



US010395370B2

(12) **United States Patent**
Hsiao et al.

(10) **Patent No.:** **US 10,395,370 B2**

(45) **Date of Patent:** **Aug. 27, 2019**

(54) **METHOD AND WEARABLE APPARATUS FOR DISEASE DIAGNOSIS**

H04N 5/2621 (2013.01); *G06T 2207/10016* (2013.01); *G06T 2207/10024* (2013.01); *G06T 2207/20016* (2013.01); *G06T 2207/30076* (2013.01)

(71) Applicant: **National Taiwan University, Taipei (TW)**

(58) **Field of Classification Search**

CPC *G06T 7/0016*
See application file for complete search history.

(72) Inventors: **Hao-Ming Hsiao, Taipei (TW); Hsien-Li Kao, Taipei (TW); Kuang-Huei Lee, Taipei (TW); Dian-Ru Li, Taipei (TW)**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(73) Assignee: **National Taiwan University, Taipei (TW)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 443 days.

2006/0239530 A1 * 10/2006 Oosawa *G06T 7/0012*
382/130
2010/0021085 A1 * 1/2010 Kabasawa *G06T 3/4084*
382/300
2014/0072193 A1 * 3/2014 Motomura *G06T 7/0012*
382/128

(Continued)

(21) Appl. No.: **14/838,341**

(22) Filed: **Aug. 27, 2015**

(65) **Prior Publication Data**

US 2016/0078622 A1 Mar. 17, 2016

Primary Examiner — Rowina J Cattungal

(74) *Attorney, Agent, or Firm* — JCIPRNET

(30) **Foreign Application Priority Data**

Sep. 16, 2014 (TW) 103131894 A

(57) **ABSTRACT**

A method and a wearable apparatus for disease diagnosis are provided. The method is applied to the wearable apparatus with an image capturing unit and a display unit. In this method, a plurality of input images in a field of view of the wearable apparatus are captured by using the image capturing unit, wherein each of the input images contains an array of pixels. The variations of the pixel values in a time domain are analyzed. The pixel variations within a specific frequency range are magnified and the magnified pixel variations are added onto the original ones to generate an output image. The output image is overlapped with a current image in the field of view of the wearable apparatus and displayed on the display unit.

(51) **Int. Cl.**

G06T 7/00 (2017.01)
H04N 5/225 (2006.01)
H04N 5/232 (2006.01)
H04N 5/265 (2006.01)
A61B 3/14 (2006.01)
A61B 3/00 (2006.01)
H04N 5/262 (2006.01)
G06T 7/33 (2017.01)

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

CPC *G06T 7/0016* (2013.01); *A61B 3/0041* (2013.01); *A61B 3/14* (2013.01); *G06T 7/33* (2017.01); *H04N 5/2252* (2013.01); *H04N 5/23293* (2013.01); *H04N 5/265* (2013.01);

10 Claims, 6 Drawing Sheets

