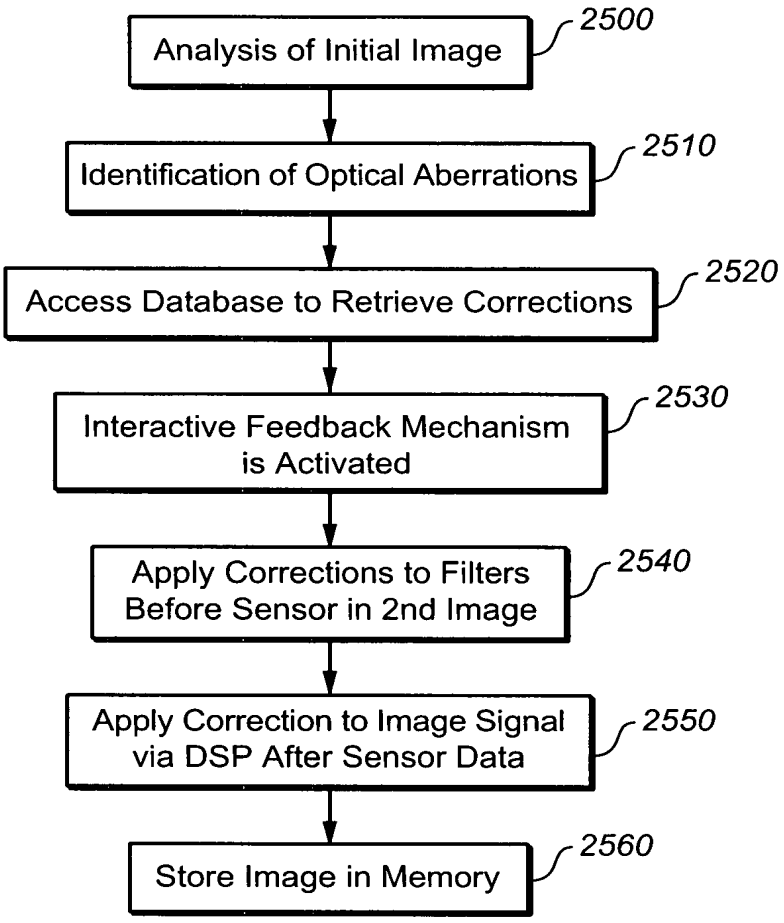

Analysis of Initial Image
2500
Identification of Optical Aberrations
2510
Access Database to Retrieve Corrections
2520
Interactive Feedback Mechanism is Activated
2530
Apply Corrections to Filters Before Sensor in 2nd Image
2540
Apply Correction to Image Signal via DSP After Sensor Data
2550
Store Image in Memory
2560

