



US010084953B1

(12) **United States Patent**  
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(10) **Patent No.: US 10,084,953 B1**  
(45) **Date of Patent: Sep. 25, 2018**

(54) **THIN MULTI-APERTURE IMAGING SYSTEM WITH AUTO-FOCUS AND METHODS FOR USING SAME**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/982,446**

(22) Filed: **May 17, 2018**

**Related U.S. Application Data**

(63) Continuation of application No. 15/407,271, filed on Jan. 17, 2017, now Pat. No. 9,998,653, which is a continuation of application No. 14/906,116, filed as application No. PCT/IB2014/063393 on Jul. 24, 2014, now Pat. No. 9,571,731.

(60) Provisional application No. 61/861,185, filed on Aug. 1, 2013.

(51) **Int. Cl.**  
**H04N 5/232** (2006.01)  
**H04N 9/09** (2006.01)  
**G02B 7/36** (2006.01)  
**H04N 5/225** (2006.01)  
**G02B 27/64** (2006.01)  
**H04N 5/262** (2006.01)  
**H04N 9/64** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **H04N 5/23212** (2013.01); **G02B 7/36** (2013.01); **H04N 5/2258** (2013.01); **H04N 9/09** (2013.01); **G02B 27/646** (2013.01); **H04N 5/23232** (2013.01); **H04N 5/2628** (2013.01); **H04N 9/64** (2013.01)

(58) **Field of Classification Search**  
CPC ..... G02B 27/646; G02B 7/36; H04N 5/2258; H04N 5/23212; H04N 5/23232; H04N 5/2628; H04N 5/33; H04N 9/045; H04N 9/09; H04N 9/64  
See application file for complete search history.

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(57) **ABSTRACT**  
Dual-aperture digital cameras with auto-focus (AF) and related methods for obtaining a focused and, optionally optically stabilized color image of an object or scene. A dual-aperture camera includes a first sub-camera having a first optics bloc and a color image sensor for providing a color image, a second sub-camera having a second optics bloc and a clear image sensor for providing a luminance image, the first and second sub-cameras having substantially the same field of view, an AF mechanism coupled mechanically at least to the first optics bloc, and a camera controller coupled to the AF mechanism and to the two image sensors and configured to control the AF mechanism, to calculate a scaling difference and a sharpness difference between the color and luminance images, the scaling and sharpness differences being due to the AF mechanism, and to process the color and luminance images into a fused color image using the calculated differences.

**22 Claims, 10 Drawing Sheets**

