

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 355153-02	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2015/045779	International filing date ( <i>day/month/year</i> ) 19 August 2015 (19-08-2015)	(Earliest) Priority Date ( <i>day/month/year</i> ) 21 August 2014 (21-08-2014)
Applicant  MICROSOFT TECHNOLOGY LICENSING, LLC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

- the international application in the language in which it was filed  
 a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b.  This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6**bis**(a)).

c.  With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2.  **Certain claims were found unsearchable** (See Box No. II)

3.  **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

- the text is approved as submitted by the applicant  
 the text has been established by this Authority to read as follows:

HEAD-MOUNTED DISPLAY WITH ELECTROCHROMIC DIMMING MODULE FOR AUGMENTED AND VIRTUAL REALITY PERCEPTION

5. With regard to the **abstract**,

- the text is approved as submitted by the applicant  
 the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 3  
 as suggested by the applicant  
 as selected by this Authority, because the applicant failed to suggest a figure  
 as selected by this Authority, because this figure better characterizes the invention
- b.  none of the figures is to be published with the abstract

## Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

The technology provides a dimming module (198) for a near-eye display, NED, device (14r, l) that controls an amount of ambient light (170) that passes through the transmissive near-eye display (112) to a user. The dimming module (198) includes at least one electrochromic cell (400) that enables variable density dimming so that the NED device (14r, l) may be used in an augmented reality (AR) and/or virtual reality (VR) application. The electrochromic cell (400) may be a monochrome electrochromic cell having stacked layers of a monochrome electrochromic compound layer (453a) and insulator (454a) sandwiched between a pair of transparent substrates (450a, b) and conductors (451a, b). A current may be applied to the conductor layers (451a, b) to control the amount of dimming in response to a dimming value. A NED device (14l, r) having a dimming module (198) may be included in a visor (8), or other type of head-mounted display, HMD (2). The dimming module (198) may be flat and supported by a flat waveguide mount (123) in the user's field of view.

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## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

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A. CLASSIFICATION OF SUBJECT MATTER  
INV. G02B27/01 G02F1/15  
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 G02F

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	US 2014/111838 A1 (HAN SOON-SEOB [KR] ET AL) 24 April 2014 (2014-04-24)	1-8,10,14,15
Y	figures 1-10 paragraph [0032] - paragraph [0124]	9
Y	US 2012/105473 A1 (BAR-ZEEV AVI [US] ET AL) 3 May 2012 (2012-05-03)	1
Y	paragraph [0032] - paragraph [0124]	
Y	JP S56 146123 A (ASAHI GLASS CO LTD) 13 November 1981 (1981-11-13)	1
Y	abstract	
Y	JP 2014 021452 A (RICOH CO LTD) 3 February 2014 (2014-02-03)	9
	paragraph [0052]	
	-/--	

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 <b>19 November 2015</b>	Date of mailing of the international search report <b>10/12/2015</b>
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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 <b>Kentischer, Florian</b>
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International application No  
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2010 013016 U1 (LOEWE OPTA GMBH [DE]) 17 February 2011 (2011-02-17)	10-13
Y	figures 1,2 paragraph [0020] - paragraph [0045] -----	1

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014111838 A1	24-04-2014	KR 20140052294 A US 2014111838 A1	07-05-2014 24-04-2014
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US 2012105473 A1	03-05-2012	CN 102591449 A US 2012105473 A1	18-07-2012 03-05-2012
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JP S56146123 A	13-11-1981	JP H0115851 B2 JP S56146123 A	20-03-1989 13-11-1981
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JP 2014021452 A	03-02-2014	NONE	
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DE 202010013016 U1	17-02-2011	NONE	
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**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-10, 14, 15

Head-mounted display apparatus including an electrochromic dimming module, and method of displaying an augmented reality with said head-mounted display apparatus involving dimming ambient light passing through the display apparatus depending on the ambient light level detected by a sensor.

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2. claim: 11

Method of displaying an augmented reality with a head-mounted display apparatus involving dimming ambient light passing through the display apparatus depending on a received user preference.

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3. claims: 12, 13

Method of displaying an augmented reality with a head-mounted display apparatus involving dimming ambient light passing through the display apparatus depending on a type of application.

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