FIG. 25

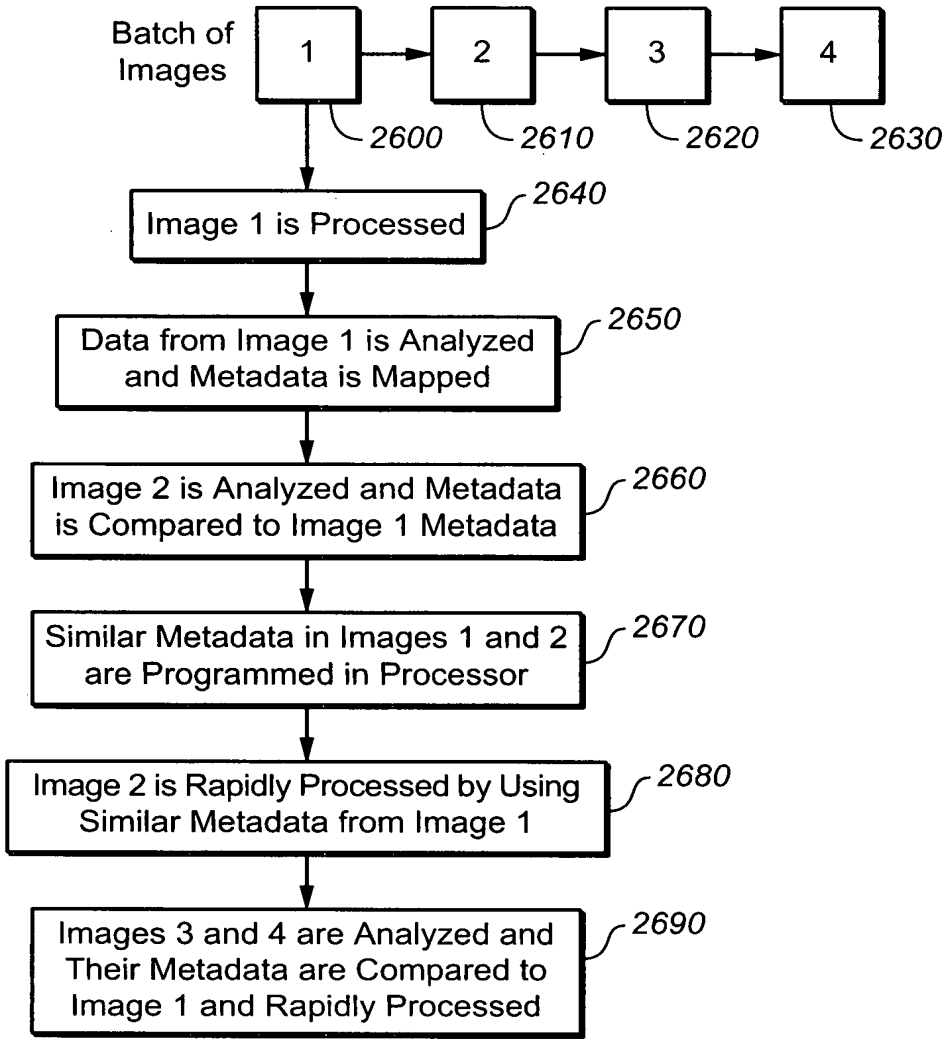

Batch of Images
1
2
3
4
2600
2610
2620
2630
Image 1 is Processed
2640
Data from Image 1 is Analyzed and Metadata is Mapped
2650
Image 2 is Analyzed and Metadata is Compared to Image 1 Metadata
2660
Similar Metadata in Images 1 and 2 are Programmed in Processor
2670
Image 2 is Rapidly Processed by Using Similar Metadata from Image 1
2680
Images 3 and 4 are Analyzed and Their Metadata are Compared to Image 1 and Rapidly Processed
2690

