US 20170124942A1

(19) United States

(12) Patent Application Publication

Evans, V et al.

(10) Pub. No.: US 2017/0124942 A1

(43) Pub. Date: May 4, 2017

(54) **LIGHT SENSOR BENEATH A DUAL-MODE DISPLAY**

(71) Applicant: **Essential Products, Inc.**, Palo Alto, CA (US)

(72) Inventors: **David John Evans, V**, Palo Alto, CA (US); **Xinrui Jiang**, San Jose, CA (US); **Andrew E. Rubin**, Los Altos, CA (US); **Matthew Hershenson**, Los Altos, CA (US); **Xiaoyu Miao**, Palo Alto, CA (US); **Joseph Anthony Tate**, San Jose, CA (US); **Jason Sean Gagne-Keats**, Cupertino, CA (US)

(21) Appl. No.: **15/336,380**

(22) Filed: **Oct. 27, 2016**

Related U.S. Application Data

(60) Provisional application No. 62/249,130, filed on Oct. 30, 2015, provisional application No. 62/300,631, filed on Feb. 26, 2016, provisional application No. 62/319,099, filed on Apr. 6, 2016, provisional application No. 62/373,910, filed on Aug. 11, 2016.

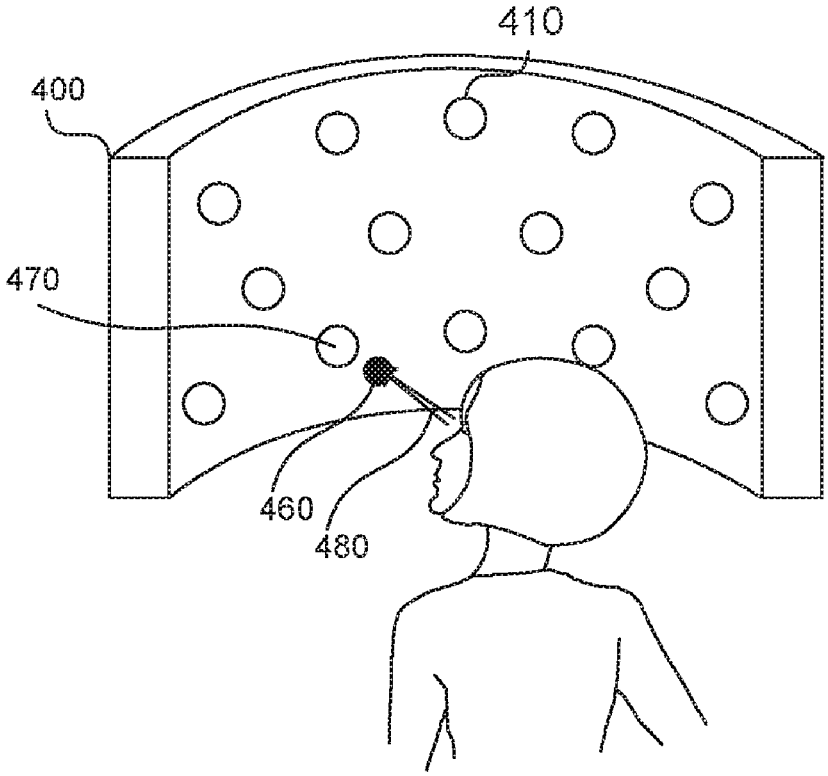
Publication Classification

(51) **Int. Cl.**

G09G 3/3208	(2006.01)
G02B 27/01	(2006.01)
G02B 27/00	(2006.01)
G06F 3/01	(2006.01)

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

CPC ***G09G 3/3208*** (2013.01); ***G06F 3/012*** (2013.01); ***G06F 3/013*** (2013.01); ***G02B 27/017*** (2013.01); ***G02B 27/0093*** (2013.01); *G09G 2360/144* (2013.01); *G02B 2027/0178* (2013.01); *G02B 2027/0138* (2013.01); *G02B 2027/014* (2013.01); *G06F 3/005* (2013.01)

(57) **ABSTRACT**

The technology disclosed here integrates a light sensor with a dual-mode display, thus increasing the size of the dual-mode display. The light sensor can be a camera, an ambient sensor, a proximity sensor, etc. The light sensor is placed beneath the dual-mode display and can detect incoming light while the dual-mode display is displaying a display image. The dual-mode display and the light sensor can operate at the same time. For example, a camera placed beneath the dual-mode display can record an image of the environment, while at the same time the dual-mode display is showing the display image. Further, multiple light sensors can be placed at various locations beneath the dual-mode display.