PATENT ASSIGNMENT

Electronic Version v1.1 Stylesheet Version v1.1

| SUBMISSION TYPE: | NEW ASSIGNMENT |
|-----------------------|----------------|
| NATURE OF CONVEYANCE: | ASSIGNMENT |

CONVEYING PARTY DATA

| Name | Execution Date |
|-------------------------|----------------|
| Norman Haas | 02/08/2013 |
| Ying Li | 02/04/2013 |
| Charles A. Otto | 02/17/2013 |
| Sharathchandra Pankanti | 02/02/2013 |
| Hoang Trinh | 02/04/2013 |

RECEIVING PARTY DATA

| Name: | International Business Machines Corporation |
|-----------------|---|
| Street Address: | New Orchard Road |
| City: | Armonk |
| State/Country: | NEW YORK |
| Postal Code: | 10504 |

PROPERTY NUMBERS Total: 1

| Property Type | Number |
|---------------------|----------|
| Application Number: | 13786453 |

CORRESPONDENCE DATA

Fax Number: 7183746092

Correspondence will be sent via US Mail when the fax attempt is unsuccessful.

Phone: 718-544-1110

Email: ITUCHMAN@TUCHMANLAW.COM
Correspondent Name: LAW OFFICE OF IDO TUCHMAN

Address Line 1: 82-70 BEVERLY ROAD

Address Line 4: KEW GARDENS, NEW YORK 11415

| ATTORNEY DOCKET NUMBER: | YOR920120870US1 | |
|--------------------------------|---|--|
| NAME OF SUBMITTER: Ido Tuchman | | |
| | This document serves as an Oath/Declaration (37 CER 163). | |

502254554 REEL: 029930 FRAME: 0322

13786/

Total Attachments: 10 source=YOR920120870US1SignedDec#page1.tif source=YOR920120870US1SignedDec#page2.tif source=YOR920120870US1SignedDec#page3.tif source=YOR920120870US1SignedDec#page4.tif source=YOR920120870US1SignedDec#page5.tif source=YOR920120870US1SignedDec#page6.tif source=YOR920120870US1SignedDec#page7.tif source=YOR920120870US1SignedDec#page8.tif

source=YOR920120870US1SignedDec#page9.tif source=YOR920120870US1SignedDec#page10.tif

PATENT REEL: 029930 FRAME: 0323

Title of Invention: FRAME TO FRAME PERSISTENT SHADOW REDUCTION WITHIN AN IMAGE

| As a below named inventor, I hereby declare that: | |
|--|--|
| This declaration is directed to the attached application, or (if following box is checked): | |
| [] United States application or PCT international application number | |
| The above-identified application was made or authorized to be made by me. | |
| I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. | |
| I have reviewed and understand the contents of the application, including the claims. | |
| I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR Section 1.56. | |
| and the state of t | |

Whereas, the undersigned inventor(s) has/have made certain inventions, improvements, and discoveries (herein referred to as the "Invention") disclosed in the above-identified patent application and further identified by the IBM Docket Number provided above in the header of this document;

Whereas, International Business Machines Corporation, a corporation of New York having a place of business at Armonk, New York (herein referred to as "IBM"), desires to acquire, and each undersigned inventor desires to grant to IBM, the entire worldwide right, title, and interest in and to the Invention and in and to any and all patent applications and patents directed thereto;