FIG. 26

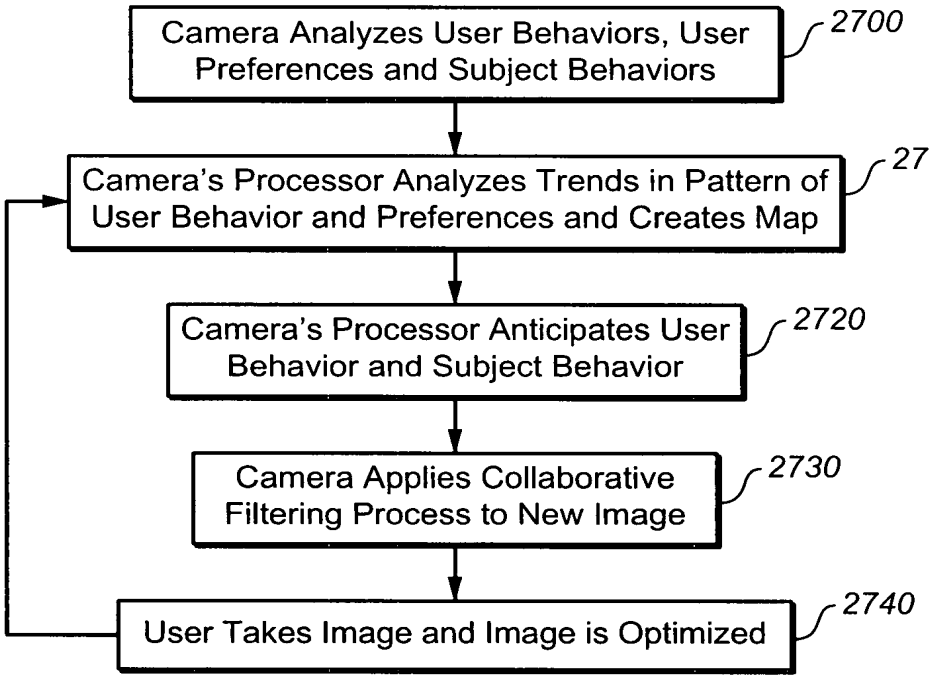

Camera Analyzes User Behaviors, User Preferences and Subject Behaviors
2700
Camera's Processor Analyzes Trends in Pattern of User Behavior and Preferences and Creates Map
2710
Camera's Processor Anticipates User Behavior and Subject Behavior
2720
Camera Applies Collaborative Filtering Process to New Image
2730
User Takes Image and Image is Optimized
2740

FIG. 27

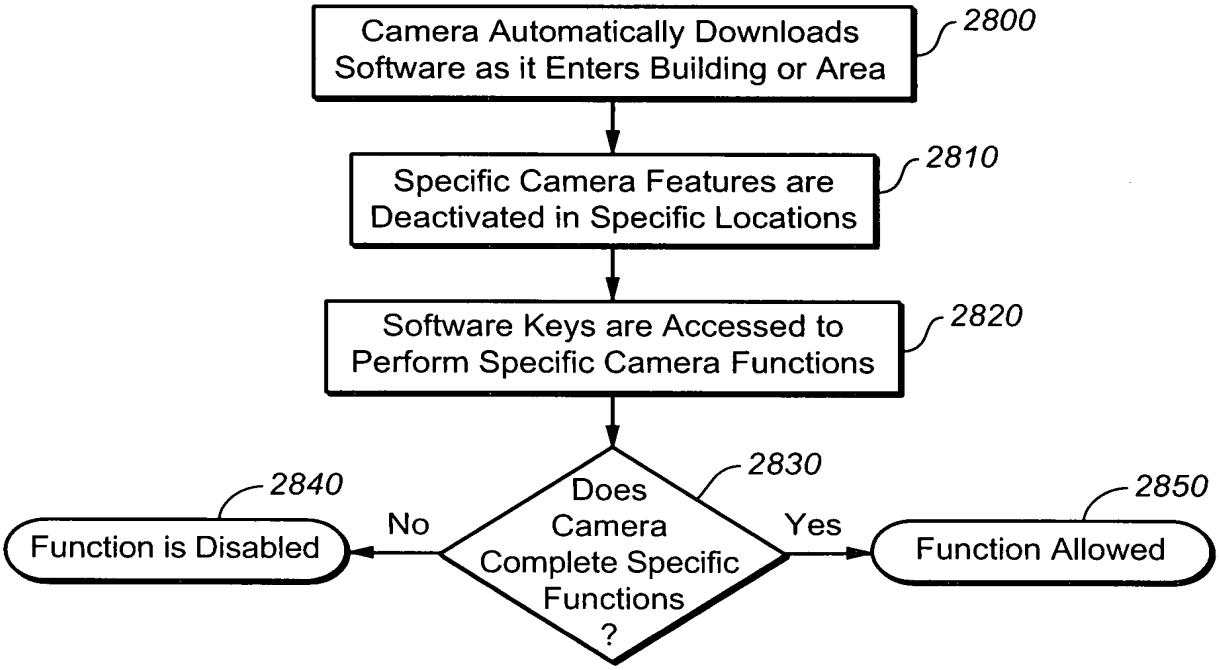

Camera Automatically Downloads Software as it Enters Building or Area
2800
Specific Camera Features are Deactivated in Specific Locations
2810
Software Keys are Accessed to Perform Specific Camera Functions
2820
Does Camera Complete Specific Functions ?
2830
No
Yes
Function is Disabled
2840
Function Allowed
2850

