1.

US 20180018516A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2018/0018516 A1**

(43) **Pub. Date: Jan. 18, 2018**

ODINOKIKH et al.

(54) **METHOD AND APPARATUS FOR IRIS RECOGNITION**

(71) Applicant: **Samsung Electronics Co., Ltd.**, Suwon-si (KR)

(72) Inventors: **Gleb Andreevich ODINOKIKH**, Moscow (RU); **Vitaly Sergeevich GNATYUK**, Moscow (RU); **Aleksei Mikhailovich FARTUKOV**, Moscow (RU); **Vladimir Alekseevich EREMEEV**, Moscow (RU); **Mikhail Vladimirovich KOROBKIN**, Moscow (RU); **Aleksei Bronislavovich DANILEVICH**, Moscow (RU); **Dae-kyu SHIN**, Suwon-si (KR); **Ju-woan YOO**, Anyang-si (KR); **Kwang-hyun LEE**, Suwon-si (KR); **Hee-jun LEE**, Seoul (KR)

(21) Appl. No.: **15/652,651**

(22) Filed: **Jul. 18, 2017**

(30) **Foreign Application Priority Data**

Jul. 18, 2016 (RU) 2016129250
Jun. 5, 2017 (KR) 10-2017-0069773

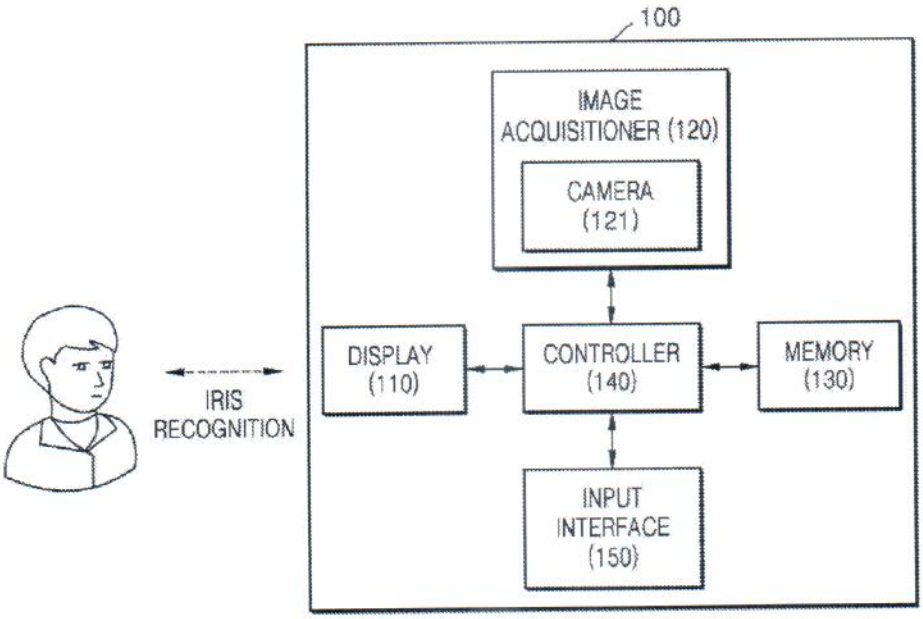
Publication Classification

(51) **Int. Cl.**
G06K 9/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G06K 9/00617*** (2013.01); ***G06K 9/00604*** (2013.01); ***G06K 9/0061*** (2013.01)

(57) **ABSTRACT**

An apparatus for recognizing an iris is provided. The apparatus includes an image acquisition module configured to acquire a plurality of images, and a processor configured to select at least one image for iris recognition from among the plurality of images based on pupil information of each of the plurality of images, and recognize an iris in at least one image, wherein the pupil information includes at least one of information about a pupil radius and information about a pupil contrast.



2.

US 20180012071A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2018/0012071 A1**

KOROBKIN et al. (43) **Pub. Date: Jan. 11, 2018**

(54) **ADAPTIVE QUANTIZATION METHOD FOR IRIS IMAGE ENCODING**

(71) Applicant: **Samsung Electronics Co., Ltd.**, Suwon-si (KR)

(72) Inventors: **Mikhail Vladimirovich KOROBKIN**, Moscow (RU); **Vladimir Alekseevich EREMEEV**, Moscow (RU); **Aleksei Mikhailovich FARTUKOV**, Moscow (RU); **Gleb Andreevich ODINOKIKH**, Moscow (RU); **Vitaly Sergeevich GNATYUK**, Moscow (RU); **Aleksei Bronislavovich DANILEVICH**, Moscow (RU); **Dae-kyu SHIN**, Suwon-si (KR); **Ju-woan YOO**, Anyang-si (KR); **Kwang-hyun LEE**, Suwon-si (KR); **Hee-jun LEE**, Seoul (KR)