Now, therefore, for good and valuable consideration, the receipt and sufficiency thereof being hereby acknowledged, each undersigned inventor ("ASSIGNOR") hereby sells or has sold, assigns or has assigned, and otherwise transfers or has transferred to IBM (the "ASSIGNEE"), its successors, legal representatives, and assigns, the entire worldwide right, title, and interest in and to the Invention, the above-identified United States patent application, and any and all other patent applications and patents for the Invention which may be applied for or granted therefor in the United States and in all foreign countries and jurisdictions, including all divisions, continuations, reissues, reexaminations, renewals, extensions, counterparts, substitutes, and extensions thereof, and all rights of priority resulting from the filing of such applications and granting of such patents. In addition, each undersigned inventor hereby authorizes and requests the Director of the United States Patent and Trademark Office to issue any United States Patent, and foreign patent authorities to issue any foreign patent, granted for the Invention, to IBM, its successors, legal representatives, and assigns, the entire worldwide right, title, and interest in and to the same to be held and enjoyed by IBM, its successors, legal representatives, and assigns to the full end of the terms for which any and all such patents may be granted, as fully and entirely as would have been held and enjoyed by the undersigned had this Assignment not been made; and each undersigned inventor agrees to execute any and all documents and instruments and perform all lawful acts reasonably related to recording this Assignment or perfecting title to the Invention and all related patents and applications, in IBM, its successors, legal representatives, and assigns, whenever requested by IBM, its successors, legal representatives, or assigns.

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I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

| (1) | Legal Name of Inventor: Norman Haas | |
|-----|---|----------------|
| | Signature: Haas | Date: 2/8/2019 |
| (2) | Legal Name of Inventor: Ying Li | |
| | Signature: | Date: |
| (3) | Legal Name of Inventor: Charles A. Otto | |
| | Signature: | Date: |
| (4) | Legal Name of Inventor: Sharathchandra Pankanti | |
| | Signature: | Date: |
| (5) | Legal Name of Inventor: Hoang Trinh | |
| | Signature: | Date: |

The above-identified application was made or authorized to be made by me.

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| (1) Legal Na | me of Inventor: Norman Haas | |
|---------------|---|-------------------|
| Signature | Antonina managa | |
| (2) Legal Na | me of Inventor: Ying Li | |
| Signature: | | Date: 02/54 /2013 |
| (3) Legal Na | me of Inventor: Charles A. Otto | |
| Signature: | | |
| (4) Legal Nat | me of Inventor: Sharathchandra Pankanti | |
| Signature: | | Date: |
| (5) Legal Nat | me of Inventor: Houng Trinh | |
| Signature: | | Date: |

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| (1) | egal Name of Inventor: Norman Haas | | |
|-----|---|--------------------------|--|
| | Signature | Date: | |
| (2) | Legal Name of Inventor: Ving Li | | |
| | Signature | Date: | |
| (3) | Legal Name of Inventor: Charles A. Otto | | |
| | Signature: Walte & JUS | Date: <u>7 / 7 / 1 3</u> | |
| (4) | Legal Name of Inventor: Sharathchandra Pankanti | | |
| | Signature: | Date: | |
| (5) | Legal Name of Inventor: Hoang Trinh | | |
| | Sionafare | Date: | |

Page 2 of 2

Title of Invention: FRAME TO FRAME PERSISTENT SHADOW REDUCTION WITHIN AN IMAGE

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|--|-------|
| Signature: | Date: |
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| Signature: | Date: |
| (3) Legal Name of Inventor: Charles A. Otto | |
| Signature: | Date: |
| (4) Legal Name of Inventor: Sharathchandra Panka | |
| Signature: | |
| (5) Legal Name of Inventor: Hoang Trinh | |
| Signature: | Date: |

DECLARATION (37 C.F.R. 1.63) FOR UTILITY PATENT APPLICATION USING AN APPLICATION DATA SHEET (37 C.F.R. 1.76) AND ASSIGNMENT

Title of Invention: FRAME TO FRAME PERSISTENT SHADOW REDUCTION WITHIN AN IMAGE

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| (3) | Legal Name of Inventor: Charles A. Otto | |
| | Signature: | Date: |
| (4) | Legal Name of Inventor: Sharathchandra Pankanti | |
| | Signature: | Date: |
| (5) | Legal Name of Inventor: Hoang Trinh | |
| | Signature | Date: 02/04/2013 |

Page 2 of 2