FIG. 28

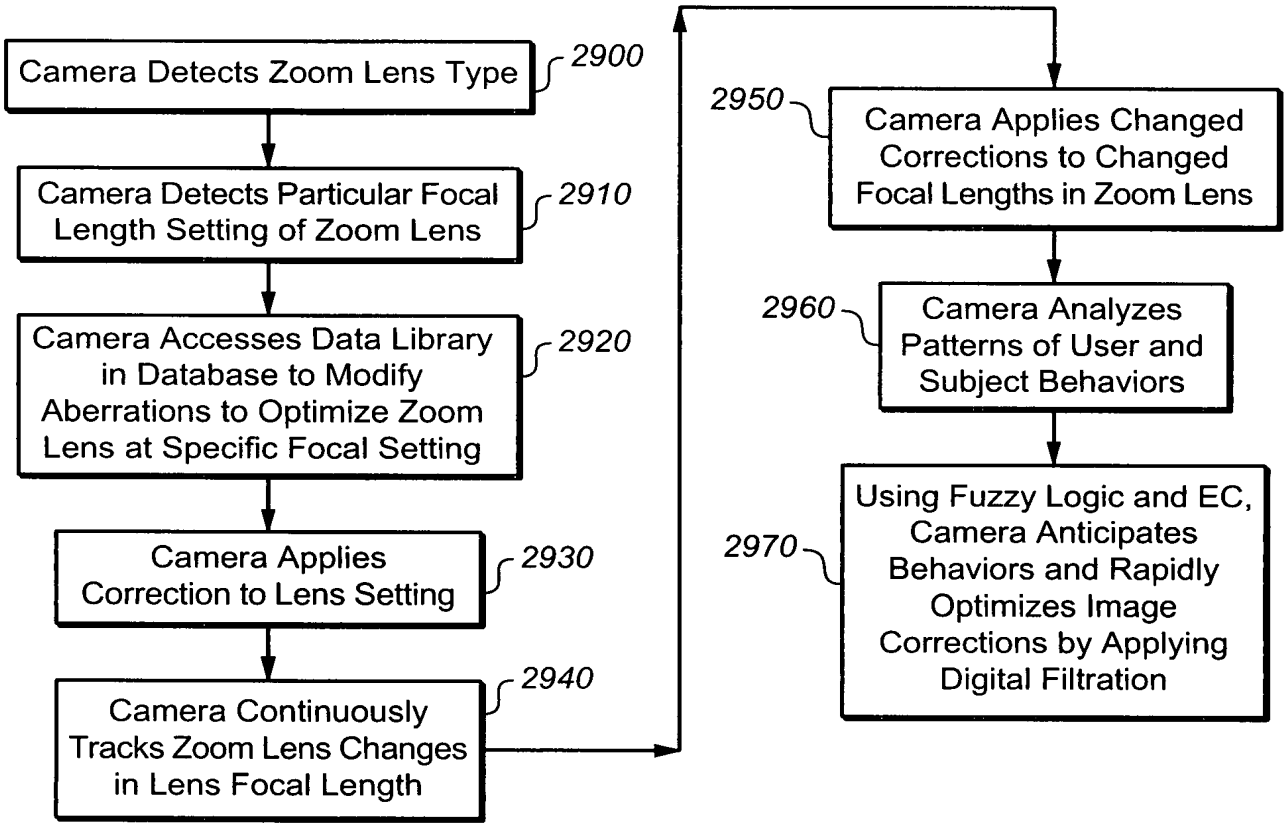

Camera Detects Zoom Lens Type
2900
Camera Detects Particular Focal Length Setting of Zoom Lens
2910
Camera Accesses Data Library in Database to Modify Aberrations to Optimize Zoom Lens at Specific Focal Setting
2920
Camera Applies Correction to Lens Setting
2930
Camera Continuously Tracks Zoom Lens Changes in Lens Focal Length
2940
2950
Camera Applies Changed Corrections to Changed Focal Lengths in Zoom Lens
2960
Camera Analyzes Patterns of User and Subject Behaviors
2970
Using Fuzzy Logic and EC, Camera Anticipates Behaviors and Rapidly Optimizes Image Corrections by Applying Digital Filtration

