

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
09 May 2019 (09.05.2019)



(10) International Publication Number
WO 2019/089100 A9

(51) International Patent Classification:
G02B 27/01 (2006.01)

(21) International Application Number:

PCT/US2018/041920

(22) International Filing Date:

13 July 2018 (13.07.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/579,266 31 October 2017 (31.10.2017) US
15/832,012 05 December 2017 (05.12.2017) US

(71) Applicant: **GOOGLE LLC** [US/US]; 1600 Amphitheatre Parkway, Mountain View, California 94043 (US).

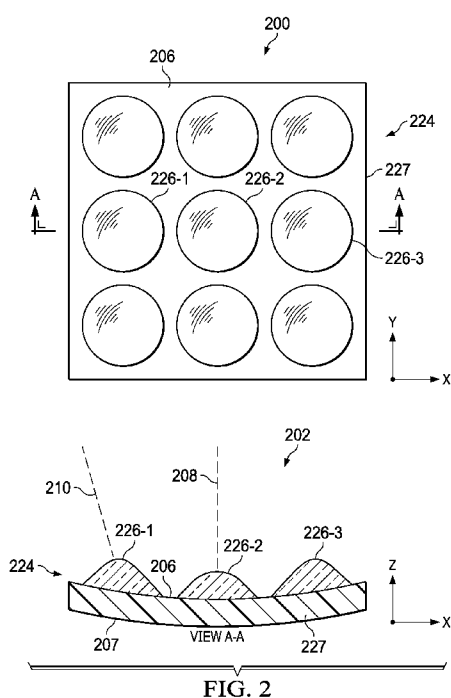
(72) Inventors: **PERREAULT, John D.**; 1600 Amphitheatre Parkway, Mountain View, California 94043 (US). **LLULL, Patrick**; 1600 Amphitheatre Parkway, Mountain View, California 94043 (US).

(74) Agent: **DAVIDSON, Ryan S.**; DAVIDSON SHEEHAN LLP, 6836 Austin Center Blvd, Suite 320, Austin, Texas 78731 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

(54) Title: NEAR-EYE DISPLAY HAVING LENSLET ARRAY WITH REDUCED OFF-AXIS OPTICAL ABERRATIONS



(57) Abstract: A near-eye display system (100) includes a display panel (110, 112) to display a lightfield image (151) comprising an array (120) of elemental images (122) and a lenslet array (124) facing the display panel and comprising lenslets (126) with spatially-varying prescriptions, such as different diameters, different focal lengths, and different asphere terms. The lenslet array further may be formed with a planar or non-planar substrate (127, 227). The system further may include a distortion map (144) comprising a set of transform matrices, each transform matrix configured to pre-distort a corresponding elemental image of a lightfield image so as to compensate for distortion expected to be introduced by a corresponding lenslet of the lenslet array, as well as a rendering component (104) configured to modify the array of elemental images of a rendered lightfield using the distortion map to generate a modified lightfield image for display at the display panel.

FIG. 2

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the revised international search report:

29 August 2019 (29.08.2019)

(15) Information about Correction:

see Notice of 29 August 2019 (29.08.2019)

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2018/041920

A. CLASSIFICATION OF SUBJECT MATTER

INV. G02B27/01

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2016/072518 A1 (SONY CORP) 12 May 2016 (2016-05-12)	1-6
Y	abstract	10,17
A	& US 2017/336626 A1 (HAYASHI MASATAKE [JP] ET AL) 23 November 2017 (2017-11-23) paragraphs [0074], [0075]; figures 1,33,35,36	19,20
X	US 2017/171533 A1 (BENITEZ PABLO [ES] ET AL) 15 June 2017 (2017-06-15)	1-9, 11-16, 18-22
Y	abstract; figures 1-7,27-29	10,17
X	US 2017/115432 A1 (SCHMIDTLIN EDOUARD [US]) 27 April 2017 (2017-04-27)	11,18
Y	abstract; figures 3a,3b,4a,4b, 6 paragraphs [0094] - [0096], [0052]	10,17



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

1 August 2019

Date of mailing of the international search report

13/08/2019

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Elflein, Wilhelm

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2018/041920

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016072518 A1	12-05-2016	CN 107148590 A JP W02016072518 A1 US 2017336626 A1 WO 2016072518 A1	08-09-2017 31-08-2017 23-11-2017 12-05-2016
US 2017171533 A1	15-06-2017	CN 106464861 A EP 3075150 A1 JP 6539672 B2 JP 2016541031 A KR 20160093039 A US 2017171533 A1 WO 2015077718 A1	22-02-2017 05-10-2016 03-07-2019 28-12-2016 05-08-2016 15-06-2017 28-05-2015
US 2017115432 A1	27-04-2017	US 2017115432 A1 US 2017115491 A1 US 2019212477 A1	27-04-2017 27-04-2017 11-07-2019