(21) Appl. No.: **15/641,962**

(22) Filed: **Jul. 5, 2017**

(30) **Foreign Application Priority Data**

Jul. 7, 2016 (RU) 2016127451
Jun. 1, 2017 (KR) 10-2017-0068659

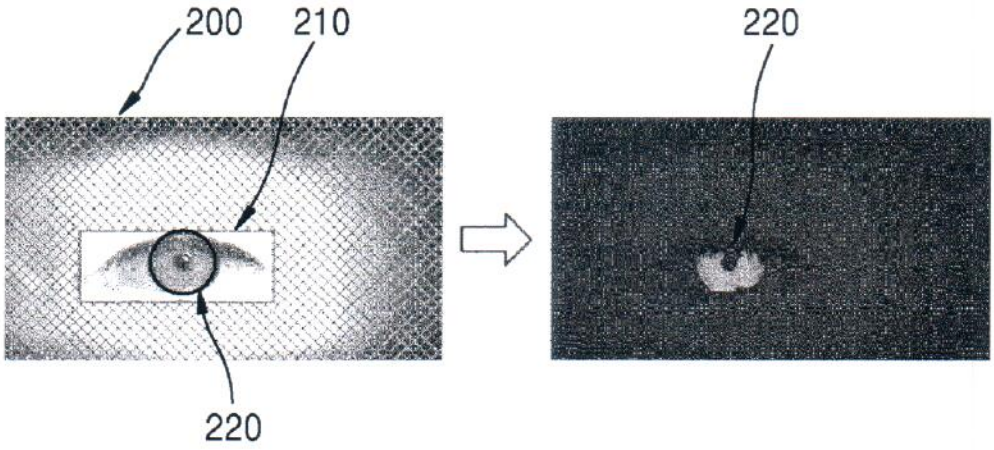
Publication Classification

(51) **Int. Cl.**
G06K 9/00 (2006.01)
G06K 9/50 (2006.01)

(52) **U.S. Cl.**
CPC ***G06K 9/00617*** (2013.01); ***G06K 9/0061*** (2013.01); *G06K 9/50* (2013.01)

(57) **ABSTRACT**

A user recognition method that uses an iris is provided. The user recognition method includes generating a first mask for blocking a non-iris object area of an iris image, generating a converted iris image, in which the non-iris object area is blocked according to the first mask, generating a second mask for additionally blocking an inconsistent area, in which quantization results of the converted iris image are inconsistent, by adaptively transforming the first mask according to features of the converted iris image, obtaining an iris code by quantizing pixels included in the iris image, obtaining a converted iris code, in which portions corresponding to the non-iris object area and the inconsistent area are blocked, by applying the second mask to the iris code, and recognizing a user by matching a reference iris code, stored by the user in advance, to the converted iris code.



3.

US 20180204058A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2018/0204058 A1**

YOO et al. (43) **Pub. Date: Jul. 19, 2018**

(54) **ELECTRONIC DEVICE FOR IRIS RECOGNITION AND OPERATING METHOD THEREOF**

(71) Applicant: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR)

(72) Inventors: **Juwoan YOO**, Anyang-si (KR); **Kwanghyun LEE**, Yongin-si (KR); **Heejun LEE**, Seoul (KR); **Alexei FARTUKOV**, Moscow (RU); **Gleb ODINOKIKH**, Moscow (RU); **Vitalii GNATIUK**, Moscow (RU); **Vladimir EREMEEV**, Moscow (RU); **Dae-Kyu SHIN**, Suwon-si (KR); **Jeong-Min PARK**, Hwaseong-si (KR); **Ji-Yoon PARK**, Yongin-si (KR)

(21) Appl. No.: **15/838,869**

(22) Filed: **Dec. 12, 2017**

(30) **Foreign Application Priority Data**

Jan. 17, 2017 (KR) 10-2017-0007960

Publication Classification

(51) **Int. Cl.**

G06K 9/00 (2006.01)

G06K 9/68 (2006.01)

(52) **U.S. Cl.**

CPC ***G06K 9/00604*** (2013.01); ***G06K 9/685*** (2013.01); ***G06K 9/00617*** (2013.01); ***G06K 9/0061*** (2013.01)

(57) **ABSTRACT**

An electronic device for iris recognition and an operating method thereof are provided. The electronic device includes a housing including a first surface, a display exposed through a first region of the first surface, a light emitting unit comprising light emitting circuitry disposed in a second region of the first surface, an image device comprising image acquiring circuitry disposed in a third region of the first surface, at least one processor disposed within the housing and electrically connected with the display, the light emitting unit and the image device, and a memory disposed within the housing and electrically connected with the at least one processor. The memory stores instructions that, when executed by the processor, cause the electronic device to store a reference template based on a first iris image which has been recognized using the light emitting unit and the image device, to authenticate a second iris image which has been recognized using the light emitting unit and the image device, using the stored reference template, and to store a template of the second iris image succeeded in authentication, as an additional template.