FIG. 29

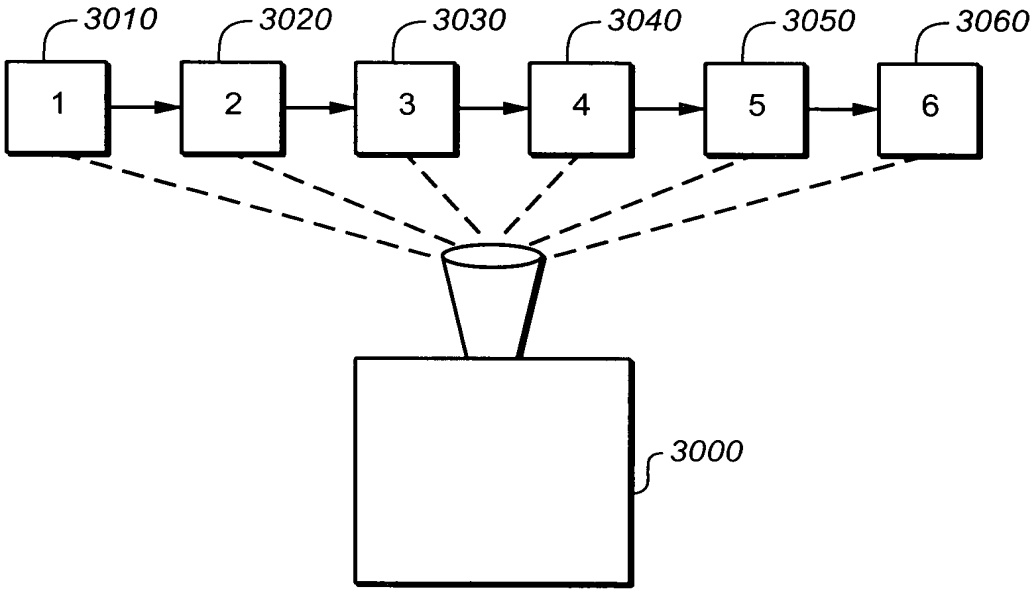

3010
3020
3030
3040
3050
3060
1
2
3
4
5
6
3000

FIG. 30

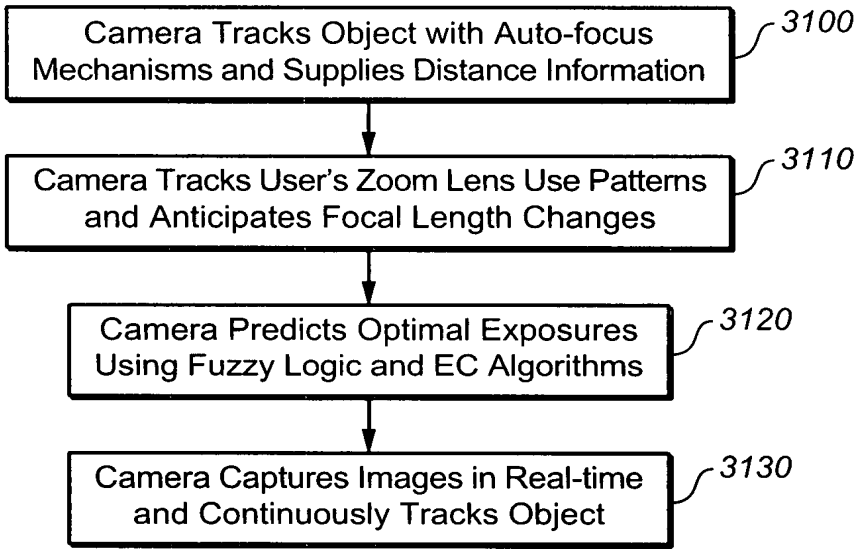

Camera Tracks Object with Auto-focus Mechanisms and Supplies Distance Information
3100
Camera Tracks User's Zoom Lens Use Patterns and Anticipates Focal Length Changes
3110
Camera Predicts Optimal Exposures Using Fuzzy Logic and EC Algorithms
3120
Camera Captures Images in Real-time and Continuously Tracks Object
3130

FIG. 31

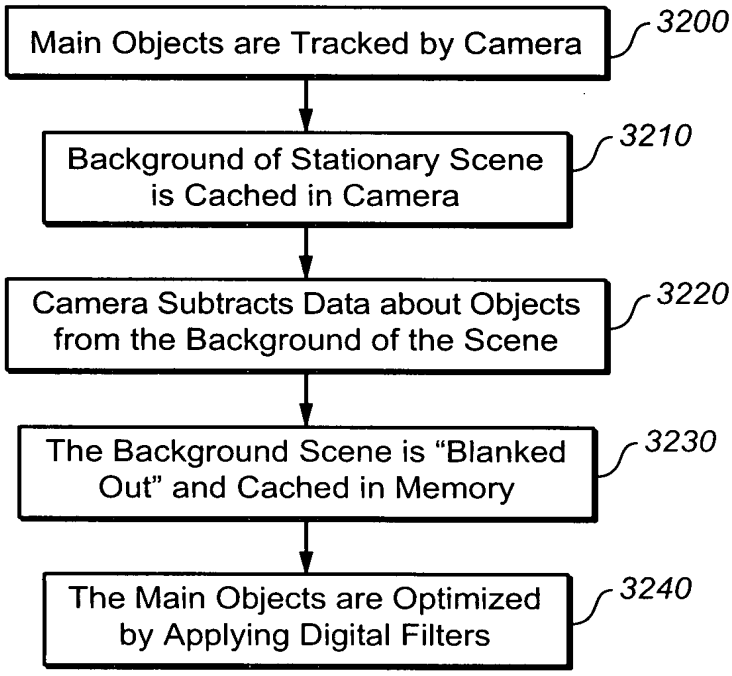

Main Objects are Tracked by Camera
3200
Background of Stationary Scene is Cached in Camera
3210
Camera Subtracts Data about Objects from the Background of the Scene
3220
The Background Scene is "Blanked Out" and Cached in Memory
3230
The Main Objects are Optimized by Applying Digital Filters
3240

FIG. 32

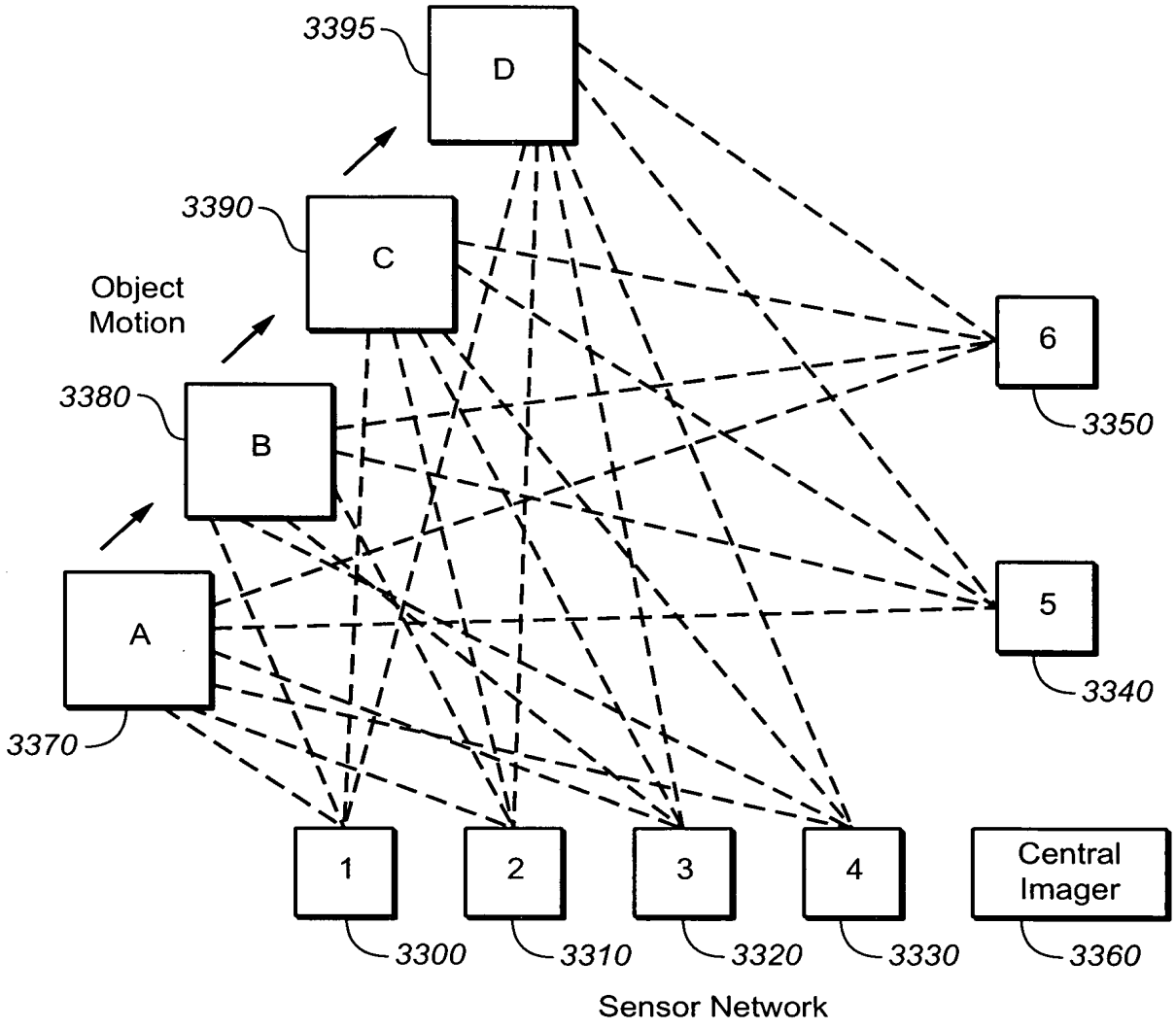

3395
D
3390
C
Object
Motion
3380
B
A
3370
6
3350
5
3340
1
2
3
4
Central
Imager
3300
3310
3320
3330
3360
Sensor Network

FIG. 33

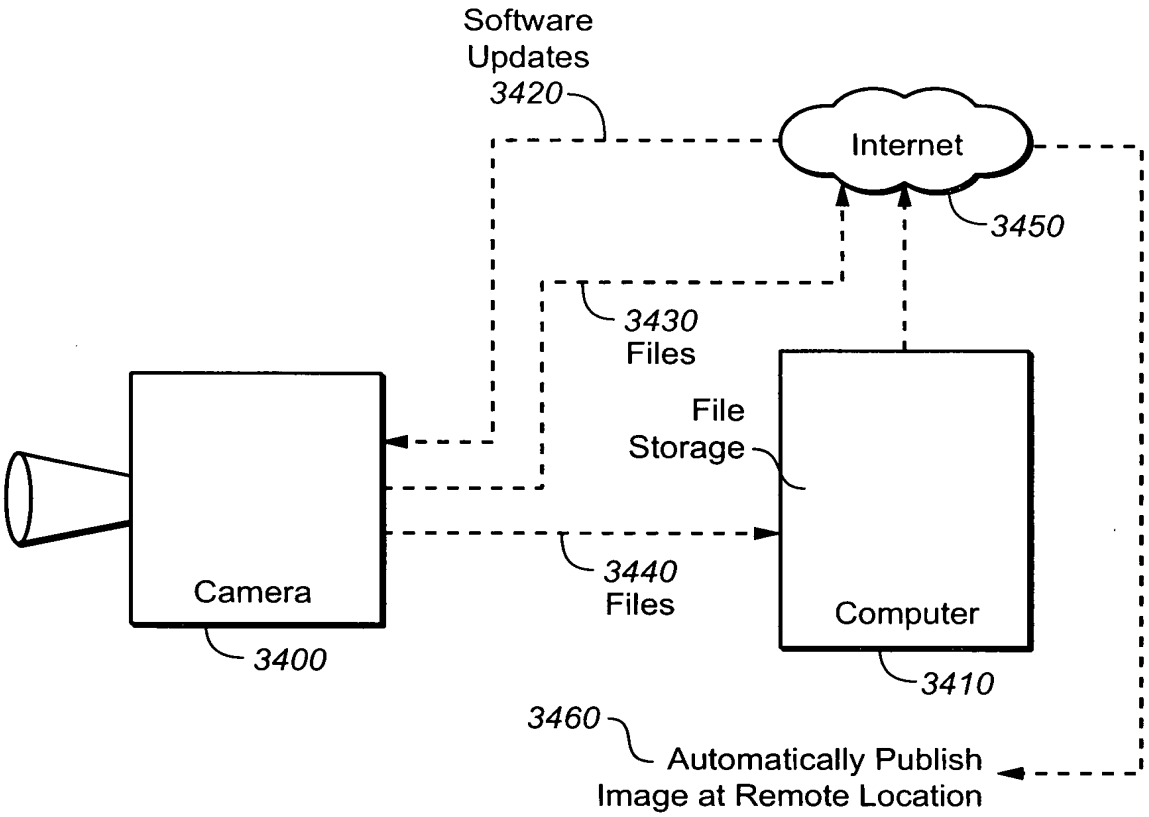

Software
Updates
3420
Internet
3450
3430
Files
File
Storage
Camera
3400
3440
Files
Computer
3410
3460
Automatically Publish
Image at Remote Location

FIG. 34

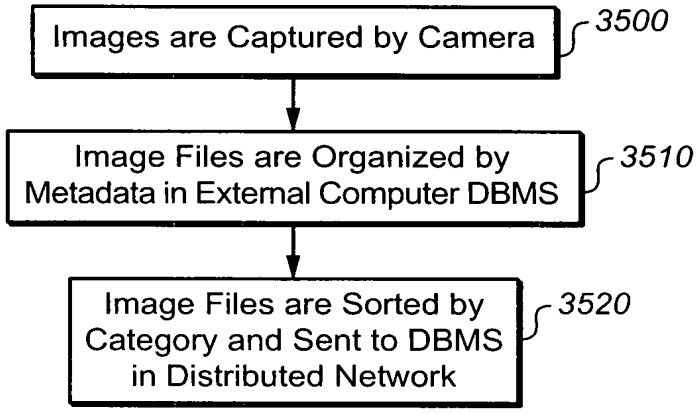

Images are Captured by Camera
3500
Image Files are Organized by
Metadata in External Computer DBMS
3510
Image Files are Sorted by
Category and Sent to DBMS
in Distributed Network
3520

FIG. 35

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☑ Declaration Submitted With Initial Filing **OR** ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	
First Named Inventor	Neal Solomon
COMPLETE IF KNOWN	
Application Number	
Filing Date	
Art Unit	
Examiner Name	

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Digital Imaging System

(Title of the Invention)

the specification of which

☑ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) ☐ as United States Application Number or PCT International Application Number ☐ and was amended on (MM/DD/YYYY) ☐ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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DECLARATION — Utility or Design Patent Application

Direct all correspondence to:	☐ The address associated with Customer Number:		OR ☑	Correspondence address below

Name	Neal Solomon		
Address	P.O. Box 21297		
City	Oakland	State CA	ZIP ~~94~~ 94620
Country US	Telephone (415) 433-5400	Email	

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR:	☐ A petition has been filed for this unsigned inventor
Given Name (first and middle [if any]) Neal ~~Solomon~~	Family Name or Surname Solomon
Inventor's Signature Neal Solomon	Date 7/6/07

Residence: City Oakland	State CA	Country US	Citizenship US
Mailing Address P.O. Box 21297			
City Oakland	State CA	Zip 94620	Country US

☐ Additional inventors or a legal representative are being named on the _____ supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.

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Application Number: **11825521** Document Date: **07/06/2007**

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

11/825521

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY FEE ($)		OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))				150			
SEARCH FEE (37 CFR 1.16(k), (i), or (m))				250			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))				100			
TOTAL CLAIMS (37 CFR 1.16(i))	10 minus 20 =		X$25=		OR	X$50	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =		X$100=			X$200=	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			N/A			N/A	
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	500		TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

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